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Spectral Liberalism: on the Subjects of Political Economy in Moscow

Adam Leeds
University of Pennsylvania, a.e.leeds@gmail.com

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Spectral Liberalism: on the Subjects of Political Economy in Moscow

Abstract
The world since 1989 has appeared to many as the “end of history,” a uniform “neoliberalism” underpinned by abstract economic theories. This dissertation, based on two years of fieldwork in among the economists of Moscow (2010–2012), brings the tools of science studies to the social sciences, building on studies of the co-constitution of objects and rationalities of rule to take seriously the local lives of mathematical economics as culture. I offer an approach to the production of liberal political modernity through unpacking how economic knowledge contributes to assembling the object it claims to study—“the economy.” In creating disciplinary knowledge, economists craft specifically Russian visions of a liberal Russia to come. While the Russian right has commanded sustained attention (and fear), the nature of Russian liberalism have been largely taken for granted. I reconstruct the genealogies of mathematical economics to understand contemporary Russian liberalism. I argue that, under Stalin, the Soviet Union ceased to have an economy, considered as a realm separate from politics. In the 1950s, reformist economists constructed models of market-based socialisms, resuscitating an economic hermeneutic of the Soviet polity. They joined forces with military cyberneticians, producing a new form of knowledge: economic cybernetics. Economic cybernetics proved a strange “trading zone” allowing mathematical economists to translate knowledges across the Iron Curtain. The culture of the “scientific-technical intelligentsia” provided a medium for elaborating new ethical relationships to power. I reveal the 1980s prehistory of the young economists who became the first Yeltsin government and dismantled the Soviet economy. Their intellectual evolution originates not in Western “neoliberal” economics but rather in Soviet reflections on market socialism. Reformist thinking within Soviet “economic cybernetics,” imagining alternative socialisms, culminated in a critical vision of the political economy of the Soviet Union inflecting contemporary Russian politics and culture. By studying the lived complexity of the liberal (and socialist) visions that arose in Russia before and after 1989, this anthropological history of economic practice opens new possibilities for imagining both present and future.

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SPECTRAL LIBERALISM:
ON THE SUBJECTS OF POLITICAL ECONOMY IN MOSCOW
ADAM E. LEEDS
A DISSERTATION
in
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Presented to the Faculties of the University of Pennsylvania
in
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Supervisor of Dissertation

__________________________
Adriana Petryna
Edmund J. and Louise W. Kahn Term Professor in Anthropology

Graduate Group Chairperson

__________________________
Deborah A. Thomas
Professor of Anthropology and Africana Studies

Dissertation Committee

John Tresch
Associate Professor of History
and Philosophy of Science

Philippe Bourgois
Richard Perry University Professor of
Anthropology and Family and
Community Medicine

Stephen Collier
Associate Professor of International Affairs
This work is dedicated to my mother and father,

Marty-Ann and Myles,

whose love for me exceeds all reason.
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ABSTRACT

SPECTRAL LIBERALISM:
ON THE SUBJECTS OF POLITICAL ECONOMY IN MOSCOW

Adam E. Leeds
Adriana Petryna

The world since 1989 has appeared to many as the “end of history,” a uniform “neoliberalism” underpinned by abstract economic theories. This dissertation, based on two years of fieldwork in among the economists of Moscow (2010–2012), brings the tools of science studies to the social sciences, building on studies of the co-constitution of objects and rationalities of rule to take seriously the local lives of mathematical economics as culture. I offer an approach to the production of liberal political modernity through unpacking how economic knowledge contributes to assembling the object it claims to study—“the economy.” In creating disciplinary knowledge, economists craft specifically Russian visions of a liberal Russia to come. While the Russian right has commanded sustained attention (and fear), the nature of Russian liberalism have been largely taken for granted. I reconstruct the genealogies of mathematical economics to understand contemporary Russian liberalism. I argue that, under Stalin, the Soviet Union ceased to have an economy, considered as a realm separate from politics. In the 1950s, reformist economists constructed models of market-based socialisms, resuscitating an economic hermeneutic of the Soviet polity. They joined forces with military cyberneticians, producing a new form of knowledge: economic cybernetics. Economic cybernetics proved a strange “trading zone” allowing mathematical economists to
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# TABLE OF CONTENTS

## ACKNOWLEDGMENTS

IV

## ABSTRACT

V

## LIST OF ILLUSTRATIONS

XI

## INTRODUCTION: SPECTRAL LIBERALISMS

1

- To Hit A Duck
- The End of History and Post-Soviet Abjection
- The Economy and Political Modernity
- From the Economic to the Economy
- The Malign Neglect of Economics
- The Survival State
- For an Anthropology of Economics
- The Soviet Union and the Anthropological Margin
- Spectral Liberalism
- Economic Reason and Socialist Governmentalities
- Marching on the White House

## LOGOMACHIA AND LEVIATHAN: WHAT IS TO BE DONE AFTER THE REVOLUTION

72

- Power to the People
- Introduction: The Post-Revolutionary Problematic
- Figures of the Universal
- An Impossible Science
- What Is A Plan?
  - Bolshevik “Macro”: The Political Economy of Industrialization
  - From Goelro to Gosplan: The Technology of the Plan
  - The Science of the Konjunktur
- To the First Five Year Plan
- The Étaticization Dynamic, 1928–1939
- The End of the Economic and the End of the Economists


124

- Introduction
- 1. Contradictions of the Political Economy of Socialism: The “Law of Value” under Socialist Conditions and the Unwritable Textbook
- 2. The Time Factor: Engineers’ Investigations of Capital Investment
3. Price Formation: The Rationality of Economic Relations 162
4. A Problematic Mechanism: Indicators, Stimulus, and Government by Interest 173
   Indicators: Overthrowing the Despotism of Val 175
   Stimulus: An Interest in Socialism 179
The Nemchinovian Synthesis and the Kosygin Reforms: Soviet Market Socialism 182
Towards a Post-Stalinist Political Economy 187

DREAMS IN CYBERNETIC FUGUE: COLD WAR TECHNOSCIENCE, THE INTELLIGENTSIA, AND THE BIRTH OF SOVIET MATHEMATICAL ECONOMICS 191
Complex Systems 191
Introduction 198
Cold War Technoscience 202
   The Soviet Post-War Military-Scientific Regime 205
Military Cybernetics 211
   Some Mathematical Preliminaries 211
   Critical Mass 215
   The Cybernetic Colonels 218
   Man-Machine Systems: From Calculation to Control 221
Cybernetic Science 223
   From the Big Seminar to the Scientific Council 223
   The Post-Stalinist Order of Knowledge 226
From the Heavens Down to Earth: A Realistic Utopian Project 231
   Economics and/or Cybernetics 235
Conclusion: A Proliferation of Communisms 242

THE LONG ROAD TO ASYMPTOPIA: SCIENTIFIC PLANNING AND THE PLACE OF THE SOVEREIGN 244
Tribes from Mars 244
Introduction: Technical Communities 248
LEMM: Fathers and Sons 257
Phase Transition, 1959-63 263
   Breakthrough 263
   The 1960 Conference: The Dialectical Unity of Quality and Quantity 265
   Institutionalization, 1961-1963 269
Input-Output: The Conscious Support of Proportionality 272
   1. LEUM: Prices of one level 275
   2. LEMM: The region as laboratory 281
II. ON THE POLITICAL ECONOMY OF NON-DEMOCRACIES: SECOND-ORDER THEORY OF TRANSITION TO CAPITALISM

*Guriev’s Flight* 431

*The Antagonisms Burst into the Open* 432

*The Western Wind* 434

*From “Transition Economics”...* 436

...to “The New Political Economy” 437

*The Twin Drivers* 439

III. POST-SOVET LIBERALISM IN SEARCH OF ITS FUTURES PAST 440

BIBLIOGRAPHY 450
LIST OF ILLUSTRATIONS

*Figure 1.* The structure of the economic field ......................................................... 344
*Figure 2.* Homeostatic change of an executive center and its environment (“AC” in the diagram above) ......................................................................................................................... 389
*Figure 3.* The interaction of fuel-energy flows ............................................................. 409
INTRODUCTION:
SPECTRAL LIBERALISMS

If people do not believe that mathematics is simple, it is only because they do not realize how complicated life is.

—John von Neumann, first national meeting of the Association for Computing Machinery, 1947

“If we speak openly, we do not sufficiently know the society in which we live and work, have not fully revealed its inherent laws, especially economic.”

— First Secretary Yury Andropov, speech at the Central Committee Plenum, 15 June, 1983

“Ontologies of the present demand archaeologies of the future, not forecasts of the past.”

—Frederic Jameson, A Singular Modernity

TO HIT A DUCK

One day a black hole flew into the room of the poet Andrei Voznesensky. He immediately thinks of how the revolutionary Futurist poet Vladimir Mayakovsky had called the sun down to earth for tea in 1920, and how the two had decided to banish night forever with light and verses. Voznesensky cringes in the corner, as the black hole introduces itself: “I am your lost civilization.” “Lost already? Really?” he wonders, “Had we overestimated or underestimated technology? Had we overestimated or underestimated freedom? Or did you destroy yourself?”
The black hole clarifies: “I am not destruction, I’m opportunity.” It was lonely, and it moves in with the poet. The poet names it “O,” after the sigh it periodically sighed, sounding of “sorrowful delight, and regret, and a moan.” Black holes, it turned out, are made of “clots of compressed memory and feeling.” O feeds on energy: the energy of life and electricity (it sucks dry both stray cats and batteries), emotions and thoughts. It jealously ransacks the poet’s memories for anything or anyone else he may have once been invested in. It dredges up those memories and reminds him of them, or consumes them; it shows him the memories of other people, channels them into the present telepathically or via the telephone switchboard.

Poets (or at least Voznesensky), historians, and perhaps anthropologists, are black holes, feeding on the energy of the past. White holes, the poet learns, create through an orientation toward the future. Many of the economists with whom I spent two years in Russia were perhaps once white holes themselves. The poet struggled to understand his country. So too do the economists try to come to grips with what had happened to themselves, to their country, and to its futures. They ask themselves the same questions that Vozenesensky asked: had they over- or underestimated technology? Or freedom? Did they destroy themselves? Is the loss of their civilization destruction or opportunity?

This black hole is juvenile, and playful, and somewhat malicious, and it hates architecture. Voznesensky becomes incensed by its antics, and yells at it—“Your peers are in school and building hydroelectric stations”—and it leaves, offended. In the post-revolutionary decades, hydroelectric stations had been deeply cathected icons of the
communist future in which nature would be tamed and light spread across a metaphorically dark country.

Vozesensky’s mind jumps around, from void to void. He thinks of the aged sculptor Henry Moore, whose semi-abstractions wrap around voids. (I think of his work, *Nuclear Energy*, either a grinning death’s head or a mushroom cloud, at the site at the University of Chicago where the Manhattan Project team conducted the first controlled nuclear reaction chain reaction.) He thinks of a 1965 New Year’s party, with Bulat Okudzhava, Bella Akhmadulina, Rodion Shchedrin, Yuri Trifonov and other young artists in various media. Decades before, the Futurist poet Khlebnikov would name their like the “aristocreators.” Moore’s sculpture reminded him of Vysotsky’s guitar. Vysotsky sings, he thinks, like he might stab himself. He is the poet of the new, urban Russia, “the children of the rebuilt country.” Of Shostakovich, evidence of “the theory of the extraterrestrial origin of life,” with whom Vozesensky had had a failed collaboration, near death, “the most architectural of composers.” Of evacuation from Leningrad, when “everything that was happening to them, to the country, had become music, frightening and majestic,” like Shostakovich’s music.

The black hole taught him how to remember: “You humans, in order to see a past image, look back at where it had been. But it’s not there anymore. You won’t see anything that way. To hit a duck, you have to aim three ducks ahead. The past flies in front of you. Look into the now—and you’ll see the past.” The same principle underlies anti-aircraft gunnery, which inspired the feedback loop at the origin of cybernetics: project a future flight path and continually recalculate and minimize the error between
projection and reality. This work is a study of history, a work of memory, from the standpoint of its futures and how they haunt the present.

He remembers bomb shelters with his mother, and construction sites for Moscow metro extensions—more voids. Four thousand O-shaped oranges solidly covering the floor of his Chelsea Hotel room, a tableau to inflame the love of an Italian publisher. Voznesensky remembers being near suicide, eternity opening up at his back, “a Karamazovism that turns me into a black hole?,” until a journal publishes his poem uncensored.

The vacuum of his abandoned profession, architecture, sucks at him: “People take up architecture… to fill up the void, to overcome the space of nonbeing, the black holes and abysses that surround this life.”

He comes to the apartment of his former teacher, the architect Leonid Pavlov, and on seeing him the pain of having given up architecture calls to him, as though Pavlov is a manifestation of his conscience. A man-conscience, he calls him, a white hole. White holes like Pavlov do not feed on the past but birth futures; the poet Voznesensky, obsessed with his memories, knows that he himself threatens to be a black hole.

Pavlov is working on a design for a computing center in Ivanovo, which he describes as “his Madonna with child.” Voznesensky protests that his poetry continues his architectural studies. Defensively, he challenges his teacher, asks what he has accomplished. Pavlov answers that “[t]his is my favorite thing—in the world.” It is a photograph of a construction site, of two enormous flat rectangles.
I spent two years in this building of Pavlov’s photograph, which is the Central Economic Mathematical Institute of the Academy of Sciences (CEMI). Founded in 1963, it is twenty-three stories tall, composed of two superimposed enormous rectangles, their faces scored into squares the size of Pavlov’s cosmic unit, one-millionth of the earth’s diameter. It once housed a thousand economists and mathematicians who dreamed of perfecting scientific planning and of building a new socialism. At least eighteen, by my count, of the economists who would dismantle Soviet socialism in Yeltsin’s first government had worked there. The history of mathematical economics in the Soviet Union and in Russia is inseparable from CEMI. It is the flagship, center, and refuge for the network and the movement, inspired by the vision of the mathematician Leonid Kantorovich, brought to fruition by the efforts of Vasily Nemchinov, and built into an empire by Nikolai Federenko, who helmed it until 1986.

Voznesenky writes that “Muscovites know that flat building as the windbreak blocking Lomonsonov Avenue. That building is an Ear. In the center, as if on a plastic panel, is hung a sculptural-mosaic ear with an enormous hole. Pushkin’s genius gave life to a chopped-off head. Gogol cut off a nose, and Pavlov has erected a monument to the Ear.”

“‘It is no ear, it’s a Möbius strip,’ Pavlov explains, ‘It’s a sculptural-philosophical figure eight that speaks of the infinity of space, with an almost Moorean hole in the middle. That is an eye into the belly of Mother Nature. I made its dimension one-millionth of the earth’s diameter. That is the magic module of my work. All the details are multiples of that number. That’s why you are drawn to the proportions of the
square—instinctively man feels a correspondence with the earth.” Pavlov cautions him not to drop into a black hole. The black hole comes back, Voznesensky sees it at a moment of triumph, and then it turns away, his lost civilization, his destruction and his opportunity, and he never sees it again.

The architect Pavlov, the poet’s old teacher, was born in 1909. He studied at the hotbed of Soviet Constructivist architecture, the Higher Artistic-Technical Studios (Vkhutemas), which sought an architecture that would revolutionize everyday life. He was connected to the Organization of Contemporary Architecture (OSA) Group, the architectural wing of the avant-garde multimedia arts movement gathered around the journal *The Left Front of the Arts*, which included such luminaries as the poet Mayakovskiy, artist Alexander Rodchenko, and director Sergei Eisenstein. But he graduated in 1930, right as the avant-gardism of the 1920s was rejected in favor of Stalinist neoclassicism. Pavlov barely built anything through the ensuing decades. When fashion changed again, in the 1960s, he started building his modernist masterpieces like CEMI, in dialogue with Le Corbusier, but also his teacher Aleksandr Vesnin and his friend Ivan Leonidov. While in the 1920s he was interested in designing cinema halls, by the 1960s and 70s he became obsessed with cars and computers. Pavlov built enormous automobile service centers. His 1966–1967 entry into a competition for a master plan for Moscow envisioned demolishing much of the center of Moscow and crisscrossing it with enormous highways. He also built several of the most important computer centers of the Soviet Union, those of Gosplan and the Central Statistical Administration, as well as the building for CEMI. These three sites together were the places where the dream of the
plan, of a rationally organized and thus maximally free society, was dreamed most intensely, in minute, maddening, perfect detail—rational-technical dreams. CEMI was supposed to be a cyborg: one of its two superimposed rectangles was to have housed gigantic computers, and the other the economists whose models would run on them. Pavlov’s trajectory, the decades of waiting before a final flowering, in a sense recapitulates that of the founder of CEMI, Vassily Nemchinov. The reformist economists too had to wait until the 1960s before they had their chance.

Emerging from the station at the corner of Nakhimovsky Prospect and Profsoyuznaya Street you find yourself first in the buzzing disorder of crowds sluicing through the kiosks that now crowd the once ample sidewalks. The kiosks sell shwarama and roasted chickens, mobile phones and flash drives, kielbasa and oranges. Between and around them groups of men stand with their bottles and old women sell knit socks and shawls, and in the right season berries and mushrooms. But if you walk out of the kiosks, or raise your gaze above them, the towering buildings come into view.

Northward up Profsoyuznaya the neoclassical facades of Stalin-era ensembles begin, pierced by huge arches that open into quiet courtyards; this metro stop was one of the first opened under Khrushchev, and marked a new stage of urban growth. Down in the shadows between the gleaming new apartment towers some of Khrushchev’s four-story housing for the masses still stands (khrushchevki, rhyming with the word for slums). But well before those new towers, the open landscape was dominated by the bulk of the huge new institutes of the Academy of Sciences. This region was designated the home to a cluster of such institutes, but above all those of economic science.
Immediately south of the corner rises the monolith of the Institute of International Economics and International Relations (IMEMO). Directly behind the kiosks squats the enormous Institute of Scientific Information for the Social Sciences (INION), the former conduit through the Iron Curtain for Western science into the USSR. Its huge reflecting pool is now empty and choked with weeds and bottles, and the graceful cantilevered bridge that once spanned it providing a dramatic sense of separation and entrance is slowly crumbling and its gates are locked. A little ways further east across the street is the Institute of Oceanography. Still further down the block is the duolith of CEMI, and across the street from it the twice as large home of its longtime foes, the Institute of Economics, the center for orthodox Marxist-Leninist political economy. In an especially vulgar historical irony, the first floor of the Institute of Economics has been given over to dealerships for Chevrolet and Daiwo. On the far side of CEMI, finally reaching the end of the block and the quiet Novocheremushkinskaya Street, is the former Institute for the Study of the World Socialist System, the last of the key economics research institutes of the Academy of Sciences. Within a fifteen minute walk you can also reach the Institute for Systems Analysis, the Institute of Problems of Control, the Institute of Sociology, and the Microeconomic Institute (the sole successor to three of Gosplan’s research institutes).

A little imagination is required to see the block as it once was, when the institutes were by far the most commanding structures, a temple complex meant as testament to the strength and ambition of Soviet science at its most optimistic. Now the sightlines are blocked and the buildings overshadowed by the strings of tall identical apartment
buildings commanding the ridge between INION and CEMI, most of their windows black at night, the apartments sold for speculation more than for habitation.

Soviet science did not take place in the departments of universities, as in the U.S., with several dozen faculty at most, but in these enormous “factories of knowledge”. Today the factory called CEMI runs at a fraction of its former capacity. In the late 1980s a series of leadership struggles split the staff into three other institutes that occupy the same building (one large, the Institute of Economic Forecasting (1986), and two small, the Institutes of Problems of the Market (1991) and of Social and Economic Problems of the Population (1990)). As the Academy of Science’s funding was cut or made meaningless by inflation during the 1990s the staff of researchers steadily fell due to emigration, exiting into business or politics, or taking up outside teaching. The intake of new postdoctoral and doctoral researchers shrunk almost to zero as their stipends became meaninglessly small. CEMI once bustled with a thousand workers, and now with about a third as many feels empty. As the aging economists die, their offices empty out one by one.

The lobby has not been renovated in decades, the dark concrete room still lined by faded orange modernist chairs that bespeak an obsolete vision of the future, and the immense garderobe usually hosts so few jackets as to appear empty on casual inspection. Across from the elevators and the honor board with pictures of the military veterans and survivors of the siege of Leningrad amongst the staff, the bulletin board still posts the tables of contents of the journals published by the institutes and the titles of upcoming lectures of the various seminar series. The hallways are poorly lit, and the parquet
flooring is scuffed white and coming up in places. The titles on the office doors are set in mismatched typefaces from different decades. The cold stairwell is blackened with years of cigarette smoke. Aiming to make up for lost funding, institutes rent out the increasing number of vacant rooms to private businesses under arrangements sometimes more, sometimes less, legal. The most lucrative deals involve the *de facto* privatization of institute land. Two shiny pink condominium towers, under construction during my time there, now crowd CEMI on either side. A travel agency, advertising package vacations to Cyprus, Egypt, and Thailand, shares the lobby, and the seventh floor is largely given over to an art and design school, the students of which, dressed colorfully and fashionably, contrast humorously crammed into the elevators with the soberly suited old economists. A guard post on the nineteenth floor is still manned, indicating that it used to do classified military contract work, even though it now only guards a graphic design firm.

But the seventh, ninth, and seventeenth floors have been taken over by the offices and classrooms of the New Economic School (NES), my primary host during my fieldwork from 2010 to 2012. From the corridor nothing seems different, but passing through the doorways you enter brightly renovated suites, with new furniture, computers, classroom and office equipment. NES was founded in 1992, nearly as soon as it was legally possible to do so. NES was the initiative of Valery Makarov, a protégé of Nobel prizewinner Leonid Kantorovich and the director of CEMI since Fedorenko’s ouster, and Gur Ofer, professor of economics at Hebrew University. Then Prime Minister Yegor Gaidar supported the plan and George Soros provided funding. NES was designed to bring Western orthodox mathematical economic education at the masters level in order to
train cadres of economists with skills to support both the new private sector and the new demands of economic governance. While it initially involved some teaching from CEMI personnel, this shrank over time and now, despite outward symbols of connection between the two institutions, very little substantive interaction remains. NES is almost entirely staffed by its own students that have returned from Western doctoral programs, and they have brought Western manners back with them. They dress in casual shirts tucked into jeans, rather than grey suits, and they call each other by the new first name and formal pronoun form that has taken root in the business worlds of the new middle classes, rather than the traditional form of first name and patronymic. With a few exceptions, they interact little with the CEMI researchers, about whom they will say that “they are excellent mathematicians,” meaning that they are not economists. And they do not like the building, it feels far too dingy and Soviet.

**THE END OF HISTORY AND POST-SOVIET ABJECTION**

To many observers, the world since the fall of the Soviet Union seems to be covered by an increasingly homogenous neoliberal capitalism. The teleology of modernity was once seen to have two variants: either the world was progressing towards capitalism, or it was progressing one step further to communism. If communism were the goal of history, all setbacks were mere epicycles. Now it seems that the experience of actually existing communism was itself the epicycle. Not only have the centrally planned economies either collapsed or reformed themselves out of existence, but many of the social democracies are dismantling their welfare states. In the battle of market versus
plan, the market appears victorious. Opponents of capitalism now struggle to articulate new post-capitalist visions or strategies by which to achieve them.

Prior to the Soviet Union’s stagnation and demise it was still possible to claim that its economic system was salvageable, and that it or some future socialist state would be able to combine planning and liberal democracy. But with the end of the Soviet Union, the consensus quickly emerged that a planned economy was not a viable economic model. Western leftism retreated, either fighting rearguard actions to slow the erosion of the welfare state, or embracing small-scale anarchist experiments that reduce the questions of politics to problems of interpersonal ethics. Organizations based in identity increasingly have ignored the question of capitalism; they have found themselves in the uncomfortable company of cheerleaders for the market who see discrimination as an atavistic distortion of labor markets. In the words of Margaret Thatcher, it increasingly appears that “There Is No Alternative”—or at least that the contemporary left has thus far failed to generate one. By destabilizing the common sense around the collapse of the Soviet Union and unearthing the technical-rational utopic imaginaries of alternatives buried in the rubble, I hope to rescue some sense of openness to alternative ways for ordering the life of a (post-)industrial world.

By 2010, when I arrived in Moscow, the machinery of teleological history had broken down. The Soviet Union had collapsed in 1991, and while there was considerable nostalgia for it, nostalgia takes off when its object is accepted as irrevocably gone. But the capitalist utopia that was promised, the hope of joining the West and achieving its consumption levels, had never materialized. Instead, most Russians experienced a sharp
decline in their living standards, while they watched a small number of businessmen and politicians appropriate the productive assets built up by seventy-four years of labor to become obscenely wealthy. And then, in 1998, Russia defaulted on its loans, the ruble crashed, and much of the world wrote off the Russian transition to capitalism as a failure. There are as many published explanations for this failure as there are rusting former factory towns strung out along the Trans-Siberian Railway. Russian capitalism has its defenders who argue that the foundation of a market economy has been laid, and all that is needed is more time and renewed will for reform. But these are in the minority. The widely shared impression was that Russia had achieved not capitalism, but either something less—perhaps a strange kind of post-industrial neo-feudalism—or something more—a crony capitalism run amok or apotheosed neoliberalism in which all things were for sale, including those that Western capitalisms exclude from the market.

In 2010, the self-conscious proponents of liberalism, capitalism, and democracy continually asked how attachment to these political concepts could be so quietly in decline, how a people that had so decisively ended Soviet communism could accept an order condemned by its critics as a xenophobic authoritarian kleptocracy? The flagship parties of 1990s liberalism, even those that had pledged their support to the Putin project, had been gradually squeezed out of the political arena. As economist Konstantin Sonin told me, Western commentators and some Russians misread the Kremlin as the arena of a shadow war of “liberals” and “siloviki” (alumni of the intelligence and defense communities), thus mistakenly replicating basic assumptions of American style two-party competition in a non-democratic context. The spectacle of competitive democracy was
revealed as farce on September 24, 2011, when Medvedev announced that by prior agreement he and Putin would again switch places. Their hopes betrayed, those liberals who remained in government were technocrats, survivors from the era of economic reforms, who merely tried to stay useful: newspapers referred to them as the old Bolsheviks had to the Tsarist scientists and engineers they had continued to employ, as the “bourgeois specialists.” To the new corporate class or “office plankton,” that fraction of the first truly post-Soviet generation that captured much of the gains of the Putin prosperity, the liberals of the 1990s were irrelevant remnants of the Soviet order that they had dismantled. Meanwhile, for the majority of Russians seeking only stability in which to rebuild domestic lives in small cities scattered across the expansive rusting remains of the Soviet technostructure the liberals were simply traitors.

With all hope of progress arrested, the country was seemingly adrift, without a historical trajectory. This state of historical abjection offered an opening to thought. The Cold War narrative was gone and the promised capitalism had never arrived. The contemporary moment’s resistance to totalizing narrative enabled long submerged histories began to resurface. These histories became available to me through an ethnographic inquiry into Moscow economics. Starting from the third floor cafeteria of CEMI, I traced the networks outward. The economists I met represented three generations. The youngest had grown up after the fall of the Soviet Union, received their degrees in Western universities, and turned down careers abroad to return and serve their country. The next generation, now in their fifties and sixties, had been Yeltsin’s first

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government, and had tried to guide the collapse of the Soviet Union toward capitalism. And the oldest were the survivors of the first generation of Soviet mathematical economics, who had tried to express the perfect scientific socialism in complex formulae.

When I had first arrived in Moscow to interview economists, I had hoped to do a study of the co-construction of academic theory and state policy in the present. But the economists I began to talk to and the world they inhabited simply made no sense to me. The divisions of the profession by theory and by politics were radically different than those familiar from the United States. I turned to history to try to shed light on them, and found myself doing so alongside the economists themselves. Serguei Oushakine has characterized the way that historical event has shattered individual self narratives as inducing a form of symbolic “aphasia.” Post-Soviet Russians grasp for affective and intellectual modes to reconnect their memories and the present haunted by them, to reconstitute both selves and solidarities. And as I retraced their genealogies of and with these economists through oral histories and archival research, the homogenous unity of a neoliberal present and the bipolarity of the Cold War past both dissolved.

In the decades immediately following the Second World War, Soviet society as a whole and the military-scientific complex in particular transformed in ways that resembled those in the West: a large new generation flooded into a university system expanding at breakneck speed, while links between the military and science established during the war continued to proliferate and suck in more and more resources for Cold War competition. This transformation happened under the aegis of a grand

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interdisciplinary project of “cybernetics,” which was to be in service of the “scientific-technical revolution.” This revolution was to take up where industrialization had left off, and involved a massive buildout of applied science. All this was accompanied by a cultural hypervvalorization of science, and a newfound institutional autonomy for scientists. The result was the creation of a vast new caste, one sometimes called the Soviet middle class, composed of several fractions, which I refer to collectively as the scientific intelligentsia: engineers, the “scientific-technical intelligentsia,” “engineering-technical workers,” teachers and professors, and others. In the relatively autonomous institutional interstices created for and by the scientific intelligentsia, new relationships to the state were negotiated, beyond opposition, dissidence, or withdrawal. Contra the conventional historical narrative that emphasizes the role of the comparatively tiny circles of intellectual and cultural dissidents, it is this much larger caste of the scientific intelligentsia that provided the social basis for perestroika, that supported the painful reforms of the 1990s, and from which most members of the post-Soviet liberal intelligentsia hailed.

Within this caste, I argue, the economists turn out to be crucial. An anthropological history of Soviet-era economics is therefore essential to understand the present conjuncture. This now dying cultural world of Soviet economics helped bring it into being.

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The flowering of economic thought of the 1920s ended in Stalin’s Great Break that initiated the industrialization drive, whereupon economics became a complex form of apologetics and political pedagogy. In league with the newly powerful mathematicians and physicists that came to dominate the Academy of Science under the banner of cybernetics, mathematical economists quickly institutionalized themselves. By means of mathematical tools shared with the emerging mainstream of Western economics but interpreted vastly differently, these economists began to elaborate alternative visions to what Stalin had built, visions of what true socialism would be. These economic cyberneticians occupied the position of loyal reformers. They could expect comfortable lifestyles within the Academy, and sought to enact reform through the channels and networks it provided. The post-Thaw generation of the 1970s and 1980s was increasingly disillusioned with Soviet socialism’s possibilities for reforming itself. This generation came to power with Yeltsin in 1992, and enacted the measures that guided the collapse of the Soviet order and the birth of capitalism. I argue that the line of development of reform thinking within Soviet economic cybernetics, culminating in a critical vision of the political economy of the Soviet Union, together with dissidence and withdrawal among others, constituted post-Soviet Russian liberalism. The multigenerational narrative of these economists forms the heart of my story. This dissertation is an account of the intellectual and institutional formations and transformations of these economists. It is also a story of people, with their styles of sociability, longings, aspirations, and nostalgias.

Over the past twenty-five years, anthropologists have increasingly examined the forms and relations of subject and state and how they have changed, most recently under
the rubric of “neoliberalism.” They have asked what the state is, and how citizens are enabled, constrained, or forced to participate in it (or disallowed, dismissed, or discarded by it). How are neoliberal subjects constituted as such, how do they relate to the state, and what sort of state would have or create citizens like that? These questions have been posed most often from the points of view of people who are not part of government, who are objects of expertise. Despite calls issued long ago for anthropology to “study up” anthropologists are still not comfortable doing so. George Marcus suggests that after the collapse of anthropology’s discipline-specific frameworks in the 1980s, an activist stance, a stance of solidarity with those studied, has taken its place as disciplinary diacritic. But, I argue, understanding liberal states, understanding governmentality, requires studying another category of people: those who are the state, who have strong claims to its advisory positions, those who, in the extreme, make it their life’s work to bring a liberal vision literally to life. With Michel Foucault, I argue that it is political economists, not philosophers, who articulate such visions, such “reflexive prisms” in which the state appears as a subject and logic of action, not in the abstract but as situated responses to historically specific problematizations of rule. Political economy is the savoir that articulates political philosophy and techniques of rule via liberal technologies of government, that is to say, governmentalities.

The Soviet case is fundamental for understanding the intertwined fates of liberalism and socialism in the twentieth century, and thus the predicament that we find ourselves in at the beginning of the twenty-first. As much as the advent of the Soviet Union undergirded the teleologies of Marxian histories, its disappearance anchors the trope of “neoliberalism” as it functions in the contemporary human sciences: a (tragic) teleology arcing toward a liberal “end of history,” a label for the epoch in which we now find ourselves, the essence of which is expressed in all its particulars. Telling the story of political economy in the Soviet Union and Russia removes the collapse of the Soviet Union from the narrative of epochal neoliberalism, eliminates its telos, and thus dissolves the trope. This end of the master trope of neoliberalism is essential to free the human sciences from the blank, flat field of the end of history, and rescue any politics that might still involve them. The fall of the Soviet Union in 1991 undermined our ability to remember the very recent past, to understand a present in which new liberalisms are ceaselessly being generated and thus to think alternative futures. Telling one such history, that of Soviet economics and the birth of post-Soviet liberalism, clears the ground to begin to understand the liberalisms that are—always—just now coming into being or passing away around the world. This history thereby reactivates the productive co-imagination of liberalisms and socialisms that lies at the heart of the modern political imaginary.

THE ECONOMY AND POLITICAL MODERNITY
This is one story about political modernity, meaning the practices and discourses of the ordering of collective life and life in common in the West (and tendentially the globe), from a place that has always imagined itself as situated on the margin of the West, from Russia. In particular, it is a story about liberalism, about Russian liberalism. Liberalisms, I will argue, are at once values of societies or particular groups within them, and political technologies: rationalities of governing collective life with respect to and by means of an aspect of social reality that we call “the economy.”

The economy is one of the names by which we have come to unreflectively understand our social life. In the social imaginary of modernity, collective life is fragmented, differentiated, or regionalized. That is to say, we find it impossible to describe our experience of life under a single vocabulary or within a single framework. We experience and describe that experience as differentiated into the political, the economic, the social, the aesthetic, the moral, the scientific, the technical, the legal, among others. We find no unitary perspective on the whole of collective life, only these refracted partial perspectives. They overlap without coinciding, we cannot move among them without the loss of translation, without, to continue the visual metaphor, parallax. That our experience of our world is fragmentary is reflected in everyday speech, in our institutions and our programs for changing them, and in our organized self-consciousness about our experience, which we call the social sciences. Beginning with reflections on the division of labor, this fragmentation of the world became explicitly thematized in the work of Durkheim and Weber, and remains central to contemporary theorists such as Bourdieu, Luhmann, Giddens, Fligstein, White, Latour and others, who have expressed it
in a variety of idioms: as fields, systems, modes of existence, instances, value spheres, orders of worth, etc. Anthropologically, and remaining relatively agnostic with respect to theoretical language, we can say that these are basic macrocategories of Western cosmology in the form it has assumed since roughly the eighteenth century.

Politics, within Western cosmology, is the discourse and practices of ordering life in common. Political modernity is characterized by what Charles Taylor called a “irremediably bifocal” world: “Objectifying pictures of social reality are just as prominent a feature of Western modernity as the constitution of large-scale collective agencies”. Pre-modern Western forms of moral order, he argues, conceived order as either the reflection of the Law of a people governing them since time immemorial and creating them as \textit{a} people, or as a social hierarchy corresponding to a cosmic hierarchy. In both cases, this transcendent Form constitutes the collectivity that is the subject of action. And in both cases, the order tends to impose itself, it is at work \textit{in} reality realizing itself. But the modern moral order denies the self-realization of a transcendent ordering principle. On the one hand are now the various forms of freedom and agency to impose worldly forms of social order, from the sovereign to the collective agency of the people. These forms of collective agency are no longer constituted by a transcendent Form, but are self-constituting and radically secular. But on the other hand is necessity: the way we are causally linked to each other, the inert reality of collective life itself. Rather than there being transcendent and telic Forms-at-work in reality, human agency instead must impose

\begin{footnotes}
\footnote{Taylor, \textit{Modern Social Imaginaries}, p. 10-12.}
\footnote{Taylor, \textit{Modern Social Imaginaries}, p. 92–6.}
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order on an inert reality, one that knows only efficient causes, not final ones. The ordering of life in common becomes a matter of interlocking causes, of good engineering design. These ways that our actions causally affect each other evince law-like regularities. One name for the systematicity of these causes that condition our agency, the way they interlock, has become “the economy,” but there are other names for it. As Taylor puts it,

“For moderns, organized society is no longer equivalent to the polity. Once we discover the impersonal processes happening behind the backs of agents, there may well be other aspects of society that show some law-like systematicity. The invisible-hand-guided economy is one such aspect; other facets of social life or culture or demography will later be singled out for scientific treatment. There will be more than one way in which the same body of systematically interacting human beings can be considered as forming an entity, a society. We can speak of them as an economy or a state or a civil society (now identified in its non-political aspects) or just as a society or a culture. Society has become unhooked from ‘polity’ and now floats free through a number of different applications.”

Scholarly accounts of the genealogy of the economy are just beginning to be written. The task is to narrate a history that moves between the growing everyday intuition of systematicity and necessity to the social arrangements by which people provide for their material wellbeing, the variety of discourses that recognize this experience and orient actors with respect to it, and the increasingly institutionalized

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10 Taylor, *Modern Social Imaginaries*, p. 70–1

reflections on these experiences and discourses. The last of these, explicit discourses that try to think collective life under a notion of economy, are what, emerging from ethics, law, and political philosophy, announced itself as “political economy” in the eighteenth century.

FROM THE ECONOMIC TO THE ECONOMY

It is of course trivially true that the economic has always been with us, if what we mean by it is the ways in which humans engage in intercourse with each other and nature so as to ensure their individual and group survival. But we can have all the activities without any such concept as “the economy.” Speaking of the ancient Greeks and Romans, Moses Finley writes that

“Of course they farmed, traded, manufactured, mined, taxed, coined, deposited and loaned money, made profits or failed in their enterprises. And they discussed these activities in their talk and their writing. What they did not do, however, was to combine these particular activities conceptually into a unit, in Parsonian terms, a ‘differentiated sub-system of society.’”12

Or, in the words of Louis Dumont, “It should be obvious that there is nothing like an economy out there, unless and until men construct such an object.”13 One way of saying this is that in the broadest possible sense, the economic is an etic, ethological, or even existential category, but emically “the economy” is a category internal to the history of self-reflection of the West. Economic anthropology, insofar as it has forgotten this, has

tended to take for granted this notion of the economic, even as it has struggled to show
the cultural specificity of economic life and its inextricable entanglements in local logics
less obviously economic. Ratcheting up our reflexivity one level, we might conjecture
that the obviousness of the notion of the economic as an ethological category is only so
obvious from within our own cultural and historical horizons.

Recent work has identified several thresholds in the emergence of the notion of
the economic. Michel Foucault, Margaret Schabas, and others see the late eighteenth and
early nineteenth century as a critical threshold in which “the economic” becomes an
aspect of social life distinct both politics and nature. Foucault argues that the
Physiocrats represent a threshold in the economic, and therefore in the modern state. The
Physiocrats, he claims, discover that collective life has a naturalness to it, an internal
complexity that exhibits law-like behavior, that can be studied with a mode of knowledge
akin (but not identical) to rational mechanics. At this point it is not yet named “the
economy,” but their science was to be called “political economy.” “Economy” had
meant, at this time, the relationship of management and care that the head of a household
exercises with respect to the people and things of that household. Political economy
asserted that there was a specific form of management proper to the scale of the political
community. The proper exercise of this political economy would bring about the increase
of the wealth of the nation.

This naturalness, we are now in a position to understand, was of course the logic
of capital. Marx, to whom is often anachronistically attributed a position of “economic

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determinism,” called the society characterized by this logic “bourgeois society,” or a society dominated by the capitalist “mode of production.” Though it became unthinking habit to say that Marxian theory understands capitalism to be dominated by the economic, Marx’s categories make no reference to an entity called the economy. When he wrote of bourgeois society, he meant a society dominated by the new classes of the bourgeoisie. When he wrote of a mode of production, it was not a synonym for society or economy; rather, he meant a specific way of bringing funds, people, and materials together in the productive process, namely one in which labor power was sold for money to one who possessed the means to set it into motion, the means of production. In a society in which this mode of production predominates, the profit-seeking behavior of capitalists is not optional. Each capitalist must act so as to extract “surplus value” in the most ruthless way possible, and reinvest this surplus at ever larger scale, otherwise he will cease to become a capitalist either by the failure of his business or by being bought by a business that is more efficient. In the phrase of Moshe Postone, whose reading of Marx pays strict attention to the ways that Marx carefully delimits the historical specificity of his categories, capitalism is characterized by an impersonal form of power, by “abstract domination.”

Later inheritors, like Weber and Sombart, explored the ways that this logic generated by the capitalist mode of production begins to torque and twist other institutions, customs, and modes of representation, no matter how seemingly distant from the productive process, into forms that support, enable, or enhance this logic. Widening

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the frame outward from the productive process, they showed how the capitalist mode of production gives rise to a form of life called capitalism. In the more contemporary language of Althusser, history is a “process without a subject” in which the differentiated and overdetermined structure of the capitalist social formation is, in contradistinction to other forms of social life where the religious/ideological or the political are dominant, determined “in the last instance” by the economic.

More recently, in a series of influential articles, Timothy Mitchell has drawn attention to a further twentieth century threshold, that at which “the economy” emerges as a nominalization. He draws on the work of Michael Emmison, who points out that, in English, the nominalization dates to the 1930s and Huge Radice, who associates it with the advent of Keynesian economics. These works put enormous weight on the undoubtedly enormous theoretical achievement of Keynes’s *General Theory of Employment, Interest and Money* of 1936. But this theory-centric narrative ignores the less celebrated but crucial wave of new statistical work and new econometric techniques being developed simultaneously, independently and in conversation, from the United States to Soviet Russia.

Adam Tooze has argued in detail that the emergence of the idea of a realm of reality called the economy is inseparable from the assembly of the modern macro-economic statistical system. The creation of numbers to measure economic life led

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inexorably to the intuition that there was some *thing* being measured. The modern macro-economic statistical system is a very recent creation. Why the first statistics arguably date from the birth of the modern, absolutist state in the seventeenth century, the first official statistics date from the revolutions of the late eighteenth century. The production of numbers began a dramatic increase in the 1870s, peaking during and after the First World War, and achieving a kind of perfection in the 1950s with the global standardization of a particular repertoire of macroeconomic statistics. Four initially separate statistical systems had to merge for this to happen: trade statistics, which in their origin were customs records; employment statistics; price indexes, first created by business publications and associations; and finally national income measures, deriving from tax records and then attempts to describe the “business cycle.” Over this period, these numbers were produced in ever greater volume and detail, at ever greater frequency, and increasingly by official state agencies. In the first three decades of the twentieth century, depending on the language, the languages of Europe began to recognize an object of which all of these numbers were signs. Usage shifted from “economic” as an adjective modifying various realms of (usually money-mediated) activity to a noun referring to some metaphorical “part” of the national polity.  

An enormous impetus to this drive toward the technical representation of the unity of economic activity was lent by the advent of the Soviet Union itself. The Soviet Union was to plan economic life, and it therefore created representations and realizations of this...
life. In 1926 Pavel I. Popov and Lev N. Litoshenko of the Soviet Central Statistical Administration produced the *Balance of the national economy for 1923/1924*, by far the most comprehensive and sophisticated attempt up to that point to depict the economic life of a nation as a measurable totality. As later, two Russian émigrés to the United States who were familiar with this work, Simon Kuznets and Wassily Leontiev, would invent the modern frameworks of national income accounting and input-output analysis, respectively. With these methods, the representation of the economy as a sociotechnical object passed the threshold to become that entity that we live with today. There is thus a case to be made that priority for the invention of the economy belongs to the Soviet Union.

**THE MALIGN NEGLECT OF ECONOMICS**

The history of economic thought is deeply imbricated in the development of conceptions about the economy. Yet economic thought has remained curiously unstudied by anthropologists. The hermeneutic human sciences have so disengaged with academic economics, or indeed vilified it, as to have become largely ignorant of it. Or perhaps the process went the other way around. We have tended to resort to a crude form of ideology critique that dismisses economics as a methodologically illegitimate support of the power of capital that our discipline would not accept for any other realm of cultural activity. This critique is in uneasy tension with the increasing anti-statism of the Western left. But

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moreover, it simply fails to take into account the many ways that economics acts in the world.

Political economy, of course, began within the then-undifferentiated human sciences. Professor Adam Smith, let us remember, held the chair of Moral Philosophy at Glasgow. The decisive separation of political economy from the other human sciences happened in stages, which I can only sketch. Crucial, of course, was the extremely rapid mathematization of economics in the wake of the Second World War—a process only beginning to be understood and which I will treat explicitly in later chapters—that left most nonspecialists simply unable to engage with it on its own ground. One of the premises of this study is that mathematized economics is no less political economy, no less dealing with the fundamental issues in politics and ethics that concern the other human sciences. But with mathematicization this became opaque to outsiders, as well as to many economists, who thenceforth could make a career out of elaborating the mathematical technique itself without suffering critique, etc. No less important was the academic left’s gradual ceding of the ground of economics to the right. Western or non-Soviet Marxist economics ran into very difficult impasses in the economic foundations of Marxism. Those Marxists who elected to treat the economic questions as decisively settled won intellectual hegemony. An orthodoxy was cultivated around refusing innovation in economic thought, treating all innovation in the economic sciences as apologies for capitalism. That a plurality of those economists crucial to the enormous leap in mathematical sophistication of non-Marxist economics were themselves socialists or fellow travelers, and saw their innovations as at least as much if not more applicable to
planning a socialist society than analyzing a capitalist one, was ignored.Claims of the illegitimacy of the use of mathematics in the social sciences, which finds only disconfirmation in Marx’s own writings, became dogma. Meanwhile, leftist thought fed on the very real productivity of the other elements of Marxism, which were more vitally interacting with the explosion of identitarian political movements in the 1960s and 1970s. The New Left, heir to this intellectual hegemony, thus proceeded down a line divorced from that of economic thought. The last vestiges of Marxism within the economics profession, such as Analytical Marxism, were assaulted by both their enemies and suspicious comrades until exhausted and extinguished.

Politics is no less important. Non-Marxist economics, increasingly bereft of bonafide leftists, moved still further rightward. This was due to a combination of theoretical advances that were hard to square (only temporarily, as it turns out) with the Keynesian neoclassical synthesis had served as the national framework of the social democratic welfare state and outright academic McCarthyism. This rightward drift of an increasingly consolidated mainstream converged with the renewed offensive of an increasingly multinational and financialized capitalist class against the Fordist compromise (i.e., Reaganism and Thatcherism), or was seen to have so converged, as both tool and prop. At the same time, the hermeneutic human sciences were themselves moving leftward, first riding the swell of student radicalism in the 1960s and 1970s, and then reimporting leftist European philosophy in the 1980s and 1990s following several decades of separate evolution. Leftish human sciences that had completed an

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20 An exception were powerful feminist materialist critiques of labor, but these were not in communication with economic thought as practiced in economics departments.
identification with the interests of the powerless and were themselves feeling embattled by assaults on public education and the humanities in particular thus confronted a rightish mainstream of the discipline of economics that proudly wore its mathematical vestments of scientifically and proclaimed its utility to politics and the powerful.

Economics was mathematical and statistical, rightish, and powerful. The hermeneutic human sciences were interpretive, leftish, and weak. Along two axes (theoretical-methodological axis and political axis) and with respect to total volume of both capital (academic but also social or economic), the positions economics and of the hermeneutic human sciences in the field of social knowledge today are maximally opposed. Such opposition has bred a mutual ignorance. The powerful economists have in their ignorance simply ignored anthropology; anthropologists, in the subordinated position, have not had that luxury, and have most often responded by vilifying economics.\(^{21}\)

The subdiscipline of the history of economic thought offered little help to mediate this growing divide, for two reasons. The first is the mathematicization of economics, which had three consequences. It involved a replacement of pedagogical practices that taught via the history of economics to ones more familiar to the hard sciences, which teach by means of textbooks and recent papers. This instituted a true split for the first time between growing numbers of practicing economists who neither not knew nor cared

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about the history of their own discipline and those who did. The latter became historians of economic thought, in a subordinated position within the discipline. The mathematicization was also a means for and reflection of a generational revolution within the discipline; those economists who were not young enough or able enough to mathematically re-tool found themselves sidelined. These included many historically-oriented economists. Thus, not only were historians of economic thought doubly-subordinated, but they were largely unable to write the post-mathematicization history of their own discipline; it is only in the 1990s that the history of mathematical economics began to be written in earnest. The second reason for the inability of the history of economic thought to the mediate the divide was that it remained within economics departments, albeit in ever dwindling numbers, and continued to address itself to economists. Meanwhile, the rest of the history profession, and perhaps foremost within it the history of science, underwent a rapid increase in historiographical sophistication. The Whiggish histories written by the economists, which combed the past for jewels to be polished and presented to their colleagues, looked increasingly dated and naive to other historians of science. This gap too only began to be bridged in the 1990s, as some historians of economic thought realized that their ever-shrinking community required the broader audiences of interdisciplinary science studies for its continued vitality.

The times may be propitious to begin to reverse this nearly complete non-comprehension. Economic orthodoxy has returned from its high theory mania and is studying topics more immediately relevant to other social sciences. The economic crisis of 2008 and subsequent global depression have not only reoriented research programs
toward the failures of markets but driven wedges into the cracks in the monolith.

Conversely, the crisis has driven press, money and students to the remaining heterodox economists, triggered a massive wave of self-study in economics among leftists, and dramatically raised awareness of economic concepts and their power among the literate public at large. More simply, the ongoing global economic crisis made the real and rhetorical power of economic knowledge in the world order impossible to ignore, and there are signs that the human sciences are beginning to respond.

The theory of ideology is not a powerful enough tool to deal with the power and sophistication of economics, and this has grown more and more obvious. The concept itself, in its modern usage, comes from Marx. In *The German Ideology*, Marx and Engels launched a critique of the Left Hegelians with whom they had themselves previously been associated. For this, they borrowed the phrase ideology, which had previous referred to empiricist theories of perception and cognition. Marx and Engels claimed that the Young Hegelians turned real history into mere phenomena of the progress of the Idea. Their claims to radical politics reduced to narcissistic celebrations of the critical intellectual who functions as the vehicle or herald for the final apotheosis of the Idea. Real history, claimed Marx and Engels, is material. Its contradictions are not between determinations of the Idea, but between groups of people estranged by the ever-deepening division of labor. The “overcoming” of those contradictions is nothing less than political revolution. In their account, the Young Hegelians were not only guilty of transforming the progress of history into the progress of the Idea, but in so doing they offered support and succor to the oppressors, for the revolutionary anger and ardor of
anyone convinced by their “ideology” would thereby be quieted. Objectively, their ideas—that is to say, their idea of history as the history of the Idea—functioned to maintain the status quo.

Economics has often served the powerful, and it has sometimes been wrong. This could hardly be more the case than with Soviet economics. However if this remains all that we can say about economics—Western or Soviet—we will have said very little, and understood even less of how it functions and what it does in the world. The tools of science studies that have been developed since the 1980s offer a new way to get a grip on the multi-faceted phenomenon of economic science.

The anthropological appropriation of science studies, an intersection acknowledged by practitioners of both fields to offer new and profound possibilities, allows us to study how scientific knowledge emerges in the process of interesting, enrolling, and translating heterogeneous interests. From this perspective an economics research center appears as a knowledge-producing laboratory, traversed by the interests of academic, political, economic, and civil society actors, sitting atop of a constant and massive stream of inscriptions that render “the economy” visible and calculable, and itself producing yet more inscriptions for the use of other actors. Only after such networks are relatively stabilized can science take on the appearance of autonomous conceptual products, like those studied by intellectual historians. Tracing these networks

requires meticulous attention to the materiality of science, including inscriptions of various forms—stories and numbers, forms and formulas. The anthropology of science’s early focus was (as noted by Mirowski & Nik-Khah on the ‘hard’ and biomedical sciences. The anthropology and sociology of finance is now a burgeoning cottage industry of its own.

Here I seek to expand the ambit of science studies to the social sciences. What is often referred to as “mainstream” mathematical economics is a knowledge producing endeavor, in many ways like any other. A heterogeneous assemblage, different aspects of it invite different forms of analysis.

THE SURVIVAL STATE

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In a seminar room at the Higher School of Economics (HSE), a public university founded by the liberal members of the economic department of the flagship Moscow State University in 1991, a projection of a Powerpoint presentation covers the wall in a series of complicated equations. They are a model, specifically a discrete time microfounded infinite horizon model without overlapping generations. It is meant to represent how a society appropriates its history in order to derive a sense of national and civic unity that can support a civilizational efflorescence, or fails to.

The word for such an efflorescence in contemporary Russian parlance is *passionarnost*, or passionarity, a neologism coined by Soviet historian and ethnologist Lev Gumilev. The son of the prominent poets Nikolai Gumilev and Anna Akhmatova who were vital links with and symbols of the humanist moral mission of the intelligentsia during Stalinism, he had spent most of his early life in prison camps. Akhmatova waited everyday before the walls of the prison with the scores of other wives and family members of the disappeared for any word of their location, well-being, or continued life. This experience became the inspiration for Akhmatova’s legendary expression of the moral wasteland of Stalinism in her now canonical poetic cycle *Requiem*:

“Seventeen months I've screamed,
I've called you to come home,
Flung myself at the butcher’s feet,
My son, and my terror.
Everything is eternally confused,
And I cannot distinguish
Now, who is beast, and who is man,
And how long to wait for the execution.”

Her life and work became a living example of what it meant to be a member of the intelligentsia to the idealistic generation that came of age in the post-Stalin 1960s, separated from that heritage but for a few survivors like Akhmatova by the abyss of the purges of the 1930s. The Russian intelligentsia, while defined in official Soviet political economy as a pseudo-class or layer [sloi] embracing all those with higher education and engaged in certain white collar occupations, continues to understand itself within a particular social imaginary of the polity, as those who bear a responsibility to plead on behalf of the silent and suffering people, the narod, to the overwhelming state power, or vlast’, that governs in callous ignorance or indifference to their fate. The economist is summoning this intelligentsia imaginary in the seminar room, weaving it into his model and his relationship to it.

After Stalin’s death, Gumilev drew on his fieldwork in the Volga Delta and North Caucasus to develop a novel theory of ethnogenesis that sidestepped the official Marxist-Leninist stage theory of national attainment into which Soviet ethnography shoehorned its data. Most of his books were unpublishable during his lifetime, but experienced a massive popularity during Perestroika, and his terms have become part of the ethnonationalist commonsense of most Russians. I learned to expect the question “Have you read Gumilev?” whenever I explained my reason for living in Moscow. According to Gumilev’s theory, when certain conditions are met, a people can enter a passionary state, often embodied in its great political leaders and cultural producers, during which they
generate an enduring national culture and identity. Passionary individuals are capable of enormous creativity or even self-sacrifice in the name of the whole; the unpassionary are content to adapt to their environment and work for merely personal gain or security. Alexander the Great, Napoleon, Joan D’Arc were passionary individuals; the Italian Renaissance, the Arab expansion, the glory of classical Athens and the Space Race were symptoms of brief society-wide surges in passionarity. For many Russians, as the Levada Center’s poll annually shows, Stalin remains another exemplar.

The speaker today was a young economist, Roman Zakharenko. Very tall, thin, and boyish, the Siberian had come to Moscow for his masters in economics at the New Economic School (NES), a Soros-funded University located within the massive building of the Central Economic Mathematical Institute (CEMI) of the Academy of Sciences. CEMI, since the 1960s, had functioned as the heart of Soviet reform economics, attempting to construct out of equations and the stuff of dreams alternative visions of future socialisms which would employ markets to assemble economic interests into a polity. In 1992, its director, Valery Makarov, a protégé of Leonid Kantorovich, the lone Russian Nobel-prize winner in economics (for the invention of linear programming), and Viktor Polterovich, met with Israeli-American economist Gur Ofer to formulate a plan for a new institution that would be a channel for the wholesale import of American mathematical economics into the former Soviet Union. The model was Keynesian economist Don Patinkin's founding of Hebrew University's economics department. The longterm goal was to change not only the imagination of possible economic policy, but also Russia’s sense of the meaning of the economic. Newly appointed Deputy Prime
Minister Yegor Gaidar, the architect of transition, signed the decree, George Soros footed the bill, and NES opened that fall. NES had fed a steady stream of students to foreign doctoral programs, and some of them came back, all according to plan. Zakharenko graduated from Pennsylvania State University and returned to take up a position at the International Center for Economics and Finance, a second or parallel Westernized economics department within HSE.

Accordingly, the mathematical apparatus of his presentation could hardly have been more orthodox, despite the strangeness of the topic to be modeled. Drawing on Richard Dawkin’s theory of “memes,” an informal though ubiquitous part of the American economics education within which it functions as an apology for the interdisciplinary hegemony of orthodoxy, Zakharenko translates passionarity into a concern for the “reproductive success” of one’s cultural achievements. In other words, your cultural impact on posterity is in your utility function. At which point Zakharenko began to recite the first lines of Pushkin’s famous untitled poem (itself a tribute to Horace’s Ode 3.30), often called by its epigram, *Exigi Monumentum,*

“I’ve raised a miraculous monument to myself,

The public path to it will never be overgrown,

Raising higher its defiant head

    Than the Alexandrian Column.

“No, I will never truly die— the soul in sacred lyre
Will outlive my flesh and escape corruption —
And honored I will be, until in the sublunar world
Will live another poet as great.”

Within a couple words, he was echoed by the thundering chorus of the two dozen economists in the audience, at once confirming their membership in the community oriented towards the canon and towards history itself, the truth of the poet’s sentiment, and their investment in the economist’s problem.

This orientation now took the form of an optimization problem, in which agents choose how to split their time between survival and the production of cultural contributions, given varying difficulty of access to the contributions of previous generations, and varying expectations of the degree to which their contribution will be honored by subsequent generations. Accordingly, they maximize the following expression,

\[
\max_e \sum_{n=1}^{t-1} C_n + \ln(T - e) + a_e \frac{C^E_{t+1}}{\tau},
\]

where the first term is the individual’s cultural contribution, the second is survival, and the last term is his or her expected tribute from future generations, wherein \(a\) is ability, \(e\) is passionate effort, \(C^E\) is the expectation of tribute from future generations’ passionate effort, and \(\tau\) is the difficulty of access to past contributions. It represented an individual’s degree of rootedness in the past and commitment to the historical community. Under the derivable first-order conditions for optimal cultural contribution,
increased expectation that future generations will honor one’s effort stimulates more individuals to contribute, and contributing individuals to contribute more. Assuming either even or exponential distributions of talent, the model produces a range of possible aggregate cultural contributions, but two fixed points, two steady states. In the first state, the survival state, individuals focus on their own domestic affairs, and neither make contributions nor pay tribute to those of the past. In the second, passionary state, individuals expect the tribute of their descendants, make their own contributions, and are accordingly happier for it. “[T]he world changes,” Zakharenko concludes, “as long as there are people willing to change the world.”

Nowhere in this presentation was there any mention of Russia; theoretical papers in mathematical economics rarely mention the place or time that inspired them. But everyone in the room knew that they were living in the survival state. To many, after the elation and tumult of the 1990s, Russian seemed to have settled into a long period of political apathy, domestic survival, and public cynicism. In the post socialist world, both Russian and American sociologists have noted with anxiety the strange silence of the Russian people: their lack of protest at conditions that could seem intolerable, their refusal to respond to surveys or to answer with “no answer,” and to vote “against all.”

Lauren Berlant has defined “political depression” as “affective judgments of the world's intractability—evidenced in affectlessness, apathy, coolness, cynicism, and so on—modes of what might be called detachment that are really not detached at all but

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constitute ongoing relations of sociality.” The way that Russians ignored politics seemed to have something of that; it was not born of ignorance, but a stubborn refusal to engage. It was the winter of 2010–2011, and under then-President Dmitry Medvedev, whose speeches and cabinet appointments made overtures towards the concerns of the Moscow liberals, some were feeling a glimmer of hope that Russian might one day soon emerge from this dark tunnel. At the same time an angry and ugly nationalism seemed to simmer.

I met Roman Zakharenko later in his office to talk further, arriving late because the Higher School of Economics occupies a sprawling and confusing warren of interconnected buildings in the center of the city, real estate worth enormous sums of money but given to it by its government patrons. Living in State College, Pennsylvania had been inspiring to him: “Everyone in the US competes! There are blood drives, everyone is protesting this, protesting that.” Whereas in Russia, everything has dropped off in the 1990s, “even in the 1980s” when Zakharenko would have been a child living in Siberia, “they did something.” I ask him if he feels any changes, either for better or worse, and he does not, but claims to be an optimist. What was he doing to contribute to the rebirth of a passionary Russia? “I participate in my condominium association. Well, there is not yet a formal association. My initiative is to improve the look of the building, but some of the older residents don’t like it. They think I don’t have the authority to do anything because I have lived there not long.” Following very rapid privatization of apartments to their occupants for a mere 320 ruble registration fee, the grounds and

common spaces of the majority of buildings, still nominally the responsibility of the municipality, fell into (even deeper) disrepair. Buildings, even those inhabited by many wealthy households, often appeared dilapidated, with graffiti over their dirty whitewash and dark corridors with burned out lightbulbs that stank of urine. In 1996, a new regulation allowed a majority of tenants to form “comradeships of dwelling proprietors” (tovarishchestvo sobstvennikov zhil’ia, or TSZh) and assume responsibility from the city, aligning individual incentives and shared goals. The TSZh had even greater hopes pinned on them—they were to be schools of democracy—but they have not proved popular. I bring up the commonly heard contention that Russians are not yet ready for a broadening of democracy, either because of a national mentality, or the psychological legacy of communism, or simple lack of practice. In response, he delivers an anekdot, that genre of acerbic Russian joke at which the laughter usually feels dry and forced:

“An inspector is visiting a state asylum, and the director gives him a tour. When they see the swimming pool, it is dry, but inmates are jumping into it and injuring themselves. The inspector says, ‘This is horrible! Why don’t you fill up the swimming pool?’ The director replies, ‘Well, they don’t know how to swim. When they learn, then I will fill it up.’”

FOR AN ANTHROPOLOGY OF ECONOMICS

Economics’ disciplinary structure and the models and techniques that comprise its subject areas require highly non-linear genealogies that can trace the repeated generation of new problems to be solved, problematics within which solution are sought, and technical means out of which the models are built. But at the same time, economics is
also embroiled in social life in myriad ways, each of which exhibits its own styles of reasoning supporting its veridiction. A macroeconomic analyst who attempts to understand what is currently happening in the economy, uses models differently than does a policy analyst, for example. Other practices include forecasting, program evaluation, pure theory in several styles, cliometrics (historical analysis), among others. Each of these is a particular learned knack that involves implicit understandings of what sort of models are appropriate for representing what sorts of realities, how to manipulate the models to support inference, and how to transform this understanding into narratives that are relevant for the task at hand. These practical abilities of economists evolved in interaction with the spread of economists into positions in various fields of social action that granted them new areas of jurisdiction for their expertise.

We can study economics in many ways. First, it is a system of knowledge: modes of argumentation and inference, paradigms of mathematical and statistical technique, theories of the causal structures of an area of reality, repertoires of genres of inscription, and metadiscourses about the acceptable means of theory- and model-building. Second, it is an academic disciplinary field in an ecology of such disciplines, which interlocks with extra-disciplinary fields of politics and business, a set institutions that grow and change over time, a form of expertise with social efficacy and myriad effects. Third, it is part of the cultural world of people occupying specific social roles, a highly organized region of cultural knowledge and system of affectively-loaded tropes and metaphors. It is only as a sometimes useful analytical approximation that it is separable from the rest of the cultural
knowledge possessed by economists as members of social group. In this study, it is all of those things—system of expert knowledge, disciplinary field, cultural world—and more.

But I am especially concerned with the historical constitution of economics’ present relationship with state power, with its role as both a model for government and a means of government. With Foucault, I argue that economics is a form of knowledge, a savoir, that is integral to modern power. Political economy was, in its original inspiration, a reflection on life in common, balanced at the intersection of law, ethics, and politics. Foucault argued that political economy was a new mode of veridiction that addressed a normative discourse to the state about the nature and state of the life of the nation that required modifications in the state’s dominant technology of power. The absolutist state had aspired to the direct control in detail of every aspect of the polity. Political economists replied that the polity is not composed of individuals that can be ruled one by one, but has a thick nature formed by their interconnected activities that may resist state action and generate unintended consequences. Accordingly, to achieve its goals, the state must govern less, and govern indirectly, by affecting the milieux in which subjects pursue their interests. The mode of veridiction of political economy—the way it spoke to the state in the name of facts that only it was in position to know—was inextricable from the tendential transition of the dominant technology of power from one of discipline to that which Foucault calls, simply, liberalism.

Why do I say liberalism, instead of capitalism? Both concepts respond to the form of society dominated by the logic of market exchange. The concept of capitalism grasps
this society from the perspective of how it accomplishes the transhistorical task of providing the means for individual and group survival and flourishing in its own unprecedented way: structured by the separation of workers from the means of production. Under capitalism, necessary coordination occurs through the capitalist mode of production and the market. People are separated from each other by ownership of property and brought back together via exchange. In contrast, the concept of liberalism grasps the same society from the perspective of power. Liberalism is a new way of bringing governing people, one which imagines a unitary entity called the state against a realm outside of it. This realm, the market (or the economy or more broadly civil society) is both a technology of government and the object of government. Government takes place via the milieux in which separated individuals enter into relationships of exchange.

Economists are the practical theoreticians of liberalism, and thus have a different relationship to the state than do bureaucrats. Rather than exploring the market as a mechanism for the exchange of goods, I am interested in how markets are variously imagined as technologies for producing political order.

The mathematization of economics, which began in the late nineteenth century and reached a new threshold of sophistication in the middle of the twentieth century, is often interpreted as a retreat from political economy’s original breadth. I would argue that mathematical economics remains political economy. What has changed dramatically with its mathematization is economics’ utility to the state as a means of government. Only with the accelerating deployment of statistical systems that cast the life of the polity into numbers and the corresponding mathematicization of economics that transformed it into a
theoretical edifice capable of bringing these numbers into relation could economics begin to serve as a practical and technical tool akin to engineering. Economics has become an increasingly important part of what Andreas Glaeser calls political epistemics, the way societies generate knowledge about themselves.\textsuperscript{31} The Second World War was a watershed in this history, drawing those with mathematical ability into the economics profession, and drawing economists into new relationships with and within the state. The development of mathematical and statistical technique in economics has co-evolved with new means and visions of government.

**THE SOVIET UNION AND THE ANTHROPOLOGICAL MARGIN**

In this study, I examine the changes over time in economics in the Soviet Union. Soviet economics comprised multiple interacting forms of expertise inseparable from larger culture worlds, with a jurisdiction formed at the intersection of several fields of social action, its technical means changing over time in response to problems of managing collective life as they were posed. Soviet economic thought constructed the productive forces of the nation as an object of government—or failed to—proposing oftentimes failed projects for the reprogramming of the exercise of state power. Battles over visions of governmentality were the other side of battles for the establishment or transformation of modes of economic veridiction. Soviet economics generated a series of propositions about government that contributed to the demise of the Soviet planned economy itself. In this way, I argue that it was essential to the constitution of post-Soviet Russian liberalism. And the cultural world of Soviet economists, and more broadly the

scientific-technical intelligentsia to which they belonged, was the petri dish within which grew the attitudes, dispositions, and affective habits—the habitus—that give Russian liberalism its particular flavor.

Why study economics in the Soviet Union at all? After all, Soviet economic science often appears as a pseudo-science, or at best as a failed project that could only be of interest as a curiosity. But Soviet economic science was never so divorced from Western economics. They spring from the same root, and they developed in each other’s mirror, just as did the societies in which they operated. The realities of the United States and the Soviet Union, the governmental ideals of liberal capitalism and anti-liberal socialism, the knowledges of Soviet economics and Western economics—each member of the pairs changed over the seventy-four years of the Soviet experiment through reflection upon all others. The history of Soviet economics is thus part of more than the history of the Soviet Union. It is a vantage point displaced but still internal to the political imaginary of the Western modernity.

Anthropology has always operated within the margin produced by difference. It begins with social theory, which is to say the West’s auto-ethnography, and its archive, the abstractions generated in the process of applying social theory to other locales. Ideally, anthropology generates new concepts, new theory in the encounter between what the anthropologist brings to the field and what she finds. In reality, most contemporary ethnography is a mixture of attempts to convey the experience of certain forms of life in their own terms, and social theoretical analyses of forms of life that condition experience. The crucial role of difference in anthropological knowledge production has always
rendered anthropology of the West difficult. It slides out of view before the anthropologist can get enough of a hold on it to convey it to the (Western) reader.

A study of political modernity via Russian liberalism offers a triple displacement or folding. First, the history and culture of Russia cannot be related without reference to that of the rest of the West, yet for at least three hundred years Russia has had an almost neurotic obsession with its degree of Westernness or essential otherness. Second, Russia was also the site of actually existing socialism, and the imagination of socialism is and has always been the obverse side of the political imagination of capitalist modernity. Together socialism and capitalism have marked the limits of the modern political imagination. Third and finally, liberalism within the Soviet Union was so suppressed as to not have known its own name, and in post-Soviet Russia its presence remains weak, uncertain, or, as I will call it, *spectral*—and yet remains crucial all the same. The West from its margin, liberalism from socialism, socialism from its own spectral liberalism—these are the unstable margins of difference within which my analysis will move.

The Soviet Union poses even more acutely the problems of reflexivity that apply to any application of social theory to the West. Social theory was generated out of the experience of the transition to the capitalist mode of production in Europe. Its categories therefore fit that experience best. At the same time this affinity can render analysis nearsighted. Russia has always been part of this European experience, but with enough difference that social science has always found it difficult to study. At the same time, nowhere else have the categories of social science become so integral to everyday life. Marxism was a social scientific doctrine—a political economic theory—but in the Soviet
Union the language of Marxism became part of everyday culture. Inculcating Marxian language and modes of thinking into everyday life was supposed to be a means for transforming the latter.

The transformation of everyday life was part of the *ontological project of* Bolshevism. Bolshevism reflected upon the fragmentation of the experience of social life characteristic of capitalist modernity, and in particular on the determining role of the economic. It was explicitly a political project to annihilate the economic or resubordinate it to the political. This was to involve changing the relationship among all of the spheres of social experience, not only economics but also art, science, and technology in order to reconstitute their unity on a new level—and thus the possibility of the true “reign of freedom.”

When I argue in later chapters Stalinism involved the extinction of the economic, and that the 1960s were an attempt to recreate an economic mode within a socialist governmentality. This, as I show, is not a Foucauldian category imposed on the Soviet experience. This was exactly how Soviet economists and philosophers described what was happening. Despite the abstraction of the theoretical tools and the reconditeness of the realm of social action under examination, my use of these theoretical resources is anthropological. I derive my theory from observation about how the “natives” see the world. The concepts of Marx, Foucault, and Latour are in part useful tools because Russian economists see the world through the lenses of social theory, it is part of their culture. Studying the vicissitudes of economics and the economic—of social theory and
its objects—in the Soviet Union turns out to be a way to anthropologically investigate this basic category of the cosmology of Western modernity.

SPECTRAL LIBERALISM

When you emerge from the wide mouth of the escalator shaft from Beloyusskaya Metro Station, the bright teal Empire-style facade of the train station is to your back and you won’t see it. The rail line it was built to serve in 1870 went first to Smolensk before being extended to Belarus, gaining it its current name, and thence to Warsaw, becoming Moscow’s gateway to the West. The exit from the metro station is cramped. You have to push past the people trying to get in and down, the homeless who sit in the vents along the airlock between the swinging doors heavy enough to throw you to the ground, the people with placards on their chest advertising “WORK,” the people handing out fliers for “CREDIT—FAST!,” or trying to sell you cheap SIM cards for a dozen different mobile phone operators, the lines waiting at the kiosks to buy shawarma or change currencies. I receive a flier for a nearby high-end strip club, named “Egoist Gold.”

The streets snarl in front of and around this train station. The traffic flows are a disaster; broad Leningradskii Prospekt backs up for miles in front of the station. If you look up from your feet, from the crowd, you see the low nondescript tower of PricewaterhouseCoopers, the firm’s name in big blue letters facing the station. It is the best-established in Russia of the Big Four accounting firms. It got an early start. While economists have taken the majority of the credit—or blame—for the privatization of Russia, the several dozen academics and technocrats who designed the program had
neither the capacity nor knowhow to carry it out. For that, PricewaterhouseCoopers sent a veritable army of accountants, bankers, information systems engineers, lawyers, and assorted other specialists.

I am on my way to meet Sergei Yurevich Pavlenko, at that time the head of the Russian Financial Oversight Agency, which vies with the Central Bank for jurisdiction over banks. We meet in the restaurant of a hotel not far from the square, the sort of restaurant that is always deserted at any time of day or night unless taken over by a celebratory banquet. Only highly emotional pop music filled the large space. I have been systematically interviewing the former members of the Gaidar government, in which Pavlenko served. They have passed me off one to the next. Pavlenko, I was told, was a deeply reflective man who had avoided publicity for years. I want to ask him about the sociological coordinates of the group of economists to which he belongs. As my questions have changed, so too are the people that I am instructed to ask about them. Lately I have been asking about liberalism.

Born in Novosibirsk and educated as a mathematical economist, he then trained as an economic sociologist. In the Soviet Union, sociology developed mostly as a specialty within the jurisdiction, though not the methodological orientations, of reformist mathematical economics. Any social science not founded on historical materialism and the political economy of socialism threatened their ideological monopoly, and thus the foundations of the regime. Mathematical economics developed in parallel to “the political economy of socialism” (politekonomiia as it is shortened) as the leadership of the country realized the utter irrelevance of political economy to improving planning and mitigating
the slowdown in growth. The mathematical economists, their papers inscrutable to most readers, were also always able to pretend to Marxist bonafides. But sociology could never make a similarly stable accommodation with historical materialism. The regime remained without systematic knowledge of the country it ruled, as decade by decade that country changed.

Accordingly sociology had an intermittent and uncertain existence, and only in the last two decades did little pockets begin to institutionalize. The most prominent was the “Novosibirsk School,” the founder of which was Tatyanna Zaslavskaya. In 1983 a classified paper of hers leaked and was published by the Washington Post, one of the first signs as to how seriously Soviet leadership was worried at the state of their non-knowledge about the country. Moving to Moscow as one of the voices of perestroika, she founded the All-Union Center for the Study of Public Opinion in 1988, the first such research body in the Soviet Union, and the most important until its takeover by the government in 2003. In protest, most of its staff left and formed a new institute, the Levada Center. She and her students and colleagues, including Pavlenko, had engaged in decades of fieldwork on the agricultural economy of Siberia, especially the Altai Krai. Pavleno’s early research had been on the behavior, decision-making, and understandings of collective farm managers. “The specificity of the Novosibirsk School was its empiricism, and that it left the cities, where control was greatest—not only state control, but also social control—and went to the villages.”

Economic sociology drew, he says, people with political inclinations, and in the relatively isolated and free from ideological control environment of Novosibirsk
that included Maoists, Trotskyists, Peronists, enthusiasts of the Red Brigades, and sundry other leftists. One of his friends was an active supporter of the right to emigration of the Volga Germans, and another of Baltic independence, two of the politicizing causes of the 1970s. Economic sociology began to develop in the late 1970s, Pavlenko tells me, as soon as mathematical economics had reached sufficient sophistication to reveal its limits. “When all the formulas had been worked out it seemed that somewhere there was a delta. And this delta is obviously the person. So, okay, we said, let’s try to understand the person.”

Pavlenko later met a group of young mathematical economists from Moscow and Leningrad who were searching for likeminded people. Two of their number had come to Novosibirsk to learn how to do field research, Slava Shironin and Petr Aven, the future Minister of Foreign Economic Relations and subsequently president of Alfa-Bank. They found the sociologists’ evolving understanding of informal bargaining relationships congruent with their own incipient theorizing of the decay of the Soviet state. When, in the fall of 1991, Yegor Gaidar was appointed Minister of Economy and Finance by Boris Yeltsin, with a mandate to begin an immediate radical transition to market, he brought his friends from this circle into government. To coordinate the reform effort, Gaidar set up a Working Center for Economic Reform. Pavlenko headed the internal research division of the Working Center.

The sociologists saw their function as the reflective generation of representations of society. “As a result of censorship in the first half of the 1970s, literature ceased to fulfill the role it had when Lenin said, ‘Lev Tolstoy is the mirror of the Russian
revolution.’ Soviet literature ceased to be an instrument of comprehending society.”

This mission of literature, taken so seriously perhaps nowhere as it was in Russia, was the result of the peculiar estrangement of intellectuals from politics. Under absolutism, without avenues for direct participation, creating the cultural environment of the ruling castes became politics. With the cooption of literature to political goals under Stalin—the creation of official unions for writers and artists, and a state system of prizes and sinecures to add carrot to stick—this moral core began to seem rotten. In the 1960s, with the publication of earnest internal critiques of the Soviet system like Dudintsev’s *Not By Bread Alone* and Solzhenitsyn’s *A Day in the Life of Ivan Denisovich*, there were hopes for rebirth, soon squashed. But from the mid-1950s, as Khrushchev closed down the “Gulag Archipelago,” he simultaneously built another archipelago that dotted the continental expense, one of civilian and military scientific institutes and research cities [*naukogrady*] that had no names and could be found on no maps. The intelligentsia, as Pavlenko put it, became “the community of junior scientists” who worked very little, read quite a lot, and went to the theater constantly. The scientific-technical intelligentsia created in the 1950s and 1960s to serve the military-industrial complex came to a growing self-consciousness of their own power and conceived a mission to elaborate the values and goals of the atomic age society they were engineering into existence.

In 1957, the mathematician Mikhail Lavrentiev founded the Siberian Division of the Academy of Sciences, and broke ground on a new “academic city,” Akademgorodok, in the woods outside of Novosibirsk. He proposed it as a place of interdisciplinary collaboration, relative freedom from Party ideologists, and ready funding. A utopian
communist city for the scientists who would invent utopia. Within a short span, dozens of institutes rose in the forest, and tens of thousands of scientists relocated there. There were no social scientists except mathematical economists, most of whom had backgrounds in pure mathematics or physics, and those of them that turned to sociology. “There was such a high concentration of scientists in a small space. Among them, smart physicists, mathematicians, and chemists. It was a kind of micro-society, mikrosotsium. In distinction from economists and sociologists, physicists weren’t limited in their contacts. They might speak idiocy, they might say smart things, they might say the one and then the other. But this expanded the limits of science. That was its function for social science.”

Increasingly my research had come to focus on the nature of liberalism in post-Soviet Russia. Here I ran up against an unexpected impediment. The self-identified socialists and the nationalists knew exactly who the liberals were. The newspapers had no trouble identifying people like Pavlenko as “leading liberals.” But when I asked liberals whether, how, or in what sense they understood themselves to be liberals, they were uncomfortable with the label. When I asked them to explicate Russian liberalism today, they hemmed and hawed and attempted to evade the question. Explaining my puzzlement at this reaction to Pavlenko, he nodded his head curtly and immediately offered an explanation:

“I think that liberalism as a political stream doesn't exist in Russia. Liberalism exists as some sort of system of life values that includes within itself political values. It's not a political conception. It's a conception of a lifestyle. And in the
lifestyle of the Russian the state is present, but complexly and indirectly.

Liberalism in Russia is simply some sort of ideology of familial relationships.

After the state ceased to be a member of the family, or more exactly, we ceased to be members of the family of the socialist state, in some Freudian sense having killed our father, then ideology ceased to have its space and turned into the same sort of specter that Marx said haunted Europe. Such a specter is the liberalism haunting Russia today, and it cannot become reality simply because it does not have its space for realization.”

This explanation astounded me and did little to help me understand. What did it mean for liberalism to be spectral? How could liberalism be not a political conception but a lifestyle? How had “we” ceased to be members of the family of the socialist state? What did it mean for ideology not to have a “space for realization”? Years later I wrote to Pavlenko to pose these questions to him. He explained that

“When I speak of ‘lifestyle,’ I mean more ‘culture.’ The situation was asymmetrical, on the one hand ‘ideology’ and on the other hand ‘culture,’ or better, ‘counterculture.’ The processes of the 1960s continued in the USSR in the 1970s and 1980s. But the difference was that in the West the political system absorbed them, and in the Union, not. Thus the asymmetry. And the totalitarian state, insofar as it was ‘totalitarian’ totally penetrated the life of its citizens, not only the space of social communication, but even internal dialogue. This made independent thinking possible only in a critical or oppositional mode, and put the
bearer of such consciousness in a damaged position, one lacking in coherence or integrity."

I seek genealogies of this spectral liberalism in multiple generations of Soviet economists reflecting upon the society in which they lived. The stories liberalism tells about itself tend to seek its roots spatially or metaphorically distant from and untainted by the state. The notions of “civil society” and “antipolitics” employed by Polish dissidents presuppose such a story, as much as do Western narratives of essentially autonomous liberal subjects repressed and oppressed by state power. In contrast, my story finds that which will be called liberalism developing within the heart of the state. I look to the scientific-technical intelligentsia, a caste that the state created and to which it granted privileges, and within this caste the economists, an occupational group living and working in the heart of the state apparatus, helping it both to promulgate its own self-understanding and to govern in accord with that understanding.

**ECONOMIC REASON AND SOCIALIST GOVERNMENTALITIES**

My narrative begins with the seizure of power by the Bolsheviks. The First World War catapulted into government specialists of various sorts, including economists. At the same time, the Bolshevik leaders were themselves economic theoreticians. The economic field became multiply contested, as different factions carved out new niches for themselves in the growing state apparatus and fought for jurisdiction over different arenas of state practice. They divided along their understandings of the basic problem of the early Soviet state and strategy for solving it: how to industrialize a peasant nation. But
they were also divided by their presuppositions of how a socialist state would govern the polity.

However, industrialization was inseparable from a deeper project to transform the basic ontological categories of society—a transformation that was called Cultural Revolution. The relationships between science and technology and between science and politics—and thus between all of these and economics, positioned at their intersection—were all to be transformed. We see the battles over these relationships being played out throughout the 1920s in institutionalized struggles between scientists and engineers, engineers and planning economists, planning economists and statisticians, and all of the above with Bolshevik theoreticians.

With the onset of crash industrialization, all approaches to planning lost, cataclysmically. The major economists were killed or arrested. As the hypertrophying state rapidly substituted itself for nearly all autonomous economic activity, official political economy celebrated the complete freedom of the state with respect to reality. Economics, as an institutionalized mode of veridiction, and the economy, as a semi-autonomous reality confronting and setting limits to state power, disappeared together. Official political economy celebrated the complete freedom of the state with respect to reality.

The second chapter gives a pre-history of the mathematicization of Soviet economics. In 1939, Leonid Kantorovich invented linear programming, but he failed to elicit much interest in his discovery the end of the 1950s. What changed in the intervening twenty years? I argue that in the immediate postwar period, a series of
practical problems drove some economists to reconstruct a lost understanding of the economic as such.

On the one hand, the state had hypertrophied as it absorbed the economy. But on the other, we have the objects planned, above all the infrastructural core of industrialization: the large-scale sociotechnical networks of electrification and transportation. Accordingly, in the 1930s and 1940s electrical and transport engineers found themselves tackling economic problems alongside practical planners. Somewhat later, in the immediate post-World War 2 period, the Soviet administrative management system that had grown organically and without a blueprint begins to be theorized by economists, in piecemeal fashion. The industrial base had been created, but new problems of governance had emerged. The increasingly complicated industrial structure required rationalization. Capital investment, the technological structure of production, and industrial management became problem sites generating the production of economic knowledge. The specifics of accounting systems, the planning apparatus, and pricing formulas, in all their seemingly dreary and arcane detail, are the medium within which Soviet economic thought begins to gather speed.

I review four debates in Soviet economics from the late 1930s to the late 1950s: on the applicability of the “law of value” to socialism, on how to compare the effectiveness of capital investment, on the methodology for setting prices, and on how to get the best performance from enterprises. As I will show, while these debates began from highly specific problems of planning, their interconnections gradually became
clearer to the participants. The result was a new interpretation of the productive
relations of the Soviet Union, a diagnosis of their pathologies, and prescriptions for their
reform.

This non-mathematical reformist economics constituted a sea change in Soviet
understandings of the nature of their own society as both a productive ensemble and a
polity. More than a pre-history of mathematical economics, then, this is the history of a
profound watershed in the history of power in the Soviet Union. The Stalinist technology
of power was a hypertrophied form of disciplinary power that assumed the unlimited
competence of the party-state to minutely organize social life. It recognized no external
realm of economic reason that could frustrate its designs. I claim that these four debates
reassembled the economic: a mode of complex interconnection of people and things
independent of the state that yet must be taken into account by the state. By rendering
visible the way that the institutional mechanisms of Soviet socialism articulated local
interests, they constructed this “economic mechanism,” as it would come to be called by
the end of the 1960s, as a site for veridiction. My argument recovers this rupture in the
fundamental political ontology of Soviet socialism via a detailed reconstruction of
economists’ problematizations of the institutions for managing productive life in
common.

Soviet reformism must be situated within a wave of market socialist reform
proposals that swept across the communist bloc in the 1950s and 1960s, leading to
Hungary’s New Economic Mechanism and Yugoslavian “Goulash Communism.” They
proposed to organically unite markets and planning. The state would not be a
counterweight to or safeguard against the market. Rather, the market would be planning, and planning would be marketized. They were hopes for a “socialism with a human face”: a liberal socialism.

The third chapter gives the other half of the story of the mathematicization of Soviet economics. I position the vogue for cybernetics as a crucial driver of the transformation of the institutional structures and epistemic order of Soviet technoscience that occurred in the 1950s and 1960s. The electrical power industry had midwifed radio, electronics, and control engineering. Under the impetus of Cold War military competition, these technologies rapidly developed and ramified. Huge numbers of new scientists and engineers wielding new forms of highly-mathematized knowledge were trained to staff the four industrial sectors that formed the new leading edge of Cold War growth—atomic weapons and energy, rocketry, radio-electronics, and computation. Inseparable from the rapid growth of Soviet military science, Soviet cybernetics was both result and medium of surprising recombinations of different forms of scientific and engineering expertise to create novel military technologies. Military computing was the point of entry for cybernetics, while its focal tasks—the bomb, rocketry, and radar—in turn shaped cybernetic understandings. The rapid growth and cyberneticization of these new areas of militarily-driven science caused a tectonic transformation of the Stalinist articulation of science, technology and politics.

A crucial moment of these latter shifts, I further suggest, was the transformation of Soviet economics into a properly mathematical economics. In a series of analogical transfers, mathematicians and engineers derived a radical vision of cybernetic
communism from their specific military engineering tasks. The euphoria triggered by the expanding vistas of the scientifically possible manifested as dreams of a new and truly scientific planning and management of the state that would be adequate to the challenges of its industrialized form. Their encounter with reformist economics of the second chapter, mediated by computational utopias, enabled the transfer of advanced mathematical technique, metaphors, and personnel from military science to the social sciences. In longer perspective, the stratum of scientists and engineers forged in the Soviet military-scientific regime became the heart of late Soviet pro-democracy intelligentsia, while mathematical economics would give rise to alternative visions of socialism activated in the denouement of the Soviet story.

The fourth chapter builds on the previous two to narrate the assembly of Soviet mathematical economics properly speaking. “Mathematical methods” constituted an intervention into the economic field. They were welcomed and wielded by a segment of the reformists, against the more conservative of the political economists. The latter reacted with various arguments against mathematics, which had not been relevant since the first Five Year Plan, the beginning of the industrialization drive. But the new industrial sectors, new personnel bearing new expertise, and new metadiscourse of cybernetics—all brought into being as part of the creation of new sociotechnical weapons systems—had changed the terrain. Young mathematicians and physicists, often with cybernetic inclinations, were recruited into the economics profession. They deployed the new tools of input-output analysis and linear programming within the problematization defined by the reformist economists. In the process, that problematization mutated.
Mathematical technique gave new forms of inference and new justifications for pre-existing proposals. But conversely, mathematical technique became its own level of historical effectivity. In the encounter of technique with the reality opened up by the problems, both problems and mathematics grew, and grew together. The ensembles were experimental systems that generated novelty that continually modified the system and its capacity for producing further novelty.

Mathematical economics had two centers of gravity, two communities, one based around input-output modeling, and the other around optimization techniques, constituted the heart of Soviet mathematical economics. While they both came to be housed first of all at the CEMI, their overlapping networks extended in different directions. The optimizers were more closely connected to the Academy of Sciences, to the applied mathematics profession and to military cybernetics and computing institutes. The input-output modelers were more closely connected to the planning apparatus—Gosplan and its institutes, and the Central Statistical Administration—and to the institutes of applied industrial science.

These two schools of thought re-established the veridictionary capacity of economists’ facts in the face of political power. This upsurge of mathematical economics was an (unsuccessful) part of a pan-Eastern European wave of efforts to introduce limited markets into socialism. Khrushchev’s Thaw in the early 1960s made possible new ethical stances and strategies with respect to Soviet power. In this context, a new concept, that of the “economic mechanism,” allowed space for imagining alternative socialisms.
The fifth and final chapter reveals the prehistory of the young economists who became the first Yeltsin government and tried to guide the collapse of the Soviet system toward capitalism. Soviet economists’ networks, intersecting and overlapping across the dozen major research centers of Moscow, Leningrad and Novosibirsk, were in continual motion across the 1980s, forging links and alliances with bureaucratic patronage networks, becoming visible to the public in the “battle of the programs” in 1990, and intertwined with the emerging democratic wave. But in the autumn of 1991, having come to power after the failed putsch, Yeltsin chose a 36-year-old economist named Yegor Gaidar to spearhead radical market reform and gave him carte blanche to bring into government his entire circle of similarly young and even more unknown economists. The team has been called many names—the young reformers, the Snake Hill group, the Gaidar team, the government of deputy laboratory heads, and others much less kind. To most eyes they appeared out of nowhere, and their success against far more famous (and perhaps more moderate) groups of economists appeared inexplicable, and has largely escaped attempted explanation to the present day.

The Gaidar circle took shape within the interstices of late Soviet life that allowed a limited autonomy. By the onset of perestroika, their early years spent searching for likeminded others had culminated in a seminar at a sanatorium called Snake Hill [Zmenaia Gorka]. In their memory, this was a historical watershed. Dozens of members of the original Snake Hill group later entered government at cabinet-level positions. They also took advantage of the quickly changing possibilities for forms of association opened up by perestroika, including finding international contacts and allies and forming
political clubs in Russia. Through these clubs they helped to create, especially the eponymous Club Perestroika, they opened fora for the emerging democratic political scene, contacts with which were crucial for the political battles of the 1990s to come. Many of the future liberal elites of the 1990s and 2000s, including leaders of the 2012 protests, will be drawn from this milieux of dissidents, artists, and would-be politicians.

But their theory, not just their organization, gave them an advantage. Most accounts assume that because we call them “economists” and because they oversaw the beginnings of the institutionalization of a capitalist economic system their economic theory was the orthodox ‘neoclassical’ theory with which Western observers are familiar. But this is not the case. Four distinct subgroups developed increasingly converging theories of the functioning of the Soviet state and economy. One strand came from field studies of Soviet agriculture; one from the examination of planning in practice; one from study of Eastern European socialisms; and one from historical study of the failures of prior reforms. The resulting theory, which they dubbed the “theory of the administrative market” in 1986, was a microeconomic critique of the Soviet state, and thus of the possibilities for economic reform. It constituted a generational reaction against the optimism of the mathematical theories of optimal planning of the 1960s–70s. I trace the formation both of this theory of the administrative market and of the future government as a network and thought collective from 1982 to 1991.

MARCHING ON THE WHITE HOUSE
I had not expected to encounter or study popular protest when I came to Moscow, for there had been precious little of it for quite some time. There was so little that the lack was itself becoming an object of social scientific interest, as well as increasingly anxious consternation to Americans, including myself, who had been taught to valorize it as a sign of political health. On the 31st of every month, for instance, a miscellany of discontents led by now very unpopular liberal politicians of the 1990s met on Triumfalnaya Square. But there were more journalists (if ever dwindling) and police than protestors. Academics and publicists wrote endless articles seeking to explain, condemn, or excuse the political apathy. Any hopes were invested in a change of elites, or a slow shift in policy for the better as the administration "responded" to the “demands” of the growing class of people (mostly Moscovites) with European incomes and patterns of consumption.

Yet I found myself on the metro toward Barrikadnaya Station going to Triumph Square on the second night of what was to be year of protests. I was excited with possibility and more than a little afraid. The day before the protest at the fixed parliamentary elections at Clean Ponds had drawn not the dozens expected but thousands, and they had refused to disperse. We had blocked the intersection with Masnitskaya until the OMON riot police came, and, forming phalanxes, surged forward flailing with vicious swings of their truncheons ten meters at a time. They contrasted sharply with the freshfaced young boys of the metropolitan police that everyone was accustomed to ignoring. The arrival of these huge men in their winter camouflage, their lined faces impassive behind their plastic masks, raised a tone of anger and anxiety in the humming
excitement of the crowd. My friend Ilya and I were crushed by their assault against the side of the National Telegraph Building, until the crowd broke and we ran into the sidestreets.

Ilya worked his cheap Nokia to sort the rumors. Some people were marching to the Electoral Commission; we joined the rivulets of people flowing through the alleys, past the well-loved cafes of intelligentsia life, toward Lubyanka Square. The imposing Lubyanka, the former headquarters of the KGB (now FSB), during the Great Terror of the 1930s was ringed by supplicants like Anna Akhmatova hoping for a glimpse or a word of their loved ones who had disappeared in the middle of the night. Now it was the symbol of the Putin regime, so many officials of which, including the president himself, were KGB alumni. The siloviki, they were called: representatives of the "force" [sila] "structures". At angles to it was the facade of the Polytechnical Museum, a vast 19th century paean to the hope of capitalist industrialization, later a showcase for the leading edge of the communist future, and in the 1960s a stage on which the intelligentsia and what became its dissident currents played out their coming to political consciousness.

We could not reach the square; a human chain of riot police with arms interlocked blocked all the roads to it. Feeling full of impunity, we shouted angrily in their faces “Pozor! Pozor!”—“shame!” to my amazement the same cry that I had heard across the live stream late at night from the Occupy Wall Street protests in Zucotti Park. Over the shoulders of the policeman we could see the empty space in the middle of the Square left by the statue of Feliks Dzerzhinskii, the murderous founder of the KGB, when protesters had pulled it down and smashed it in summer of 1992. Perhaps the feeling I remember
best that night is our longing to reach that empty space and fill it with our bodies and voices.

This next night, the day's rumors had it, was to be at Triumfalnaya. As I hurried from the metro station, my phone flooded with messages undelivered while I was underground: the regime had bussed skinheads and "Nashisti" (members of the official pro-regime youth group Nashi—"Ours—the derogatory title purposefully sounded of "Nazi") from the suburbs; they had drums and megaphones and were beating the protestors; the OMON had come and were already arresting people; Ilya and Lesha were hiding in the lobby of a hotel. As I entered the Square I found my friend Tanya, whom I had not really expected to find there. A friend of mine had met her at a meeting of the architectural preservation society Archnadzor, one of the oldest "civil society" organizations in Russia, formed to protest Stalin's destruction of churches in the scientific atheism campaign, and had been dating her for several months. A tall, slight blonde woman, she was exactly the sort of young person with disposable income and a taste for taste—"the creative class"—for which the city of administration, explicitly influenced by Richard Florida, was remaking the city center into an urban playground in an undisguised bargain for continued political quiescence. We had barely exchanged greetings when she flung me against the wall of a building and blocked me in with her body just as a group of OMON ran past us, grabbed people at random and shoved them into a mobile jail, the avtozak. The square was too chaotic, people were too panicked, no one knew what to do.

I heard someone say to go back to Barrikadnaya, to regroup there. On the way I picked up my friends, and when we arrived perhaps a hundred people were shouting
slogans at the base of the Stalinist skyscraper that looms over the metro spot, with the cheap and nostalgia-inducing cafeteria on the first floor, its décor unchanged for the better part of a century. I don't know how it happened, but soon we were marching in a long thin column through the tangle of dark pathways and staircases that threaded among the buildings before issuing onto a busy road with the White House before us. Two previous marches were on everyone's minds: the one in 1991 that felt like a revolution, when Moscovites, led by Boris Yeltsin, resisted the attempted coup of Communist Party old guard that had imprisoned Mikhail Gorbachev and declared a state of emergency; and the one during the constitutional crisis of 1993, the nightmare in which Yeltsin had ordered tanks to shell it until its white walls charred black while the deputies huddled inside.

Our little march would never have reached the square before the White House anyway—the government had many years before fenced off that square to deny it to any future protestors—but before we reached that fence a busload of OMON streaked past and deployed a human chain across the sidewalk. We piled up against them until another contingent threatened to cut off our exit, and all but a handful of us escaped across the roadway. Looking back I saw Tanya had remained in the cordon, shouting into the faces of the men towering over her, the tendons on her neck standing out, her fine hair flying. At first she had not realized the danger, and then there was nothing to do. Just as it seemed their arrest was certain they broke through and escaped to join us. We all walked back toward the metro, our stream dividing into little rivulets and eddies, breathless. While we were talking and sucking cigarettes before the columned entrance to the metro
station, Tanya clutched her stomach, squat low to the ground, and moaned that she was going to be sick.
In the summer of 1921, a twenty-two year old former war correspondent and aspiring writer named Andrei Klimentov quit his writing and resolved to put his education to work. Drought and famine, following in the wake of the prolonged Civil War, were ravaging the countryside. As he later recalled, “Being someone technically qualified, I was unable to continue to engage in contemplative work such as literature.” From 1923 to 1926, as the deputy director of the department of electrification of the Regional Land Administration he worked as an electrical engineer and land reclamation expert, constructing two small rural hydroelectric plants and one turf-fired power station.

Writing under the nom de plume Andrei Platonov, he is remembered as a giant of Russian modernist literature, whose haunting stories elongated like cast shadows the ethical contradictions of Soviet modernization, despite or because of his passionate belief in the promise of October. Much of his greatest work was unpublishable until after that promise had passed into history. But in many ways the life of the young Andrei Klimentov was exceptional only in just how perfectly it followed the mainstreams of the moment. Nearly all the aspects of his early biography are, in retrospect, exemplary.

Platonov’s early life was entwined with the technological systems central to the post-revolutionary period. His father was a railroad engineer, and he followed after him, entering the electrotechnical faculty of Voronezh Railroad Engineering School in 1918 before being swept into the war. He served on the Southwest Railroad Committee and the
editorial board of *Railroads* while beginning to publish literary criticism and exuberant revolutionary poetry. He was then conscripted into the Red Army and worked as an assistant engineer for train-mounted artillery. In very literal identification with the revolution, he wrote to his wife that “The remark about the revolution being the locomotive of history was transformed inside me into a feeling that was strange and good: remembering this sentence, I worked very diligently on the locomotive…..” In 1921 he graduated from both the Railroad School and a one-year course at one of the new Party Schools founded to forge the cadres required by the Bolshevik conspiracy when it found itself becoming the Soviet government. In the same year he published both his first volume of poetry and a political brochure, “Electrification,” in which he declaimed that “[E]lectrification is a revolution in technology that has the same significance as the Revolution of October 1917…. Communism fights not only against Capital but also against Nature. Electrification is our best long-range artillery in the struggle against this Nature…. Electricity is a light, elusive spirit of life; it comes out of everything and goes into everything where there is energy.” It was soon after that he devoted himself to rural electrification.

Based on that experience he was to publish a deeply autobiographical short story in 1939 called “The Motherland of Electricity” in *Industriia sotsializma*, intended as a study for a never written “Technical Novel.” The narrator is a young engineer who works every waking minute to maintain the straining turbogenerator of his small city. It is the summer of 1921. The disastrous Civil War is about to come to an end (the Southern Front had been won; fighting continued only in Siberia and the Far East) but a bad harvest had
led the previous year to famine, and millions upon millions of peasants had starved to
death, the supply lines to the cities had failed, and a naval rebellion in the fort of
Kronstadt had been brutally put down. In this summer “not a drop of living moisture had
fallen from the sky and all nature smelt of dust and death, as if a hungry tomb already lay
gaping open for the people. That year even the flowers had no more smell than metal
filings, and deep fissures had formed in the fields, in the body of the earth, like the gaps
between the ribs of a skeleton” (261-2). Lenin responded to the crisis by ending forced
grain requisitioning—i.e., state terror perpetrated against the peasantry. This ended the
period in retrospect known as War Communism, during which the revolutionary
movement consolidated power and mobilized the human and material resources of the
country for total war, and announced the New Economic Policy (NEP). During the war,
military-disciplinary mobilization, nationalization, and centralization had quickly
solidified as an image of what socialism itself was to be. NEP was a retreat to a mixed
market economy—a retreat that quickly came to seem to some an alternative image of
socialism. But in 1921, “the market,” in this overwhelming agrarian state, meant not
factories or the shop windows of urban arcades, but rather thousands of miles of small
peasant holdings, most organized as the many hundred year old redistributive commune.
In the countryside the state was weak often to the point of total absence— weaker indeed
than it had ever been, after the peasants had seized the revolutionary moment to
expropriate the landed nobility that had been the mediator of central power to the
provinces.
The Chairman of the Provincial Executive Committee receives an urgent plea from the Verchovka village soviet’s Secretary, Stepan Zharyonov. Verchovka’s power plant requires an engineer, and the narrator is dispatched. Though the village is but three days walk from the town, the young engineer must wander in search of it, so quickly does knowledge of the countryside (“the depths,” as metropolitan intellectuals have long been in the habit of calling it) drop off with distance. There turn out to be three Verchovkas—Old, New, and Not-So-Poor—and his destination is the last. In 1920, Lenin had inaugurated the State Commission for the Electrification of Russia, or GOELRO, which quickly worked up the very first nationwide plans, and was to become the State Planning Commission, or Gosplan. As socialism became identified with planning, and the Soviet Union with socialism, Gosplan was to become the icon of all three. This conflation was announced at the beginning of the social processes that were to render it plausible, with Lenin’s pronunciation in November of that year that “Communism is Soviet power plus the electrification of the countryside”.32

When the young engineer arrives in the entirely destitute Not-So-Poor Verchovka, he passes a procession of villagers led by a priest in the blistering sun, praying for rain. With atheist eyes he gazes on this ensemble with pity, and finds a hopeless disbelief reflected back at him from the eyes of the icon of the Madonna; in the eyes of an old woman “could be seen a keen mind that had undergone such trials in this life that in all likelihood the old woman’s knowledge was no less in scope than the entirety of economic science and she herself could have been a respected Academician” (265). She affably

agrees to his assaults on a piety worn down to pure habit. He decides “to dedicate [his] life to her, because in youth it always seems there is a great deal of life and that there will be enough of it to help every old woman” (267). When he reaches the “powerplant,” he discovers that it is a motorcycle captured from the 77th Royal British Colonial Division, up on blocks, turning a dynamo that is powering a single lightbulb.

The engineer’s journey extends with him Soviet power, electricity, and the state—and hope for new futures. The peasants in the dark huddle and stare at the lightbulb and the straining motorcycle, and “some of the thinner peasants were giving open expression to their joy, walking up to the mechanism and stroking it as if it were some creature they loved” (267). In a further and nearly vicious juxtaposition of the darkness of the countryside and the light of the technological future, demonstrating that that future is constructed only at the cost of the literal bodies of the people, the machine is powered by alcohol, Russia’s scourge, distilled by an old man who sits all day with some salted potato in hand, blind drunk, testing whether it is strong enough to serve as fuel. The peasants faces upturned to the lightbulb reflect what Frederic Jameson calls the “aesthetic shock” of modernity: the situation of incomplete modernization. Drawing on Arno Mayer’s The Persistence of the Old Regime (1981), Jameson notes that feudalism survived far longer than often believed, that capitalism began in enclaves, that the two logically distinct modes of production play out in interpenetrating historical time.

This was even more true in Russia. The beginnings of capitalist agriculture grew within the slowly decaying rural social relations of imperial absolutism, while Russian industry was long spread among state-created or -stimulated enclaves in the countryside,
thus decoupling it from urbanization, in opposition to the European pattern in which the two processes stoked each other.\textsuperscript{33} In Russia the aesthetic shock of the factory—or the hydroelectric plant, or even merely a British “Indian” and sidecar up on blocks—irrupting in the black earth of the field was that much more electricifying. Jameson’s point is not merely to draw attention to this experience, but to situate it as the phenomenal ground for the continual temptation in the self-conceptions of modern subjects and their theories of history to slip from or ignore the mode of production—capitalism—in favor of technology. Technology, in a radicalization of its historically varying but real semi-autonomy, becomes the subject of history and object of affective attachment.\textsuperscript{34} The roaring engine in the field becomes the emblem for the engine of accumulation that is capitalism. This tendency toward substitution had gone into high gear when capitalism itself becomes attenuated or eclipsed, after the revolution.

The practically-minded engineer asks why the starving village would expend grain for fuel merely to light the huts. But the light, he is told, is also that of enlightenment (prosvetanie, in Russian, from svet—“light,” not education [obrazovanie]). The peasants have pillaged the library of the local landowner. “Now the peasants read books in the evenings—some read out loud, some read to themselves, and some are still learning … And we give them light in their huts—so we’ve got light and we’ve got reading. Until the people have some other joy, let them have light and reading” (269). A variety of Russian cultural missions, longstanding or of recent advent, and many if not


the majority not socialist in inspiration or origin, aimed to transform society and especially the “depths,” as the provinces are still called. The majority of them were in a kulturtrager [kulturnichestvo] mode, taking for true culture the high culture of the arts and sciences, and implicitly the modes of behavior of the Westernized upper classes. Those enrolled in these missions, not least many Bolsheviks, conceived enlightenment as a social as well as spiritual “raising up,” a process to eliminate the gap between the elites and the masses through a democratization of education. But there were other, more radical conceptions as well. A deep strain in Bolshevism which, before the revolution, was promulgated by the Vpered (“Forward”) faction, and afterward became the movement for a proletarian culture, Proletkul’t, sought to overcome the divide between high culture and mass culture by creating a new culture of the future corresponding to the new society. Emerging during retrospection after the failed liberal revolution of 1905, the Vperedists began to theorize a cultural revolution to precede the political revolution.

While the Civil War raged, the Bolshevik government supported the dramatic, epochal extension of existing education systems via innumerable experiments and new initiatives. The variegated field of cultural projects increasingly began to be channeled through the Bolshevik state. Many Bolsheviks saw “culture,” conceived increasingly broadly, as central to the communist project, as well as necessary for its support. Becoming literate, becoming cultured, was essential for rising from heteronomous “spontaneity” to the “consciousness” that would unerringly support the revolution and be able to participate fully in the society it would bring into being. In October of 1920, the Politburo subordinated the threateningly independent Proletkul’t movement to the Party;
paradoxically this led to the recuperation of its concerns within the Party itself, with the declaration that year of the opening of the “third front” of culture (after the victories on the first and second fronts of politics and the war). At the same time, the Party consolidated its schools, such as the one that from which Platonov graduated in that very year, and those of the Red Army into a single hierarchical system of political education. With NEP’s delay of full communism into some indefinite future, the energies determined to bring the revolution to completion and new anxieties about its safety and purity were channeled into the imagination of a thorough-going cultural revolution, a deliberate reconstruction of the “superstructure,” ranging from art, literature, the intelligentsia, to the habits of everyday life [byt’].

The engineer decides to retrofit the engine to draw water into the fields of the poorest peasants, the widows and wives of Red Army soldiers. The phrase “poor peasants” [bedniaki] is important: Lenin’s great work The Development of Capitalism in Russian argued that, since the since the 1861 emancipation of the peasantry, incipient capitalist agriculture was inducing a tendential differentiation of the peasantry into poor, middle, and rich peasants. The political import was twofold. First, he argued against that powerful strand of intelligentsia Populism [narodnichestvo] that held that the peasant commune provided an alternative and uniquely Russian route to socialism that would bypass the stage of capitalism in the Marxian series of modes of production. Second, he established the theoretical basis for an alliance [smychka] of the urban proletarians (politically advanced but few in number, and yet further reduced by the dramatic “re-

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ruralization” induced by the wars) and the increasingly proletarianized middle and poor peasantry. This was crucial both politically and theoretically: Marxian orthodoxy held that socialism would only be built in the most advanced countries, but with the crushing of the German Communist uprising in 1921 (and the stabilization of the mark in 1924), hopes for European revolution faded, and a theoretical basis had to be found for building socialism in a single, “backward,” country. When the engineer tells his plan to irrigate the wastes of the poorest to Secretary Zhavaronov, the latter is overcome and begins to cry. Normally the Secretary speaks in verse (he is, in this way, the other half of the personality of the poet-engineer Platonov himself), and he is shocked into prose.

Having solved, finally, the technical hurdles required, the engineer lays down in the field beside the engine and “looked up at the concentration of stars in the sky, that future field of humanity’s activity, that deathless sucking emptiness filled with anxious and diminutive matter beating away in the rhythm of its unknown fate” (276). Well before any means to reach space had been invented, the engineer draws a straight line from a motorcycle up on blocks to rocketships. The roots of this passage are clear: Platonov was deeply influenced by Russian Cosmism, a strand of thought inaugurated by the writings of the ascetic librarian Nikolai Fyodorov (1829–1903). As strange a figure as Fyodorov was, he captured the imagination and admiration of his famous contemporaries, including Dostoevsky and Tolstoy, who declared that he was “proud to have lived at the same time as such a man.” Cosmism combined a deep Orthodox mysticism and eschatology, panpsychism (so visible in Platonov’s relentless animism), and a technoutopianism embracing biological resurrection and the colonization of the stars. One of his
followers, the physicist and mathematician Konstantin Tsiolkovsky (1857–1935), was a pioneer of rocketry so far ahead of his time as to be almost unrecognized until celebrated by the Bolsheviks after the Revolution; his works would inspire the young students Sergei Korolev and Valentin Glushko, the future leaders of the Soviet space program in the 1960s. Fyodorov saw universal spiritual import in the technological revolution underway: the possibility of realizing the Kingdom of Christ on Earth.

INTRODUCTION: THE POST-REVOLUTIONARY PROBLEMATIC

“The motherland of electricity”—the peasantry, technology, cultural revolution, the state, and the meaning of utopia. These are the dimensions of the problem situation facing the Bolshevik leadership and the economists and statisticians that staffed its government: how to industrialize in order to build the socialist society of the future in a nation of peasant agriculture largely beyond the reach of a weak state? The goal of industrialization was not in question; utopia could not be achieved without it. But the route and the means were. And implicit in those questions were other, more basic questions. In the momentous period from the end of War Communism to the purges of 1930, just under a decade, the very meaning of socialism, the relationship of Soviet reality to socialism, and the means of realizing the one on the basis of the other, were all in flux. What was socialism? What was the threefold relationship of socialism, planning, and markets? What is the relationship of economic knowledge to planning and thus to politics? What counts as a good plan? What are the mechanisms available to implement
plans? Which institutions should be in charge of making them? Answers to the most abstract questions were implicated in the most concrete, and vice versa.

The Bolsheviks believed deeply that technoscience was to be at the heart of the future social order. Across the decade the relation of scientific knowledge to political power and political ideology, of science to technology, and of economics with respect to all three rapidly transformed. Economics lies at the intersection of these basal distinctions in the Western order of knowledge. It is at once or by turns science, technology, ethics, and politics. It is a science of society that treats the latter with many of the forms of a natural science. It is a tool of government yet raises the banner of civil freedom. As such, the deep renegotiations of these boundaries of the 1920s and 1930s had implications for the practice or self-understanding of economics—and sometimes vice versa.

In wide-ranging debates, Bolshevik scholar-revolutionaries, agricultural statisticians, engineers, and others took up these questions, offering differing diagnoses of a quickly changing reality and proposing developmental trajectories, methodological procedures, and moral-political ideals. These debates were not only the concern of highest leadership, but focused the attention of all of the intellectually and politically aware members of the new polity. If political economy exists at the intersection of moral philosophy and argument about the actual and proper institutions of society (that is to say, political philosophy) and later also came to involve techniques for representing actually existing institutions, then Soviet economics in the 1920s in all its variety was political economy.
To anticipate, toward the end of the decade the path of industrialization was chosen, but this became inseparable from a deeper intellectual, cultural and social revolution. Uprooting the entire country and setting it in motion for crash industrialization was accompanied by the massive, violent political subjection of bodies and minds to Stalin’s goals. At the onset of industrialization, the decisive closing of the horizon of political economic reflection—for there was to be no more discussion, no more mooting of alternative diagnosis, predictions, or prescriptions—was not merely an end to debates, but a profound transformation in the order of knowledge that would render such debates simply illegitimate and impossible. As far as the economists were concerned, no side wins. Economic questions became unaskable; the economy as such disappeared from thought and practice. What replaces them is an anti-liberal disciplinary technology of total planning. When in a torturous birth the economic appears again in the vastly changed Soviet world of the 1960s, there was very little methodological or theoretical continuity.

The purpose of exploring the debates of the 1920s, then, is only secondarily concerned with their problems and doctrinal contents. The contents are interesting only insofar as they show the possibility of a gap between Soviet reality and socialist ideals, the gap in which political economic reflection finds its place again in the 1950s. The primary reason to return to these early debates is to understand the institutional and epistemological reconfigurations with which they were imbricated: it is at the level of these resulting structures that we can trace continuity across the decades. The 1920s were the period in which the institutions of the Soviet state and economy rapidly took shape.
These processes of institutional formation were affected by the theories and polemics of economists. At the same time, the various factions of economists were defining roles and positions for themselves within those institutions, positions from which to speak authoritatively with respect to emerging problems of state action. This institutional formation was inseparable from transformations in the order of knowledge.

This period thus sets the space of maneuver faced by those concerned with economic questions in the decades that followed. When we meet our protagonists in the 1950s, they are located in institutional positions at the intersection of science, engineering, and planning that were created partly by the efforts of those groups of scientists, engineers, and economists of the 1920s from which they descended, and they articulated their positions within and against an order of knowledge the creation of which involved the extinction of that very earlier economics.

The sections that follow pass from the abstract to the concrete. I begin with a basic problem at the heart of Marxism, the question of the grounding of the legitimacy of communism. Marxism gives a very special role to economic knowledge, but, as I will show its understanding of the epistemology of economics and the ontology of economic life rendered aporetic the problem of planning post-socialism. These metatheoretical debates intermittently intervened in the practice of economic knowledge production. While Bolshevik theoreticians discussed these methodological problems, planners go to planning. Accordingly, I discuss in some detail the state of the field of economic knowledge in its relationship to the practice of planning in the NEP period. While the dynamics of the field help make intelligible the decision for crash industrialization, they
did not determine it. Stalin made that decision, and in what followed both the economists and the economic were destroyed.

FIGURES OF THE UNIVERSAL

Beneath the open questions as to the nature of the state and the economy under socialism lay another: the figure of universality that was to underpin the legitimacy of the political order. Socialist social order was to be legitimate because it was not dominated by the interests of some particular social fraction over the others. Rather, it was grounded in and realized a universal. Here we reach points of ambiguity, confrontation that, as Ivan Szelenyi and Lawrence King demonstrate, Marxism inherited. Marx’s intellectual heritage encompassed three such figures of universality.36 These conceptual points of indecision, on which depended ever more elaborate and layered constructions of socialist theory and practice, were both available and crucial to subsequent disputes. The argument is not that some inner contradiction within Marxism is an arche (or worse, hamartia) that determined the subsequent course of history. Firstly, because no conceptual system is without its contradictions and always incompletely digested histories; more deeply because these contradictions are shared with those of liberal political theory and political economy (though there are differently and distinctively articulated); but most fundamentally of all because conceptual systems themselves are retrospective abstractions away from the social situations in which “concepts” are actually means to getting social action.

36 Lawrence P. King and Ivan Szelenyi, Theories of the New Class: Intellectuals and Power (Minneapolis, MN: University of Minnesota Press, 2004).
The first figure, the State, derived from Hegel’s class analysis of bourgeois society. Hegel, rather than celebrating civil society, saw it as an arena of particularistic struggle. The state would have to be the embodiment of the universal, but it could not be such insofar as it was an agent of any particular social class, such as the agricultural or industrial classes. The social ground of the state’s universality, Hegel theorized, in an apotheosis of the Prussian order, was the class of civil servants. In Marx’s earlier work, he denied this universality: the civil servants project an imaginary generalization, concealing the particularity of the state as an agent of the dominant classes. Instead, the one class not part of civil society—the proletariat—must be the means to overcoming not just the state but civil society itself to inaugurate true human emancipation in general. But then the question arises of how the most alienated class could come to a consciousness adequate to carry out their historical task.

What tutors the proletariat is a figure of Knowledge. Marx inherits this figure from Saint-Simon and Comte, who saw science as a means to emancipation, as well as the Young Hegelians. For Saint-Simon, science had two social functions. First, it would accumulate knowledge for the rational administration of an industrial society, and second, it could be a modern substitute for the order-inducing social forms then being destroyed. Whereas Saint-Simon’s vision was essentially technocratic, a knowledge of how to organize production imposed onto society, Comte saw a need for a social engineering based on a science of society, a “sociology.” The “Young Hegelians,” with whom Marx polemicized in his youth (especially in *The Holy Family* and *The German Ideology*), replaced Hegel’s civil servants with the critical intelligentsia. But whereas for
Hegel, philosophy only appears during History’s dusk, for Marx and the Young Hegelians it must guide action.

Marx tries to suture the second figure, that of Knowledge onto the third, that of the People, the proletariat, but the two remain in tension. The figure of the People, of a collective subject of political action that grounds the legitimacy of the state, is part of the deep structure of the modern political imaginary that Marx shares with liberal thinkers. As Charles Taylor schematizes the transition, the modern moral order, in which the People emerge as a form of collective agency, replaces two pre-modern conceptions of moral order: of a Law constituting a people as such and governing them from time immemorial, and of an earthly order than replicates and tends toward a cosmic order.  

Without transcendent Forms-at-work in reality, the construction of the common world must be the result of everyday action, its framing principles not of a different order than the action that takes place within them but merely the result of previous actions.

The People recognized as the political subject, of course, was a very restricted subset of all the people that were the population of the state, and the radicalism of Marxism is precisely to expand that subjecthood to those not previously included, those not licensed to participate in that great conversation, and indeed to prefer them. Marx can be taken to have argued, attempting to make inseparable the figures of the People and of

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38 Imaging this unitary subject of action, as theorized by Taylor, Habermas, and Warner, is inescapably bound up with the development of forms of circulation of semiotic media and readerly orientations toward them, such that private individuals could be considered to be in a public conversation the outcome of which, depersonalized, still could be taken to express the intentions of those who participated in it, even in the minimal stance of the reader. Jürgen Habermas, The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society (The MIT Press, 1991), Michael Warner, Publics and Counterpublics (Zone Books, 2002).
Knowledge, that the critical intellectual’s knowledge must be addressed to the life experience of the proletariat, must resonate with it. But this problem has risen and fallen in urgency in Marxist theory, depending on the conditions of working class and revolutionary organizations. In the late nineteenth and early twentieth centuries, the period of the Second International, the scientistic Marxism associated with economism and reformism was predominant. Ineluctable objective historical laws would bring socialism into being, either by inevitably driving bourgeois society to the climax of successful revolution or by slowly mutating it into its socialist other.

But Russian Marxism at the turn of the century revived the critical element of the Marxian tradition, the role of a special Knowledge in shaping the course of world history, that underlay the historical privilege of the intellectual. In the “backward”—non-industrial, absolutist—conditions of Russia, consciousness was far in advance of material conditions. The revolutionaries sought to hasten the revolution by working on consciousness to foment revolution. Exactly how to theorize this was contested within the Communist Party. Martov, for example, looked to develop class consciousness, consciousness of the need for revolution, and intellectuals organically of the working class by fomenting low-level struggles for improved working conditions and wages that would function as a practical revolutionary pedagogy. But Lenin critiqued this program, arguing that this could only give rise to “trade union consciousness” that would seek gains within the existing system, never the understanding that the system itself must be destroyed.
To what did the Bolshevik militant theorist owe his higher consciousness? To the science of historical materialism and political economy—the knowledges of the course of history and the essence of society. Though these two concepts were not yet as regimented in their meaning and relation to each other as they would later be, the forms of knowledge they represented were central to the Bolshevik claim that Marxist theory offered a privileged position of critique.

AN IMPOSSIBLE SCIENCE

According to strictest orthodoxy, in the first socialist society, the first society to be founded on the promise of scientific government, economics was impossible. Marx’s mature critique of political economy was historicist through and through: each social formation was qualitatively different from each before or after, its social relations differed, and accordingly the categories of knowledge that could grasp it also differed. The social formation of bourgeois society gave rise to the science of political economy properly speaking.

Bourgeois society required a science of political economy because its social relations were non-transparent. The relations of men to each other were mediated by a system of interrelations of things, a system so complex that even posed at this mediated level the structure and dynamics of the system were not immediately comprehensible. Classical political economy studied that system, revealed regularities and laws of its functioning. Marx’s critique of political economy went yet deeper, showing the appearances that political economy studied, the regularities that it induced, were founded
upon yet more fundamental social relationships that themselves required scientific
description. In bourgeois society, the operations of the profit-seeking induce patterns of
organization in society independent of anyone willing them into existence or cognizing
them in operation. These include not just patterns of distribution, but, over time, the
shape of the productive process itself, the allocation of labor and capital across sectors of
the economy, the direction and adoption of technical change, and the demographic
processes of the population. For Marx, the laws of motion of bourgeois society are to be
traced back from the moment of exchange of commodities (useful things that have value
in proportion to their socially necessary labor time) to a process of production
characterized by the separation of workers from the means of production, and thus by the
transformation of their labor power itself into a commodity. Just as the astronomer
deduces the elliptical heliocentric orbits of the planets behind their movements across
Earth’s night sky, so does the political economist pursue the phenomena of commodity
exchange back to their counterintuitive causes. But socialism would be different.

Marx was vague about what socialism would be. He left little but hints and
markers as to what he imagined, certainly nothing like a blueprint or a roadmap. But
through the dialectical logic that Marx inherited one thing was clear: whereas under
capitalism men were alienated from their activity and that activity came without their will
or understanding to dominate them, an abstract domination by Capital itself, under
socialism the combined productive forces of men would be under the conscious control
of society, wielded for the benefit of all, the means to and realization of Freedom. In such
a society, social relations would be transparent and there would be no need for a science
to penetrate chaotic appearances to unknown regularities. The blind and automatic operation of the “law of value” would no longer regulate social production. There would be no economic laws. Production itself would be directly and consciously planned, subordinated to the will of humankind, in particular to the proletariat as bearers of a universalistic consciousness. Accordingly, political economy—and all of its categories that were induced from and used to study capitalist social relations—would itself become history.\[39\]

Such a position, with its impeccable textual support in Marx’s corpus, was orthodox at the time of revolution.\[40\] Bolshevik theorist Nikolai Bukharin, in his very influential 1920 book *The Economics of the Transitional Period*, wrote that “the end of the capitalist-commodity society will be at the same time the end of political economy”, for “only in a society where production has an anarchistic character do the laws of social life appear as ‘natural,’ ‘spontaneous’ laws, independent of individuals and groups, acting with the blind necessity of the law of gravity.” Under socialism “all the basic ‘problems’ of political economy such as value, price, profit, etc. simply disappear. Here ‘relations between men’ are no longer expressed as ‘relations between things’.”\[41\]

Yet this answer could not be satisfying, *some* theory of socialism must be possible, even if it were not to employ the same categories as those of the theory of capitalism. There was textual support in Marx for the notion that some form of

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40 On Soviet Marxism in the 1920s, including this question of the possibility of political economy, see above all Kaufman 1953.

knowledge must be required under socialism, that there were some constraints to political will. In a letter to Kugelmann in July of 1868, Marx wrote that “the necessity of distributing social labor in definite proportions” is a “natural law” that “cannot be done away with by the particular form of social production, but can only change the form it assumes.”\textsuperscript{42} Engels, in Anti-Duhring, wrote that even as commodity exchange and thus value will no longer regulate the relationships between individuals, there will be still be a certain necessary structure to society, and a realm of knowledge appropriate to it:

"It is true that even then it will still be necessary for society to know how much labor each article of consumption requires for its production. It will then have to arrange its plan of production in accordance with its means of production, which include, in particular, its labor forces. The useful effects of the various articles of consumption, compared with each other and with the quantity of labor required for their production, will in the last analysis determine the plan. People will be able to manage everything very simply, without the intervention of the famous ‘value’."\textsuperscript{43}

One way of interpreting these questions was to say that if socialist society was to be consciously organized, then there must be a form of knowledge of government that would bring about that organization. In a book appearing in 1925, another great Bolshevik theorist of the period, Evgenii Preobrazhenskii, largely agreed with Bukharin. He was unequivocal that Marxian categories no longer would apply in a socialist society. He concluded, though, that political economy would be replaced by “social technology”

\textsuperscript{42} Karl Marx, “Karl Marx to Ludwig Kugelmann, 2 July 1868,” July 2, 1868, https://www.marxists.org/archive/marx/works/1868/letters/68_07_02a.htm.

or “social engineering,” which would be able to forecast or predict “economic necessity” and then plan in accord with it: “Social engineering differs from political economy as the market of commodity production differs from the study room of the socialist regulating authorities with their very complicated and ramified nerves system of social forecasting and planned management.” Preobrazhensky and Bukharin both make a version of the theoretical claim that is being made anew now and no longer in the Marxist idiom: that economic reason and economic reality are related. In their conceptions, economic reason is something more than technical or instrumental reason in the Weberian sense, and accordingly the latter remains when the former is gone.

In his remarks on Bukharin’s text, not to be published until 1929, Lenin disagreed with Bukharin’s declaration of the end of political economy, though he agreed that the economic categories devised for bourgeois society would cease to apply, and cited Engels as support. Engels, also in Anti-Duehring, drew a distinction between political economy in a wide and in a restricted sense. In the wide sense, it would be an as yet non-existent theory of general laws governing human provisioning; in the restricted sense, it would be different from epoch to epoch. If Marx had created the mature political economy of capitalism, it was left to his Soviet followers to found a political economy of socialism. Lenin was not alone in trying to keep open a space for such a science. What might such a science be, on what categories it might rely, what sort of epistemological relation it might have to its object? In 1925, I.I. Skvorzov-Stepanov, citing the same passages from Engels, also proposes the necessity of both a general economic science, and a political

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44 P. 62, as cited by Adam Kaufman, “The Origin…”, p. 251
economy of socialism, but in the discussions that follow he is roundly criticized for his transhistorical use of categories peculiar to bourgeois society.\textsuperscript{45}

The question reappeared in a new guise in 1926-1927, during the controversy between the “mechanists” and “idealists,” to name them by the political slurs with which they tarred each other.\textsuperscript{46} The question of the applicability of the concept of value shifted to the concept of “abstract labor.” Isaak I. Rubin took the orthodox position that abstract labor is a historically specific category, part and parcel of the way the market functions to equate qualitatively different forms of labor in the act of exchange and bring them into quantitative relations. For the mechanists, on the other hand, abstract labor is psycho-physiological. They could cite from the beginning of Capital, in which Marx, dialectically building up his full concept of abstract labor, begins with its superficial determination as “a productive expenditure of human brains, nerves, and muscle.” Under such an understanding, abstract labor would be a transhistorical category. But this sneaks value back into socialism: abstract labor produces not use values, but values. If abstract labor is transhistorical, then so is value, and so are commodities. In 1930, the Central Committee of the Bolshevik Party criticized both sides harshly, but it is clear that the mechanist tendency largely won out in subsequent years, as it became accepted that the labor theory of value would underlie price formation under socialism.

Answering these questions could be put off with the turn to the New Economic Policy. Under NEP, nationalized industrial trusts operated in a regulated market environment. As a transitional period, NEP separated the question of the nature of a true

communist order from the theoretical problem of understanding the actually existing Soviet economy. As long as a market—in the Soviet case, most importantly an agricultural market—continued to operate, capitalist categories would still apply. E. Khmelnitskaia and A. Leontiev argued that market and planned sectors cannot simply coexist alongside each other: in reality the laws of the market and the commodity form drive this mixed economy. Bataiev agreed, but argued that prices in the socialist sector no longer express values, but are a “calculative method of economic accounting,” and the proportions between industries within the socialist sector are now the result of policy. Lapidus and Ostrovitianov, in their widely used 1928 textbook, distinguish between a “law of labor allocations” that determines the proportions of the different industrial branches even in non-bourgeois societies, and under socialism is brought into effect via planning, and the law of value. In a proposition that would become dogma, they argue that in the transitional Soviet economy planning dominates, and the law of value is consciously used for socialist ends.⁴⁷ What it would mean for the law of value to be consciously used would prove a frustrating puzzle for Soviet economists.

With the launch of the industrialization drive, political economists increasingly argued that the law of value no longer applied. The true law of the land was the plan. Socialism, the society of freedom, was being built, and the compromises with capitalism were being eradicated.

WHAT IS A PLAN?

The Stalinist planning system, or more precisely the penumbra of fantasy about planning and the state that surrounded the industrialization drive of the first five year plans, subsequently have dominated the global imagination of planning. The totalitarian vision of Stalinism was that of a single, far-sighted, techno-scientific organ that would determine a comprehensive plan, exhaustive in breath and depth, operating without trade or money, imperatively arranging the minutiae of collective life, ignoring the boundaries separating the economic from the political, the public from the private. But in 1920, no one knew what planning ought to be.48

The “model” called War Communism was a series of ad hoc nationalizations, administrative controls, and militarized coercions lashed together to mobilize a country embroiled in revolutionary turmoil and civil war in order to stem the tide of a war it was losing. Control was distributed among a variety of organs; lines of jurisdiction were unclear or undrawn. There was no central plan. Insofar as it could be said to have succeeded, basic systems were breaking down—hunger threatened—and rolling it back was not optional. But while it had existed, when the revolutionary moment coincided with the demands of wartime mobilization, it was possible to imagine that socialism and the new Soviet state were identical.

With the end of War Communism, a gap opened up between the realities of the Soviet polity and the ideals of socialism. In the hole torn in the present by the Revolution, the future might be glimpsed, and a true avant-gardism flourished: the society to come was at issue and it was incessantly, exhaustingly, even neurotically argued over, fought

for, dreamed and imagined. Economic thought, being at the base of Marxism, was a key—perhaps the key—modality of this avant-gardism, and the 1920s accordingly were one of the most fertile chapters in its history.

The debates on the Soviet economy ranged across a complex and differentiated field of heterogeneous knowledges that occupied different niches of the evolving Soviet polity. They spanned the technical matters of economic research, modeling, statistics, and planning, major questions of national economic policy, and philosophical problems of the nature of socialism and the form of knowledge appropriate to it.

Within the state-planning field, three basic networks can be distinguished, with their respective social conditions of formation, forms of knowledge, political affinities, and institutional locations. The remainder of the chapter will present the structure of this field, and then set it in motion toward the First Five Year Plan. Firstly, Communist intellectuals had their base in the Bolshevik Party and its nascent educational institutions, the Institute of Red Professors and the Communist Academy. Secondly, engineers dominated portions of the state, including the planning organs, the State Committee on Electrification (GOELRO) and its successor Gosplan, and of the Academy of Sciences. Thirdly, statisticians occupied the Commissariat of Finance (Narkomfin), the Commissariat of Agriculture (Narkomzem), parts of Gosplan, the Central Statistical Administration (TsSU), the Conjuncture Institute, and the Timiryazev Agricultural Academy. Being only variably committed to Bolshevism and its intellectual conundrums and involved in the day-to-day functioning of the state, the latter two networks were
largely unconcerned with the question of the possibility of a political economy of socialism, but very concerned with the nature of the present and future Soviet order.

*Bolshevik “Macro”: The Political Economy of Industrialization*

After the revolution it may not have been clear what socialism was or ought to be, but it was never doubted that a prerequisite for achieving it, and indeed one of its central features, would be industrialization. In contrast to the fractious radical debates at the end of the nineteenth century, no one romanticized Russian “backwardness.” Marxian theory held that capitalist industrialization created the preconditions for the achievement of socialist plenty. But Russia was not industrialized. As long as hope held for revolution in industrialized Europe, the Bolsheviks could rely on the Marx’s trajectory, but when the German Communist uprising was crushed in early 1921, and the mark stabilized in 1924, the Russian situation of socialism in an agriculture country became an anomaly to be solved.49

Lenin had abandoned War Communism because he had had to, but he quickly had come to see the new policy as a new and better route to socialism, one in which the key task was “to improve the conditions of the peasantry and increase their productive forces.”50 As hope for revolution in Europe faded, the New Economic Policy was yielding surprising successes, despite its ideological questionability. But the Bolshevik theoreticians continued to argue over the correct theory of industrialization. In their


thinking the problem of industrialization was neither only political, nor only economic.
In Bolshevik “macroeconomics” (the word is used anachronistically), the two key sectors, industry and agriculture, were at the same time the two social classes that made up the smychka, the social base of the Revolution: the small and relatively politically unschooled urban proletariat, drastically reduced when part time workers returned to their farms during the war, and the vast masses of suspicious peasants.

Bukharin, who had been a proponent of War Communism, and whose *Economics of the Transitional Period* was its manifesto, was totally convinced by Lenin’s new path. He became the primary theorist of NEP as an industrialization strategy. The goal was for the state sector to gradually absorb the non-state sector via the market. (It has to be remembered that the Bolsheviks took as a matter of common sense that state-owned large industry would be more productive than both small-scale and large-scale privately owned industry, and would be able to outcompete it on its merits.) But in the meantime, the market would be the adjunct to socialism.

The political economic meaning of Bukharin’s theory was an argument against those, like Trotsky, who held that after helping the proletariat to size power, the peasantry would be an impediment to socialism. He aimed to show the alliance was the peasantry was not only necessary but feasible. The Bolsheviks understood the issue of peasant supply of grain to be crucial. If the peasants did not market their grain, not only would they not be able to buy industrial products, but the cities would starve. Urban unrest would be the high road to counterrevolution. If the peasant was to grow and market grain, then the state had best pay attention to what the peasant demanded.
Bukharin wrote in response to the “scissors crisis” of 1923: industrial goods prices had grown so high with respect to those of agricultural goods that peasants had stopped buying them, reverted to subsistence farming, and thus stopped marketing grain. When industrial prices were suppressed by state order, the market recover. Accordingly, Bukharin’s scheme depended on an understanding of the incentives of peasant production, and a theory of the flow of investment funds. Small-scale non-capital-intensive industries would need to be temporarily nurtured as to provide goods that the peasantry would want. Letting in cheap foreign goods would similarly satiate peasant demand. This would stimulate agricultural production and marketing. Peasants would be given access to credit and an easy way to market via agricultural cooperatives so that they would expand production. Grain exports would then provide funds both for state investment and to import machinery. Eventually, more efficient state-owned mass production would drive out small-scale production. The market, he argued, would both absorb the consumer goods produced by industry, and stimulate peasants to produce.51

The rebound growth, “restoration” as it was then called, had been rapid: industrial output, marketable agricultural products, and gross investment all were quick rising. However, by 1924–5, the growth rate was slowing: unused industrial capacity had all been put to work, and agricultural production was approaching pre-war levels. But return to the pre-war growth path was unacceptable. The Bolshevik theorists began to argue over the right policy to turn from “restoration” to the “reconstruction” of the national economy along new, socialist, lines.

In 1925, Bukharin was challenged from the right by Lev M. Shanin and Grigorii Ya. Sokol’nikov, both non-Marxist agricultural statisticians at Narkomfin.\textsuperscript{52} They saw the unused industrial capacity was gone, and the stock of investment goods in the country very low. Therefore, they argue that investment must favor those sectors that will have short construction times, a high rate of profit with low capital intensity, a good export market, and primarily agricultural inputs. Priority would thus favor agriculture first, and then light industry. This would not only smooth the transition to reconstruction, but also led to a faster pace of industrial growth in the long run. But their position was so contrary to the basics of Bolshevik Marxism that their theory was greeted with silence.

More consequential was the response of Evgenii A. Preobrazhenskii, Bukharin’s former ally and then current chief theorist of Trotsky’s left opposition. The left hoped for revolution in the West and beat the drum for rapid industrialization at home; as the first disappeared, their calls for the second only strengthened. Their political argument was that the peasantry had forced the retreat to NEP, and would restore capitalism if socialism were not built with an immediate industrial offensive. Preobrazhenskii’s theory was elaborated in response to the “goods famine,” or repressed inflation, of the winter of 1925, which, in the inverse of the scissors crisis of 1923, was a dearth of industrial goods for peasant demand. He blamed it on the lack of investment under War Communism, leading to the consumption of the capital stock.

The policy response, he argued, should be to replace all the worn out capital and to invest in new plant in a huge burst investment. He believed the demand for industrial

goods was now higher than ever, because peasants were no longer punitively taxed as they had been under the Tsar. The new investment would come from “primitive socialist accumulation”: policies that would shift resources into the socialist industrial sectors from the capitalist agricultural sector more quickly than would occur under trade between the two. Protectionist trade measures would provide protection for drastic monopoly pricing, which he preferred to taxation. Investment should be on a broad front, in all sectors of industry simultaneously.53

Whereas Bukharin was thinking about the most efficient and balanced use of existing productive capacity, Preobrazhenskii was thinking about the basic insufficiency of this capacity. The dilemma of industrialization that the Bolsheviks were confronting was the large capita requirements needed for industrialization, and insufficient savings to finance it. Bukharin responded to the left that channeling investment into heavy industry that would take a long time to come on line would actually exacerbate the goods famine, which would be politically dangerous. Higher prices of goods in deficit would cut into poor peasants’ incomes; insufficiency of goods would induce richer peasants to cut back production. Bukharin listed a number of measures that he thought would increase goods production in the near term while economizing on capital.

*From GOELRO to Gosplan: The Technology of the Plan*

While Gosplan would become an icon of planning itself, in the 1920s it was not an especially powerful institution, and its origin was much more modest. In 1919, in

response to electricity shortages, Lenin appointed Krzhizhanovskii, a railroad technician then running the Moscow power utility, to devise a fix. The State Committee on Electrification, GOELRO, was founded in early 1920, finishing its first draft of its plan by November of the same year. Krzhizhanovskii understood his task much more broadly than simply remedying wartime shortages. Unlike railroads, which were planned line by line, electricity required that an entire network be conceived all at once.

But power was a utility, delivered to (at this time) industrial customers. Therefore, planning the network for electricity required a knowledge of—or a plan for—the pattern of industrial production of the nation, and thus the pattern of human settlement on which it was based. As Collier argues, the biopolitical import of the plan that GOELRO created was that infrastructure development, a problem posed anew by the war, must be linked to a total plan for the industrial development of the entire country. This is no longer “public works,” as they were called in the nineteenth century, as stimuli to or means for development, but a blueprint in detail to be realized on the scale of decades.54 Work on the plan, divided into working groups of different types of engineering specialists assigned responsibility for different regions of the country, began in February 1920 and continued to the end of the year.

But this plan, subsequently lauded as the first Marxist-Leninist economy plan, was itself a version of the work of the anti-socialist engineer Vassily Grinevetsky completed in 1919 as project for the post-war reconstruction of the Russian economy.55 Grinevetsky was a a heat engineer who studied steam power, internal combustion, and

electricity generation, and rector of the one of the two flagships of the Imperial Russian system of engineering education, the Moscow Higher Technical School (MVTU). At MVTU, Grinevetsky created a curriculum oriented towards complex thesis projects: completely worked out plans for public works or industrial facilities. Importantly, these included economic projection. For Grinevetsky, economics was an essential part of the engineering curriculum. As I will show in the next chapter, when in the 1930s economics had nearly been eradicated, it was engineers, many of whom were graduates of MVTU, who could continue to address fundamental economic questions in their specialist publications. Grinevetsky’s plan for the reconstruction of the country, and thus the GOELRO plan, was based on these student projects, and wove them together into a whole. The first Soviet plan was in reality an aggregation of the work of engineers meant for the Tsarist state-led capitalist development project.

Many of the engineers and scientists working in or with GOELRO had come from or been engaged by the Commission for the Study of the Productive Forces of Russia (KEPS, later SOPS). KEPS had been founded by the Academy of Sciences in 1915, on the initiative of Academic V.I. Vernadsky, in order to support the war effort by discovering or surveying the natural resources required for industry that had previously been imported from now hostile or inaccessible sources. After both the Academy and KEPS promised their assistance to the revolutionary government in 1918, KEPS was given budget funds and a license to expand its work. By the end of that year KEPS had twenty departments (specialized by class of natural resources that they studied), including

the Department of Energetics, founded in 1916 (in 1930 this would become the Energetics Institute, directed by the same Krzizhanovskii), and in 1918 it organized the State Hydrological Institute.  

KEPS was to grow rapidly, spinning off departments into full-fledged institutes, until it represented a rival to the Academy itself. Most of its institutes were later folded into the Technological Division of the Academy of Sciences, which formed between 1932 and 1935. This would represent, finally, the recognition of the engineering profession by and its incorporation into the scientists’ Academy, and be the institutional realization of the subordination of theoretical science to practical technics demanded by the industrialization drive.

KEPS and its descendent institutions play a crucial role throughout the following decades, not always for their own contributions, but as one of several important hinges or points of translation between the academic, state-planning fields, and industrial fields. Its early participation in GOELRO established the links between the first two of those fields.

By the end of the war, the GOELRO plan was the only comprehensive plan available, and Lenin was very pleased with it. When he brought the plan to transform GOELRO into a long-range planning body to the members of his own party in the Council on Labor and Defense (STO) in 1921, they were upset that Gosplan was to include almost no Party members (four out of twenty-six members of its initial collegium) nor economists. Larin, Milyutin, and Kritsman were especially critical, and wrote articles against the project. Lenin sharply berated them in print for literary

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scholasticism, “haughty bureaucratic inattention,” and claimed that he would happily
give up dozens of good communists who criticized the bourgeois specialists diligently
building the Soviet state in return for one who worked consciously with them. He then
went around the STO to the Soviet of Peoples’ Commissars to obtain approval.
Khristianovskii became the head of Gosplan, as well of GOELRO, now incorporated
within it as its Energy Section. Engineers also had prominent roles in the various
industrial management organs under the Supreme Council of the National Economy
(Vesenkha), as well as Vesenka’s important Scientific-Technical Administration
(established 1928).

While Gosplan quickly hired a number of prominent non-Bolshevik economists,
the bulk of its employees were engineers. Engineers, galvanized by their mobilization in
the war, experience in the provisional government, and increasing professional
identification, were an increasingly self-conscious strata of Russian society. In this they
paralleled their counterparts in the United States; Russian engineers were discussing
American writings on “technocracy” in their journals by 1924. While in both countries
the First World War was a crucial juncture, in Russia the machinery of state control of
the economy into which engineers were drafted was not dismantled. The engineers that
had served the Tsarist state remained in important roles in the Soviet state.

347

60 Alex G. Cummins, “The Road to NEP, the State Commission for the Electrification of Russia
(GOELRO): A Study in Technology, Mobilization, and Economic Planning” (PhD dissertation,
University of Maryland, College Park, MD, 1988).
The 1920s saw a rapid increase in professional organization. Already the graduates of the Moscow Higher Technical School (MVTU) and the Leningrad Polytechnic Institute had formed the Technological and Polytechnical Societies, respectively. In 1915 the two had combined to create a journal for engineers, *Vestnik Inzhenerov*, and out of this effort a professional association was born in 1927, the All-Russian Association of Engineers (VAI) (with about 10,000 members in the late 1920s). VAI itself later sponsored the All-Union Intersectional Bureau of Engineers and Technologists (VMBIT) (with approximately 150,000 members and its own journal, *Inzhinernii Trud*). Further, in 1927, under the auspices of the VAI journal the discussion group Circle on General Questions of Technology was founded, with the mission of working out “whole new world view, fully adapted to contemporary political culture”—one that, as the Communists immediately noticed, made no mention of Marx.  

*The Science of the Konjunktur*

The second major network was that of the economist-statisticians. Most of them had been trained at the Timiryazev Agricultural Academy, and had worked in the local governance organs, the *zemstva*, in various parts of Russia. The formation of statistics as a profession in Imperial Russia was inseparable from the study of the “peasant question” posed by the emancipation and the progressivist self-understanding of the intelligentsia.

The war brought the statisticians into the central government, where they quickly came to occupy important positions of power, above all in the Commissariats of Finance (Narkomfin) and Agriculture (Narkomzem) and in the Central Statistical Administration.

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On the basis of the Timiryazev Academy, the agricultural economist A.V. Chayanov, whose work subsequently was taken up in the West under the rubric of “peasant studies,” had founded in 1919 an Institute for Agricultural Economics. The following year Nikolai Kondratiev founded within it the Institute for the Study of the Conjuncture of the National Economy. This institute, part of an international wave of business cycle research with the other nodes of which it was in close communication, became the in-house think tank of Narkomfin, and several of its members were permanent members of or advisors to various parts of Gosplan, which began to attract (non-Bolshevik) economists soon after its founding.

It was from within this network that came the majority of voices that sought to understand NEP not as a transient stage on the way to building socialism, but as socialism itself. Often liberal in the past political affiliations, or at least non-Bolshevik, they were liberal too in their vision of socialism. They were against the directive planning of the economy. For them, planning was to be done with “economic measures” (as they were in fact then called): methods by which the state acts on or with non-state processes by modifying the conditions under which they take place, rather than seizing upon agents and resources directly and dictating or regulating their nature and interactions without regard for any boundary between a state and its environment.

Underlying their study of the market “konjunktur”—the present state of market dynamics as available in time series data—was a theory of the peasant household

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developed by A.V. Chayanov and his students and interlocutors. The crucial problem was how would peasants respond to market signals: under what circumstances do they plant grain, sell grain, hoard grain, or invest in future grain production? This question was politically fraught because the answer to it had implications for the political role of the peasantry. If the peasant responded to market incentives like a normal capitalist subject, then the Bolsheviks could look for social stratification analogous to that which led to the creation of the urban proletariat, and thus a natural ally in the “poor peasantry.” Evidence of antagonism from the peasantry, such as hoarding, could be attributed to the capitalist behavior of the rich peasantry, the kulaks. This was Lenin’s thesis. Yet on the other hand, Bukharin’s macroeconomics for NEP required just such profit-seeking behavior from the peasantry. The contrary populist position of Chayanov’s early work, to which many agricultural statisticians subscribed, saw the peasantry as having a moral reasoning of its own, based on aversion to catastrophic risks. The peasantry did not maximize profits, but minimized household risk. Seeming social differentiation was in reality a misdescription of the different stages in the lifecycle of the peasant household, as it grew into a three generational household and then fissioned into one or two generational households.64

In the years immediately following the war, Narkomfin, the powerful center of this network, was the preeminent organ of economic governance. As Collier argues, the state budget had ceased to function in a liberal manner during the war—acting as a mechanism of translation between an external domain of the economy and the thereby

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limited activities of the state—but rather reflected material processes managed by
decree.\textsuperscript{65} With the onset of NEP, the basic problems were rationalizing the metastases of
state and party institutions that had grown during the war and reestablishing the basic
functioning of the currency. Narkomfin’s budgeting, accordingly, drew in fewer and
fewer activities, monetary reforms in 1922 and 1923 created monetary stability, and in
1923-4 Narkomfin developed a system for constraining expenditures by “control figures”
\textit{(kontrol’nye tsifry)} imposed on each departments’ expenditures, which were the only
“plan” during the early years of NEP.

This did not necessarily mean that the statistician-economists were not socialist.
Most of them were Mensheviks or Socialist Revolutionaries. And they imagined many
roles for the state. For example, the state could direct investment, state-owned trusts
could compete on the market with privately-owned businesses (and presumably, given
their greater “rationality” outcompete them), the state sector could gradually and non-
coercively grow via taxation and state investment, etc. Citing Lenin’s dictum that the
state should occupy the “commanding heights” they argued the orthodoxy of the view
that everything beneath those heights need not be directly controlled. There was also
partial support for the continuation of a reduced state role in other branches of socialist
thought that saw worker control, instead of centralized state planning, as diacritic of
socialism. There was even support for this in Lenin’s own thinking. In \textit{Left-Wing
Childishness and the Petty-Bourgeois Mentality} (1918), Lenin himself defined “state
capitalism”, in which firms were owned by the state, but workers were subordinated

bureaucratically to managers—i.e., nationalized but not socialized—as a transitional phase. These ideas were to be resurrected and hotly debated during perestroika.

TO THE FIRST FIVE YEAR PLAN

During the 1920s, the actors from these three groups were in constant dialogue. There was no clear division of labor between them, though there were differences in emphasis. While the Bolshevik theoreticians more or less set the terms of debate over policy, the planners and statisticians were in constant and influential dialogue with them.

In the early 1920s, the planners and statisticians began working out methods questions for the description of the economic life of the country and accumulating data. Kondratiev’s Conjuncture Institute was developing a series of production and price indexes.66 Both TsSU and Gosplan worked out balance methods from 1923 onwards, an accounting framework for the national economy. TsSU’s pioneering balance for 1923/4 was published in 1926. It was the predecessor both to input-output modeling and national economic accounting.67 They were turning the productive powers of the Soviet polity into a sociotechnical object. These became the tools that would be mobilized in the creation of the first Five Year Plan, the “piatiletka,” in the second half of the 1920s.

These tools cut two ways. On the one hand, and especially in the hands of the statisticians, they were methods of accounting for the market, in order to reveal its

negative effects and cushion against them. In this guise, good planning was the taking into account of the state of the economy in order to provide accurate short-term forecasting. Gosplanners tended to see the market as only a means for stimulating economic subjects to realize the centrally set goals, which must be curbed insofar as it resisted them. The plan here was the determination of a path of development, the means to achieve it, and a sense that enabled events to be seen as deviations that must be rectified. In 1923, Bukharin would give these two tendencies names around which debate would crystallize several years later: the “genetic” and “teleological” approach.

During the first half of the decade, there was no institutional monopoly on planning. Gosplan, VSNKh, and together Narkomfin, Narkomzem, and TsSU viewed for influence. Narkomfin and TsSU, the staff of which included large numbers of Socialist Revolutionaries and even some Cadets, (mostly) saw the problem as the maintenance of the market equilibrium between peasantry and city as a precondition for the controllability of the whole via economic means. Gosplan and VSNKh, staffed more by Social Democrats and Communists, (mostly) saw the problem as one of determining the proper goals and path to achieving them, though they embraced considerable diversity of opinions. Gosplan however was split internally along these two lines. In the lead up to the 14th Party Congress of December 1925, the two positions became politicized. Sokol’nikov, the director of Narkomfin, sided with the “new opposition.” The hardening of the methodological positions surprised economists on both sides.68

68 Vladimir Mau, Plan i Dogmi (Moscow: Delo, 1993).
At the beginning of NEP, Narkomfin had dominated while the key problem was currency stability, and its control figures for the state budget were the most important planning document. But with the goods famine of 1925, the balance of power tilted the other direction. The autumn of 1925 revealed that the harvest would be bad, and the peasants, for lack of goods, were uninterested in selling what they did collect. At the same time, huge credits were extended to state grain processors, who bid up grain prices. In the face of rising prices, the peasants hoarded. Gosplan continued to press for credits to industry to create a supply of products for the market. Narkomfin and TsSu responded that state interference in prices had created the problem and that new credits to industry would further upset the stability of the currency. Narkomfin urged importing consumer goods, taxing the better off peasants, and restricting credit. Both sides policies failed to the extent that they were carried out.

During the goods famine, Gosplan released its own control figures, challenging Narkomfin’s function. These are attacked from all sides. VSNKh argued Gosplan had underestimated the possibilities of industrial growth and exaggerated the health of agriculture, and moreover were too abstract, not giving concrete tasks to different sectors and industries. Gosplan replied that the control figures were just supposed to give the basic contours of growth, and rejected their interpretation as a numeric schedule of what is to be done. Narkomzem accused it of forgetting the needs of agriculture. Narkomfin attacked the financial section, and argued that given the quickly changing economic conditions a plan in any form was impossible or even dangerous. Gosplan was

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increasingly viewing its figures as something between a forecast and a plan, whereas Narkomfin saw them as a means of regulation. Gosplans figures were not officially adopted, but many state decisions corresponded to them in the second half of 1925, including new investment in heavy industry.

In the increasing tension, though neither side’s measures were effective, Gosplan could say that it knew the road to the future, while Narkomfin was fretting over the health of the market. The balance of power was tipping, and in January 1926 Narkomfin was routed: Sokol’nikov was fired. Thereafter, the state budget would not be a means of regulation the market, but just a division of the plan.

During all of 1926, a Gosplan commission headed by Strumilin worked on “The Perspectives for the Unfolding of the National Economy of the USSR in 1926/7–1930/31,” the first Five Year Plan. In February of 1927, Gosplan presented a second variant, which became the basis for the last open and contested debate on the goals and methodology of planing. But soon forming the plan became a competition between Gosplan and VSNKh. During this period, the combination of increasing investment and the near famine of winter 1927/28 led the Party to ever increasing administrative intrusion in the economy and forced requisitioning of grain, finally leading to Stalin’s decision to embark upon collectivization. Politically, the battle with the “right deviationists” was in full swing. Over the next two years, Gosplan would issue a total of three plans, and VSNKh five. Whereas Gosplan’s first plan foresaw a 79.5% growth in industrial gross output, by 1929 its optimal variant planned a whopping 179% growth.
The plan was a balance that presented the national economy as a linked set of numerical series of physical units. The relationships between the series were supposed to be a mark of its well-foundedness. But it was not the sort of balance of, for instance, Bukharin’s verbal macroeconomic model, which began with the interests of economics agents and traced the resulting financial flows. Instead it was an algebraic balance that took no account of economic interests, assumed that money and materials would flow how the plan directed them, and attempted their quantitative reconciliation.

By the time the last impossible plan was submitted in April–May 1929, no one would speak against it. Gosplan’s status grew at the expense of VSNKh, and the TsSU was formally to Gosplan. The new role of statistics under socialism—that there were no autonomous processes to study, and thus statistics in its full sense had been rendered obsolete—was recognized in 1931 with a change of its name to the Central Administration of National Economic Accounting, which it would bear until 1941.

THE ÉTATICIZATION DYNAMIC, 1928-1939

Over the years following the launch of the industrialization drive in 1928, the state spontaneously hypertrophied as the economy disappeared. I will first offer an account of this hypertrophy before returning to the debates within economic thought. This account works within the framework of Moshe Lewin’s powerful and pioneering interpretation of the dynamic process of industrialization and state building, elaborated and extended by others, especially Stephen Kotkin. The First Five Year Plan was not just a plan for work, and not just a plan for controlled social transformation, but also a symptom of the euphoria of the mobilization. Everything was considered to be malleable,
everything subject to transformation. The fiery “will of the proletariat,” properly
stoked and focused, was celebrated as recognizing no limits. This positive
transformational project was powered as well by negative affects: fear of war with hostile
capitalist encirclement, and a hatred of internal enemies as the officially proclaimed
“class war” turned from hot to cold. The mobilization of society, the growth of the state,
industrial construction, and the euphoria for transformation were all linked into a self-
reinforcing cycle.

The First Five Year Plan itself was an expression of this euphoria. In the course of
its composition, as each group of authors vied for ideological purity, and their patrons for
political power, its targets were inflated beyond any connection with the true production
possibilities of the Soviet Union. Astounding projections for increased labor
productivity—for the exertions of the proletariat—decreased costs, and better yields
became the planning targets that made the equations balance with the desired headline
industrial output growth rates. Already in the process of developing the plan, the hard-
nosed Bolshevik director of Gosplan Valerian V. Kuibyshev worried to his wife that “I
am unable to tie up the balance, and as I cannot go for contracting the capital outlays—
contracting the tempo, there will be no other way but to take upon myself an almost
unmanageable task in the realm of lowering costs.”

But even as the Plan was adopted, directives repeatedly came down from on high
to revise the figures upward. Gosplan’s Levin worried “insofar as these targets were not
always consistent among themselves, insofar as they were not put together in a unified,

70 G.V. Kuibysheva, Valerian Vladimirovich Kuibyshev: Biografiia (Moscow: Izdatel’stvo politicheskoi
national-economic plan, we were facing extremely great difficulties in considering these directives of party and government during the preparation of control figures for the year 1929/1930.”\textsuperscript{71} Levin’s fears were fully justified: the just begun and already unrealistic Five Year Plan, the object of such fanfare and adoration, was unceremoniously ignored, the control figures for 1929/1930 departed from it dramatically. As the political costs to realism became clearer, the planning economists grew increasingly worried. Strumilin, himself one of the more aggressive economists within Gosplan, famously wrote in 1929 that it is better “to stand for higher tempos rather than sit [in prison] for lower ones.”\textsuperscript{72}

The Plan was not only unrealistic, but the state lacked the capacity to execute it. But the party-state leveraged the increasing Communist Party penetration into existing institutions and state command over industry to set the entire country into motion, uprooting existing social structures and institutions. Creating chaos, the party-state tried to direct it, and in the process extended its apparatus in depth and breadth. Every exaggeration of goals and every failure to reach them triggered a further extension of state power. Building the socialist economy increasingly destabilized and even destroyed it; the manifestations of this economic disorder were met with yet further recourse to administrative and mobilizational tools: “the more bottlenecks and crisis areas appeared, the greater the urge to close the loopholes by putting the hand on more levers.”\textsuperscript{73} This was state-building—the creation of state apparatuses—but also étaticization, as these

\textsuperscript{73} Lewin, “The Disappearance of Planning…,” on pp. 276–7
state apparatuses penetrated deeper and deeper into the fabric of social institutions, becoming intrinsic to them, substituting their own impetus for former more or less autonomous dynamics. As Lewin put it, “the whole social structure [was], so to speak, sucked into the state mechanism, as if entirely assimilated by it.”

The project of social transformation was also intrinsically related to a process of intra-Party cultural and social transformation. The Party self-consciously was trying to create and enforce the ideals of class consciousness and party-mindedness [*partiinost’*] and the practices of democratic centralism. The task of transforming the country to which the Party set itself was to be a crucible for burning away its own impurities and forging true socialists.

This complex dynamic of state building set in motion by industrialization would find its reflection in political economy, which would come to argue that no economic laws constrained the action of the state. The socialist state would create its own.

**THE END OF THE ECONOMIC AND THE END OF THE ECONOMISTS**

As the beginning of the industrialization drive the meaning of the plan changed. The battles over the plan in this period have usually been presented as a battle between geneticists and teleologists: those who extrapolated from present tendencies *versus* those who worked backward from future goals. This only partly right. Participants in these debates recognized that both forms of analysis had to be combined in any planning processes. Insofar as they appeared as sides, this was cynically, the result of the politicization consequent upon the open war within the Party for control. The debate in

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fact had three sides, each expressing a certain biopolitical proposition. Planning could be an economic regulation, a technological arrangement, or, finally, a purely political management. In the end, the latter won.

In the properly economic understanding, most purely represented by the agricultural statistics of Narkomfin, Narkomzem, and the TsSU, the object of government was the milieux within which agents made interested decisions, and the financial flow that resulted from them. Governing required first of all a stable monetary situation, with stable prices. The structure of prices was a basic context for decision making. This context is what allowed governmental instruments to have an effect. But the government was not limited to maintaining monetary stability. The state budget was a powerful tool for redirecting flows within the economy. Via taxation, the state could absorb surplus from the economy, which could be redirected into state corporations. The corporations, while operating in a market milieux themselves, might have have additional, not strictly economic goals. Furthermore, the state could create new institutions that could both influence the interests of agents and the context in which those interests led to decisions. The creation of credit and marketing cooperatives would allow and incentivize the peasantry to expand their production beyond subsistence, increasingly monetizing the countryside, and thus making it susceptible to further instruments of economic government.

Weber gives a typology of five relations of an economically-oriented organization to an economic system: an “economically active organization” is primarily non-economic but includes economic action; an “economic organization,” the organized action of which
is purely economic; the “economically regulative organization”; and an “organization enforcing formal order.” In these terms, the Soviet state would be all of the first three. It is at once an actor with non-economic goals and functions, a player in the economic system via the state trusts, and a regulator of economic activity.

Planning, under this understanding, would begin by taking into account of the processes taking place in the country insofar as they were reflected in monetary units. These could be rendered visible by the construction of indexes and national accounting frameworks. The indexes and accounts would give an indication of the overall direction of the dynamic system, and warning of any accumulating unwanted tendencies. Within the limits of the stability of the system its parameters of action could then be adjusted to bring the numbers back into alignment with their desired progress.

In the second, purely technological understanding of planning, represented by all of the remaining economists and engineers at Gosplan and VSNKh, the object of government were the physical capacities of the people and materials of the country.

However, the planner still rationalizes the organization of these things, and imposes on them a structure. The most important tool becomes the balance. The balance is an ideal structure that expresses quantitative relations between things and processes. The mine can produce a certain range of quantities of coal, given a certain number of laborers; the steel mill can burn a different range of quantities of coal, producing another range of quantities of steel. All of these quantities stand in definite and limited relationships to one another. The structure of such technical relationships in the national

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economy is an ideal structure with internal coherence. A series of such structures link the present disposition of things with the target of the plan. Accordingly, working out more and more detailed balances became almost a fetish.

The government’s power to dispose of people and things is assumed to be absolute. Materials would flow wherever they were directed. The verbal macroeconomic reasoning of the debates of the 1920s, especially of Bukharin, in which the economy of is a causal structure, becomes otiose. The structure of prices here ceases to reflect the interests of economic actors; the expression of flows of materials in value terms becomes a mere accounting device that is handy for some planning purposes and not others. Productive processes would take place at whatever intensities the authorities decided, bounded only weakly by the limits of technology and the finite length of the working day.

As Stalin declared at the 15th Party Congress, “Our plans are not plan-prognoses, nor plan-guesses, but plan-directives, which are obligatory for our ruling organs.”

It is in this sense then that this conception of planning is no longer economic: there is no longer an exterior to state action, or insofar as there is, it is a pure aggregate of things, not a structured totality. Stephen Collier calls this, as a biopolitical type, “total planning.”

Technological planning was the *image*, or better, the fantasy of planning. The plan was supposed to be a document that scientifically—and this scientifcity was left completely undetermined—created an icon of the future to be achieved and the directives by which to achieve it. This was what was celebrated as one of the great achievements of

Soviet socialism and which would persist as the guiding fantasy until the collapse. Further, it has subsequently dominated the global imagination of planning.

Yet, as many have argued, the industrialization drive proceeded with any plan. And moreover, the rhetoric of industrialization was increasingly hostile to any sort of rationalization of the planning process. And indeed, if the technological vision of planning had truly won, the fate of the planners in 1929–1931 would be inexplicable. Not only were the agricultural statisticians purged en masse, but Gosplan and VSNKh—that is, the “teleologists”—too were decimated. Why? Because they continued to restrict the goals of the state. Their calculations continued to set bounds on what was possible.

Accordingly, from the 15th Party Congress onward, there are more and more frequent calls to ignore the need for a balanced growth path, and even an exaltation of disproportion. There was a post hoc rationalization for the refusal to acknowledge the constraints of proportion. It held that there were “choke points” in the productive activity—in the flows between technological process—and the goal of the planner was to chase down the choke points, direct resources thereto, open it up, see where choke points next appeared, and repeat the process. This was maintained to force the greatest possible growth.

In the context of the Great Break, any refusal to recognize the infinite power of the will of the proletariat was immediately politically suspect. It looked awfully similar to deliberate sabotage. The planners at VSNKh and Gosplan were caught in a bind. The very nature of their expertise was to express constraints in numbers, but all numerical constraints were beginning to appear counterrevolutionary. In their desperate attempts to
demonstrate their communist bonafides, the clawed up each other’s backs, pushing their planned growth rates beyond anything remotely attainable. But this was not good enough—it could not be good enough. Nothing was to constrain the goals of the political leadership, not even technical rationality.

In 1929 Stalin wrote to Molotov “It must be possible to defeat the nest of Groman, Vinogradsky, and other bourgeois politicians entrenched in Gosplan, TsSU, etc. Throw them from Moscow by their necks.” and again to Molotov in 1930: “The investigation regarding the affair of Kondratiev, Groman, Sadyrin must be carried out thoroughly. I do not worry that we will uncover direct links between them and the Rightists (Bukharin, Rykov, Tomsky). Kondratiev, Groman, and a couple of other villains must necessarily be shot.”

In the summer of 1930, several days after the 16th Party Congress, the agricultural economists and financists were all arrested: Chaynov, Makarov, Chelintsev, Rybnikov, Minin, Kondratiev, Yurovski, and others. A little later, the OGPU came for the Gosplanners, including Groman, Bazarov, and Sukhanov. It was revealed in the autumn of 1930 that three counterrevolutionary parties had been uncovered: the Menshevik Party, which included several Gosplaners, the Industrial Party, which included many of the leading engineers, including several who had played prominent roles at Gosplan, and the Peasant Worker Party, among whose leaders were said to be the agricultural statistics Chaynov and Kondratiev. Most were sent to prison camps; in 1937 many of them were re-arrested and shot.

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INTRODUCTION

In 1939 the mathematician Leonid Kantorovich invented linear programming and published his results as a pamphlet, *Mathematical Methods for the Organization and Planning of Production*. This technique will become foundational to the entire enterprise of mathematical economics East and West. For its invention Kantorovich would become the only Soviet economist to win the Nobel Prize in economics. He saw immediately that it could give a new basis to the rational organization of production on any scale, from factory to the national plan. If we were to take Soviet rhetoric about scientific planning at its word, this ought to have been what everyone was waiting for. Yet it elicited very little interest among either mathematicians or economists and languished in obscurity. He wrote his book on linear programming and economics, *Economic Calculation of the Best Use of Resources*, in 1942, and it was to remain unpublishable until 1959. Why?

In most accounts, this unpublishability is ascribed to its breach of dogma, to censorship. But it was more than that. Kantorovich’s theory had overstepped the bounds of the jurisdiction left to economists, and hinted at an understanding of government contrary to basic presuppositions of Stalinism. In the intervening years, Kantorovich would lead calculations for the critical mass of the atomic bomb, make contributions to pure mathematics, and intermittently try to elicit interest in his economic work to no avail. Though he followed the economics debates that I will examine in this chapter, he
played no part in them. But by 1959, when his book was finally published, he had an audience, and the book’s impact was nothing short of explosive. What accounts for this enormous difference? During this intervening period, the deep theoretical structure of Soviet economics, its institutions, and its social networks all changed. This chapter is focused on this period, and constitutes a partial explanation of how Kantorovich’s discovery could be uninteresting, incomprehensible, or unacceptable in 1939, but heralded as having inaugurated a revolution twenty years later.

In what follows I review four forgotten debates in Soviet economics from the late 1930s to the late 1950s: on the applicability of the “law of value” to socialism, on how to compare the effectiveness of capital investment, on the methodology for setting prices, and on how to get the best performance from enterprises. I rely on published sources—this time period is just past living memory—but reinterpret them. As I will show, while these debates began from highly specific problems of planning, their interconnections gradually became clearer to the participants. The result was a new interpretation of the productive relations of the Soviet Union, a diagnosis of their pathologies, and prescriptions for their reform.

These debates are a pre-history to mathematical economics in the Soviet, which is the topic of the following two chapters. The economics created in the course of these early debates was not mathematical, and mostly not even numerical. Subsequently, beginning in the late 1950s, a properly mathematical economics rapidly emerged, one comparable to and in transnational dialogue with the American mathematical economics, which had reached a new threshold of sophistication about a decade before.
Schematically, mathematical economics proceeds not through calculating numerical quantities, but by representing economic processes as *models*. Models are structures of mathematical objects—sets, vectors, functions, spaces, etc. The economist derives further (mathematical) properties and objects from this structure. Finally, the economist turns back to the reality from which he or she began to seek some phenomenon that can be interpreted as corresponding to the derivation. Because mathematical economics looks so very different from the economics that preceded it, its concepts, problems, and reform ideas seemed to most Western observers *sui generis*. Some thus heralded it as a “mathematical revolution,” as the advent of a new economics opposed to the disciplinary *status quo*. But this is false: Soviet mathematical economics point of departure was the basic problematic generated by its non-mathematical predecessor. In many respects, despite the leap it took in mathematical sophistication, it never exceeded that problematic.

This non-mathematical reformist economics constituted a sea change in Soviet understandings of the nature of their own society as both a productive ensemble and a polity. More than a pre-history of mathematical economics, then, this chapter describes a profound watershed in the history of power in the Soviet Union. The Stalinist technology of power was a hypertrophied form of disciplinary power that assumed the unlimited competence of the party-state to minutely organize social life. It recognized no external realm of economic reason that could frustrate its designs. I claim that these four debates reassembled the economic, a mode of complex interconnection of people and things independent of the state that yet must be taken into account by the state. My argument
recovers this rupture in the fundamental political ontology of Soviet socialism via a
detailed reconstruction of economists’ problematizations of the institutions for managing
productive life in common.

What was the state of Soviet things in the Stalinist dispensation? During the
beginning of the industrialization drive of the 1930s, Stalin killed or imprisoned the
leading planning economists. With their arguments and calculations, they had been vocal
participants in the debates over industrialization. The jurisdiction of economists was
henceforth sharply reduced. Meanwhile, process of breakneck industrialization quickly
escaped the theorization that launched it. The plan, celebrated as emblem and instrument
of the building of socialism, was completely ignored in practice. It instead became a
mobilizational icon, an impotent fetish. The actual conduct of productive activity was
guided by untheorized administrative practices.  

These were partly based on pre-
Revolutionary forms of business management, but were assembled into a new structure
from the middle of the 1920s, and by the middle of the 1930s developed institutional
logics of their own.

The young political economists trained at the Institute of Red Professors and the
Institute of Economics of the Communist Academy were left with a monopoly of the
much-changed disciplinary field, after the annihilation of the planning theorists. But they
had nothing to contribute to the practical problems of industrialization. Neither did they
become the next generation of politician-economist-philosophers on the model of the
revolutionary Bolshevik leaders. Instead, the new administrators, the great practitioners

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of the emerging system, became the emerging leaders of state and Party (especially once Stalin eliminated the last of the revolutionary leaders in the Great Terror of 1936–1938). The political economists were relegated to the auxillary role of enforcers of ideological orthodoxy, alongside the official philosophers. They apologetically conflated the broad directions of Stalinist policy with “economic law.” The (inoperable) plan itself was celebrated as economic law. The economic, as a reality confronting the state and limiting its powers, collapsed. Vladimir Mau, writing toward the end of perestroika, called this plan fetishism, in analogy with Marx’s commodity fetishism. If commodity fetishism was the “objectification” of social relationships, plan fetishism was the subjectification of economic necessity. The will of the Party, as manifest in the plan, made reality in its image. The collapse of the economic and the apotheosis of the plan is not just a retrospective historian’s story, but discussed with varying emotions by economists at the time it was occurring.79

In the political ontology of Stalinism, a single political intentionality emanating from the center was supposed to animate the polity.80 The Party, as the bearer of universal social interests and possessing scientific truth in the doctrine of Marxism-Leninism about the course of world history, knew what must be done. Stalin, as arbiter of Marxism-Leninism, was the ventriloquist of this truth, and thus of the general will. The task of each Soviet individual was to fuse his or her will indissolubly with that of the party in the interests of socialist construction. This was partymindedness, partinost’.

There could be no other legitimate intentionalities, interests, or wills within this ontology. Their continued existence was aberration: a lack of political consciousness or partymindedness, the atavistic survival of capitalist or pre-capitalist modes of thinking, or, at worst, “wrecking,” sabotage, or collusion with the enemies of the people internal or external.

Yet this state of affairs did not last. Outwardly, the Stalinist growth mechanism was celebrated as having proven its success by mobilizing the country toward victory over the fascist enemy in World War II. But government leaders and planning practitioners were becoming aware of its limits. And the postwar decade posed them more acutely than ever before. The massive rural to urban migrations—the wave of refugees from the collectivization of agriculture—that had rendered labor virtually a free good for industrialization were slowing, raising the issue of labor productivity. But the new exertions asked of the workers in the service of reconstruction were asked of a population now exhausted from industrialization and war. The existing state of affairs suppressed incomes and failed to provide goods that could motivate such exertions. Capital was likewise in short supply, having been spent by the war effort according to the principle of “at any cost.” At the same time, the planning and management system, geared for mobilization and extensive growth, was ill-equipped for inducing efficiency.

The Soviet leadership had difficulty comprehending these problems, and more, proposing solutions. In the 1930s an enormous epistemic gap had opened up between the language of official political economy and the actual practices of planning and administration. The political economists, sharply criticized by the party elite, struggled
with little success to bridge the gap; the practical economists and engineers struggled to theorize the problems that they encountered in their work, and in an ideological acceptable form. Among different but overlapping groups of experts—engineers close to planning practice, statisticians, planning economists, and political economists—a series of debates broke out.

The four debates that I treat in depth overlapped chronologically, but the conceptual overlaps only gradually became clear to the participants. First, from approximately 1937 to Stalin’s death in 1953, the political economists, while trying to solidify an ideologically orthodox political economy, debated the applicability of the “law of value” to socialist society. Second, far from the guardians of orthodoxy, in obscure trade journals, transportation and hydroelectric engineers, and those economists closest to administrative practice, raised the problem of comparing the efficiency of capital investments to choose among them. Third, the need to restore the price system to some semblance of functionality after the disarray wrought by the war led some statisticians, planners, and political economists to reconsider its basic principles and purposes. Finally, the search for productivity and growth led planners to reconsider the system of indicators for assessing enterprise performance, and thence to the proper means and rationales for stimulating enterprises to fulfill the plan.

Discursively, these debates were relatively well-bounded affairs, not an analytic device. Under Stalin, and decreasingly thereafter, they evinced a regular pattern of development. In the folk historiography of Soviet science, literature is organized into “discussions” (i.e., “the discussion on the effectiveness of capital investment”) which will
be referred to as such in future literature or in personal memories. Sometimes they were
initiated by the political leadership, and sometimes by the academic leadership.
Oftentimes they were launched by the plenary address of a conference or the editorial
board of journal. Sometimes they were not launched purposefully, but were actually a
scientific dispute gathering momentum on its own. But no matter how initiated,
retrospectively they were usually framed as being organized responses of the scientific
community to the pressing demands of the day. During discussions distinct sides were
frequently associated with an institution or a sub-unit within one. When sides mapped
onto institutions, institutionally-sponsored journals could become their mouthpieces.
Sometimes, debates had relatively clear endings, when a combination of academic and
political capital established an orthodox line on the question. This would usually be
announced via a publication by a prominent economist holding an official position of
academic power, or via collective statement of an editorial board. The place of
publication was important. In this period, the two most important economics journals, the
ones indicating political power, were *Questions of Economics (Voprosy ekonomiki)* of the
Institute of Economics and *Planned Economy (Planovoe khoziaistvo)* of Gosplan. The
mouthpieces of the Ministry of Finance and the Central Statistical Administration,
*Finances of the USSR (Finansy SSSR)* and *Questions of Statistics (Voprosy statistiki)*
played lesser roles. Oftentimes also important was *Kommunist* (the successor to
*Bol’shevik*), the policy journal of the Central Committee of the Communist Party.
Editorials in the leading newspapers *Pravda* and *Izvestiia* could give a strong indication
of where political favor lay, but themselves could not close a scientific discussion. In the
hierarchy of hermeneutic power to close debate, *Planovoe khoziaistvo* was sometimes (depending on the varying balance of power between their host institutions) trumped by *Voprosy ekonomiki*, which was in turn trumped by *Kommunist*. In the post-Stalin era, however, and especially after the 20th Party Congress, closed debates often refused to stay closed.

However, I take these debates as more than just doctrine. Just as the social studies of science and technology have learned to see the reconfiguration of social form in the details of technoscience, I demonstrate that the economic devil lay in the technical and administrative details. These debates are practical reason at work in the substance of Soviet reality. In the postwar conjuncture, the inner workings of specific locales of the planning and administrative apparatus came to appear to those working with them as problems to be solved. These actors’ local problematizations generated representations of that region of the apparatus. Gradually their representations brought larger and larger domains of that apparatus into focus along the directions required to solve the problem as it was posed. These emergent problematizations were also spaces for manoeuvre within which actors bearing different forms of expertise allied or split over claims to jurisdiction—over the power to make authoritative statements—with respect to various aspects of Soviet reality. In the process, they generated a set of increasingly reflexively rationalized discourses: economic theory. Capital valuation formulas in project bureaus, price setting procedures in Gosplan, and accounting indicators of enterprise performance—these were the technical objects seized upon as sites of practical reflection,
and the allies that could be mobilized in the struggle for institutional, political, and scientific power.

To characterize the governmental transformation that resulted from these four debates, I take as a model Foucault’s description of the advent of “the state.” In his history of governmentality, Foucault delineates the mutations of pastoral power that, at the end of the sixteenth century, constituted the advent of the form of governmental rationality that he calls Raison d’État. The place of the pastoral problem of salvation was taken by the theory of the sovereign coup d’État; the theological theme of obedience became the symptomology of sedition and revolt; the cycle of truth between pastor and laity became the knowledge of the things of the kingdom, the birth of statistics, and an orientation toward the public. These were, he tells us, the sides of the “practico-reflexive prism” by which something like the state could appear. They are not the origins of the state apparatus; the heterogeneous elements of this apparatus each have their own genealogies. He argues that the transformations he analyzes are analogous to the conditions in astronomy under which it could be first understood that the Earth is in fact a planet, but with a difference. They are the conditions that enable the variety of elements of the state apparatus to appear for the first time as “the state.” But in the case of an object like the state, unlike a planet, the constitution of such an object enables and involves new orientations with respect to it, new rationalizations of those elements that constitute it. In sum, Foucault concludes, they enable the state to enter into reflected practice, and in fact, “The state is a practice. The state is inseparable from the set of
practices by which the state actually became a way of governing, a way of doing things, and a way too of relating to government.\(^{81}\)

The four debates that I examine in this chapter form the sides of the practico-reflexive prism by which something like the economy becomes visible and begins to enter into the practice of the Soviet state. As they developed, each partial problematic began to touch the others. In a discontinuous change, as their boundaries blurred, a new unified problematic was born. Capital investment raised the problem of rational action, and with it the problem of choice, but it required the rationalization of price structure. Price setting raised the problem of the price system as a locally consequential global context for decision making. The problem of devising a correct system for assessing enterprise performance, including the criterion of profit, at once led again to the problem of prices and to that of devising a material incentive for plan fulfillment.

This is the threshold: with the posing of the problem of stimulus, the monolithic intentionality of Stalinism is shattered. Here language registered a consciousness of this incipient shift: material incentives were described as one tool for “economic methods of management” (ekonomicheskie metody khoziaistvovaniia), a phrase that employs both the newer imported word for the economy, “ekonomika,” and a nominalization of the older Russian verb related to the world for household, the direct translation of ‘oikos, khoziaistvo. The non-fusion of workers with the enterprise, enterprise with plan, and plan with history was no longer aberrant or pathological. A multiplicity of interests was normalized and naturalized.

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Accordingly the task of reform changed. Reform had previously meant the technical and managerial perfection of the existing system: tweaking it, improving the processes on which it depended, buttressing them. But now the system began to appear not as a machine, but as a milieu within which decision-making took place. The system becomes visible as an “economic mechanism,” as it would become called at the end of the 1960s, heterogeneously composed of objects, productive complexes, administrative and economic “levers,” and agentive subjects. No longer entirely animated by the goals of the Party and technically rationalized toward that end, economists must trace the interactions within this milieu of economic agents in order to shape and guide them. The social whole must be composed.

The process of reflection upon the system bore limited fruit in the so-called Kosygin reforms of 1965. In the memory of Soviet economists both immediately thereafter and Russian economists to this day, these reforms represent a moment when Soviet socialism might have opened toward another future. Though many in the West then viewed them as a first step toward the market—and some Soviets may have thought alike—we should be more cautious. The reforms were limited. Undoubtedly the majority viewed them as they were then billed, a “perfection” of the system. At the time of their passage, they were optimistically viewed as a first step in a new direction; with time that optimism would turn to frustration and then despair.

The reforms, contradictory in formulation and half-hearted in implementation, were a failure. But the pathologies of industrial management to which 1950s reformism responded remained, and would reassert themselves ever more forcefully.

The abstract theory of the political economy of socialism governed and set the stage for the subsequent assimilation of more localized problems of planning that erupted within the economics profession in the 1950s. Unlike in the other sciences, for most of which were delegated an official or de facto enforcer of scientific and/or ideological orthodoxy—infamously Lysenko in biology—there was no delegate for political economy. Stalin himself functioned as the master political economist. Yet while the political economy of socialism was supposed to be a perfected and unified body of doctrine, even under Stalin, with his active intervention, it never achieved consensus. Terms remained vague, important philosophical questions remained contentious, differing trends of thought bubbled under the surface. With Stalin’s death, the limited consensus would begin to unravel, the disagreements come to the surface. This all provided room for maneuver that was exploited by different groups to legitimize their political and scientific agenda. In the process, the roles and jurisdictions of economic knowledge began to change. During the 1930s and 1940s, debates focused on a series of related problems: the “law of value,” the meaning of the plan and plannedness [planomernost’] itself, and the existence and nature of economic law under socialism. I argue that we should see behind these various fragmentary debates a developing problematic hinging on a single question: the extent to which there are economic facts that constrain the policy of the state.
The first earnest attempts to construct a single and coherent official political economy of socialism date to the second half of the 1930s. In 1934, it had been declared that the transitional period was over: socialism had been built. The central committee set about legitimizing the untheorized actions of the Party. The crucial textbook was *The History of the All-Union Communist Party (Bolsheviks): A Short Course* of 1938. The *Short Course*, as it was named, gave a history of the Party but also of the Union since the Revolution, but it also contained a theoretical chapter written by Stalin, “Dialectical and Historical Materialism,” that fixed the meaning of these two terms and established them as the metasciences of the Soviet order of knowledge. Dialectical materialism was a general metaphysics of nature; historical materialism applied its categories to the society, creating a Marxist narrative of successions of social formations. The Central Committee planned a series of other “short courses,” and commissioned two textbooks in 1937, an introductory course edited by Lev Leont’ev, and an advanced course edited by Konstantin Ostrovitianov (then the director of the Institute of Economics). Thus began Stalin’s nearly twenty year direct involvement in formulating and guiding the doctrine of the political economy of socialism. No matter what lofty matters of state loomed, including the conduct of war, Stalin would find time to read, discuss, and edit countless drafts. During the process of drafting, the community of political economists reacted to Stalin’s interventions and each others’, debating formulations and key theoretical points. Ethan Pollock has written the archivally-based history of this textbook, which was once a matter of sovietological speculation, and in this summary of its progress I rely heavily upon his account.82

By 1938 Leont’ev was sending Stalin initial drafts, and by 1940 Stalin had decided that the final version would get the stamp “Approved by a Commission of the Central Committee,” making it holy writ. In 1941, Stalin invited Leont’ev, Ostrovitianov, four other economists, Zhadnov (secretary of the Central Committee), Molotov, Nikolai A. Voznesenskii (the head of Gosplan), and the philosopher Georgii Aleksandrov (the new head of the Department of Agitation and Propaganda) to discuss the draft. Stalin focused almost only on the political economy of socialism. During this meeting, Stalin made a series of statements that were contrary to the developing consensus among the political economists which were to be crucial for the further development of the political economy of socialism. Moreover, Stalin’s dicta created the initial ideological preconditions from which the autonomy of economic discourse could be painfully reconstructed. As a corollary, they were the basis for the arguments which were to be advanced for the legitimacy of mathematical economics nearly twenty years later.

Leont’ev had claimed, in what was then considered good orthodox fashion, that planning had allowed the USSR to “overcome the law of value.” Stalin replied angrily that these were meaningless abstractions, and anyway incorrect descriptions of both planning and the law of value. The main task of planning, Stalin averred, was to ensure the independence of the socialist economy from hostile capitalist encirclement by creating the industrial preconditions for war. Furthermore, it eliminates the conditions for economic crisis, and politically is a tool to destroy the forces that might lead to restoration of capitalism. With regard to the law of value, Stalin claimed that it still

functioned in socialism, for a variety of reasons. These reasons would each be taken as primary and essential by different groups of political economists after Stalin’s death. First, because of the black market and *kholkhoz* markets, limited markets still functioned, and thus so did the law of value. Second, because some goods were still scarce in the Soviet Union, because the state of plenty had not yet been achieved. Third, because distribution was still according to the principle of work performed, not according to need. Accordingly, the work performed had to be valued, commensurated, and measured, and it was to be valued by socially necessary labor time. Lastly, price-setting and distribution of commodity production still had a connection to the cost of production, which is a measure of value. For all these reasons, the law of value still functioned, but, in a cryptic formula that elicited endless talmudic interpretation, its “character changes” under socialism, it takes on “new content and new form” and the government consciously uses it.  

In 1943 many of these propositions were made public in an anonymous article in the flagship Bolshevik journal of philosophy, *Under the Banner of Marxism* [*Pod znamenem markizma*], entitled “Some questions on the teaching of Marxism.” It cited Engel’s “wider” definition of general political economy and then proceeded to the differences in the ways that economics operate in different societies. The law of value, it explains, “functions in a transformed manner” as “a law consciously applied by the Soviet state under the conditions of the planned administration of the national economy.”

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It affirmed as other “economic laws” industrialization, collectivization, and planning itself. That is to say, the so-called objective laws amounted to an (idealized) description of the policies of the Soviet state. This document became an essential touchstone for political economists.

Over the next few years work stopped as the war complicated both the lives of the authors and the answers to important questions about political economy, and in 1945 Andrei Zhdanov temporarily banned work on the political economy of socialism while awaiting a final draft. In 1946 a draft was produced, and in 1947 a commission led by Zhdanov, Voznesenskii, and Leont’ev began an intensive edit. But events made progress more difficult. The project’s patron, Andrei Zhdanov died in 1948, and Malenkov and Beria quickly began removing his protegés, including Voznesenskii, who was denounced in 1949 and soon thereafter shot.

Voznesenskii’s immediately acclaimed 1948 book, *The War Economy of the USSR in the Period of the Great Patriotic War* had contained a series of formulas that had seemed to hint at a notion of economic constraint on economic policy. “Socialist planning,” he wrote, “based on the rational use and application of economic laws of production and distribution [including the law of value] itself is the social law of development and as such, the subject of political economy. (156)” Planning is an economic law, but it is constrained by other laws, including the laws of value. They are not unconscious constraints, but constraints on the rationality of planning. Voznesenskii had a place for economic knowledge: “Socialist planning of production presupposes knowledge of economic laws of production and distribution and uses them in the interests
of socialism. (151)” What these economic laws are, however, or how they are to be used, is less than clear. But others had written formulations like this; what was more telling was the he warned that failure to plan in accordance with knowledge of these laws could lead to disaster. This probably indicated the Gosplan chief’s familiarity with the problems of intersectoral proportionality to which the planning agency had been developing practical solutions. Different sectors of industry provided inputs for each other, and these inputs must have definite proportions if unused inventories were not to build up on the one hand and plants sit idle for want of necessary materials or components on the other. The first several five year plans had been rife with disproportions of this sort. In other writer’s formulations, it was assumed without discussion that whatever were the plans of the Soviet state, they must be objectively necessarily and always would be, that fallibility was unthinkable. Despite the wide reach of his book, the authority of his formulation were cast into shadow with his death.

In Andrei Zhadnov’s and Voznesenskii’s absence, work bogged down. Scholars would not write without an authoritative textbook and the textbook authors had no feedback from the community of political economists. Malenkov, Suslov, and Shepilov were uninterested in the textbook project. But in late 1949 Leont’ev and Ostrovitianov sent Stalin two overlapping drafts, and in February of 1950 Stalin summoned them, Malenkov, and the philosopher Pavel Iudin to his office. He decided that Leont’ev’s version would become the single textbook. Malenkov, noting Stalin’s continued interest, took the reins again, and an editorial collective of nine authors was formed to finish the textbook. In April of 1950 a new draft was submitted to Stalin, who called another high-
level meeting within days. He lamented the lack of disagreement among the editorial commission, as evidence of scientific poverty. Stalin said warned that the recent generation of Marxists had learned from pamphlets, newspaper articles, and quotations, and this was dangerous to socialism. Economic theory, Stalin believed, had real implications for the integrity of the polity.

Finally after the April 1951 draft, Stalin decided to sponsor a large discussion. Pollock argues that this discussion should be seen as parallel to the December 1946 conference on philosophy, the summer 1948 conference on biology, the cancelled physics conference of spring 1949, and the linguistics and physiology conferences in 1950. As the Cold War chill began to set in, in Pollock writes, Stalin and the Party sought to assure themselves of the party-mindedness of the scientists. They thus supported or instigated power struggles within the disciplines that they hoped would induce the formation of not only ideological purity but also scientific consensus. The authorities took part to differing degrees in shaping the outcomes. This was not, or not always, a top-down process. Stalin seems to have had an entirely sincere belief in the importance of honest and open scholarly disagreement for eliciting scientific truth—even when his own actions sometimes undermined it. Longstanding scientific, ideological, and personal disputes among scientists became entangled with maneuverings of often opinionated party leaders, in forms of interaction that combined aspects of Soviet scientific culture with that of Party infighting. The results were accordingly uncertain. In the philosophy conference, where Stalin and Party leaders had perhaps the greatest claim to equal jurisdiction, they overturned the established orthodoxy and criticized the establishment. In the biology
conference, in a truly exceptional case that has however become emblematic of the fate of science under socialism, Trofim Lysenko was able to use his political favor to annihilate his Mendelian rivals. The physicists, with the support of the bomb project chief Beria, managed to cancel their proposed conference, leveraging the importance of their work to seal off their discipline from Party curation. In linguistics, Stalin intervened out of the blue with an essay overturning orthodoxy, while also propounding a classless vision of science. And in physiology, some inheritors of Pavlov, with the support of an interested Party, enforced a narrowing of the discipline.

Stalin was perhaps most personally invested in the economics conference. He intended the textbook, at this point already fourteen years in the writing, to be used throughout the socialist world, for it to orient all socialists toward the correct understanding of present and future. The invitees were informed that the Central Committee expected an open and critical discussion. The first meeting began on November 10th, 1951. The discussion lasted not the planned two weeks, but over five, including twenty-one plenary sessions with 110 speeches from the 257 participants. The idea of a “transformed” law of value caused heated dispute. Speakers remarked upon total lack of agreement regarding its meaning. One group said that the policies of the Party and State created all economic laws. As the State controlled both politics and the economy, it was part of both base and superstructure, and could itself be treated as an economic category. An opposing group claimed that economic laws were independent of human will, and the Party and state were subordinate to them. Another held with Stalin’s view, that the categories still applied, that the followed from the need to distribute according to
labor, but that they were transformed insofar as labor was no longer exploitative, no
longer extracted surplus value. Strumilin, with his planner’s emphasis on economic
proportionality, said that the law of value regulates industrial production, and it maintains
this function even under communism, whatever other functions it loses. Ostrovitianov, in
his closing remarks, noted that Stalin had been clear in his article on linguistics that the
political superstructure cannot determine the economic base.

In December of 1951, three detailed reports on the conference, another summary
report written by Malenkov, Suslov, and Yurii Zhdanov, and the conference minutes
were sent to Stalin, all of which he read and extensively annotated. In early 1952 he
began to write up his “Remarks.” He emphasized that economic laws in all formations
were “objective” and “scientific.” The Soviet state does not create laws, but it does use
them. Planning practice reflects them. He then laid down the so-called “basic law of
socialism,” which henceforth entered all political economy textbooks: securing maximum
satisfaction of constantly rising requirements through expansion and perfection of
socialist production on the basis of advanced technology. Prying apart the plan itself from
planning as an economic law, a conflation that had reigned throughout the previous
twenty years, Stalin said that the plan is not itself an economic law. Rather, the plan
reflects the requirements of the law of balanced development of the national economic,
which itself circumscribes the operation of the law of value.

He offered a new justification for the operation of the law of value under
socialism, complicating matters for the political economists considerably, by arguing that
exchange between collective farms and state-owned industry counted as commodity
exchange, and thus that the law of value must be operable. Stalin thus broke the orthodox
equation of capitalist society and commodity producing society. He argued that various
forms of pre-capitalist society already had restricted realms of commodity production,
and so does Soviet socialism. Whereas expropriating the peasants might be a step towards
full communism, it would destroy the political alliance. Any nationalization of the
collective farm sector must take place in the future through some more consensual
mechanism. Though this did not well reflect actual practice, Stalin thus said that the law
of value regulates commerce between the collective farm sector and the state-owned
sector. Furthermore, the law of value, by which Stalin seemed to mean something like
cost-accounting, serves a normative role in the internal functioning of industry.
Managers, he wrote, ought to manage their enterprises so as to maximize output, profit,
labor productivity, etc., and minimize inputs, waste, etc. Prices too ought to be set with
regard to values, at least relative prices. Here there is also a feedback from the
commodity exchange between town and country: the prices of consumption goods
determine the wage bill, and the latter helps set the floor to industrial price-setting. This
argument was also in the Lapidus and Ostrovitianov textbook, but had been played down
over the intervening decades. What Stalin argued that the law of value does not do under
socialism is regulate the proportions between different sectors and industries. That the
plan now achieves, and, in accord with the plan, less profitable heavy industry will be
favored over more profitable light or consumer goods-oriented industry, and loss-making
enterprises whose products are required for long-term growth will be subsidized. The
law, in short, functions normatively with respect to intra-firm rationalization, but does not
impose itself upon firms as an objective force as it does under capitalism, and therefore it
does not regulate the allocation of productive forces among sectors.

Stalin had no intention of sharing these remarks beyond the core political
economists and the Politburo members, but as word got out that they existed the Central
Committee was flooded with requests for them. Yurii Zhdanov recommended that three
thousand copies be printed for distribution to political economy teachers and
departments, major journals and newspapers, party secretaries and scientific workers—
but all not for citation. At a meeting with seventeen political economists and Politburo
members, Stalin reiterated his remarks, and clarified that laws could not be
“transformed,” they either functioned or did not. What varied was the social scope of
their functioning. The State, he said, belonged to both the base (for example, insofar as its
budgeting procedures made it an economic entity) and to the superstructure (insofar as it
made decisions about expenditure), and it used the law of planned proportional
development to coordinate the economy.

Subsequently, Stalin further clarified his position in response to three letters, in a
way that tried to both establish circumscribe the role of economics. Responding to
Notkin, Stalin argued that economic laws are used consciously to varying degrees in all
social formations. The difference under socialism was that they are no longer used in the
interests of the dominant class. To A.V. Sanina and V.G. Venzher, Stalin re-emphasized
that economic laws were objective, and that if this were denied “[t]he effect would be that
we would destroy political economy as a science, because science cannot exist and

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85 Gatovskii, Kuz'minov, Laptev, Leont'ev, Ostrovitianov, Pereslegin, Pashkov, Shepilov, Iudin, Atlas,
Arakelian, Bolgov, Vasil'eva, Guskakov, Kozlov, Lubimov, and Rubinshtein.
develop unless it recognizes the existence of objective laws and studies them. And by destroying science, we would be forfeiting the possibility of foreseeing the course of developments in the economic life of the country, in other words, we would be forfeiting the possibility of providing even the most elementary economic leadership. But then Stalin seemed to turn again, limiting any ambitions of economic science to have a voice in policy. Against many of the textbook’s proposition, Iaroshenko of the Moscow Regional Statistical Administration argued that economists should rationalize the forces of production and create a scientific basis for planning the whole economy, which would replace capitalist categories. Stalin vociferously denounced him as un-Marxian. The Moscow Party Committee labeled Iaroshenko a “Bogdanovite-Bukharinist” and sent him to work in Irkutsk.

Finally, in October of 1952, Stalin’s “Remarks” and his responses to the three letters were published together as Economic Problems of Socialism in the U.S.S.R.. While a busy public discussion of Economic Problems was in progress, Stalin died in March of 1953. Finally, with the master economist gone, the textbook was finally published in 1954, eighteen months after Stalin’s death, and without the promised stamp saying “Edited by a Commission of the Central Committee” or “Authorized by the Central Committee.” And still no one was satisfied with the state of economic science.

2. THE TIME FACTOR: ENGINEERS’ INVESTIGATIONS OF CAPITAL INVESTMENT

The all-out industrialization drive quickly went out of control. When the government announced at the beginning of 1933 that the First Five Year Plan had been fulfilled in four years and three months, with industrial growth achieving 93.7% of target, this was not only based on unreliable or deceptive numbers, but also false. All the other plan targets were huge failures. The costs of investment to achieve that growth were 41.6 billion rubles, rather than 22 billion, for instance. The Soviet Union was an open construction pit. Its resources were being expended, often wasted, at an astounding rate. While the leaders heralded a triumph, the engineers and economists worried.

There was only so much capital to go around. This scarcity was exacerbated by the refusal to account for capital costs, in accordance with the labor theory of value. For Marx, labor produced value under capitalism, not socialism, but the labor theory of value had been written into Soviet accounting practices. A series of laws from 1930 to 1932, called collectively the Credit Reform, had created a new financial structure for the newly nationalized economy. State-owned enterprises were to be provided with all of their fixed capital and much of their working capital for free (the rest of the working capital was financed via short-term low-interest bank loans). Accordingly, when planning projects only yearly operating costs counted, whereas the productivity-enhancing capital invested appeared as costless. So, as much of it was used as could be obtained. This could also be theoretically justified as the choice of the most “advanced” (i.e., industrial) variant. Capital charges, it was argued, would slow the appropriation of the newest technology.

The capital scarcity was exacerbated by the gigantomania of the first five year plans: the

largest projects—immense dams and factory complexes—were deeply cathexed symbols of the future being made real. The novelist Fedor Gladkov, who helped to set the terms of socialist realism with his novel *Cement*, was taken with the immense Dnieper Hydroelectric Station project almost to the point of obsession. He moved to the construction site in 1927 and remained there for five years working on what became an immense manuscript, entitled simply *Power*, and a journalistic account, *Letters on Dnieperstroi*. “Dnieperstroi is microcosm of our entire country, with all its peculiarities and contradictions. It is the drop in which is reflected all the most complicated processes of life in the Union of Republics,” he wrote.

While writers and those economists officially in favor celebrated the power of the revolutionary will of the proletariat, as guided by the Communist Party, to express its freedom in the face of necessity, overcoming all obstacles and opening all bottlenecks, those engineers in charge of making the miracle could not be so sanguine. They worked not in the planning bodies but in the research institutes and especially the project institutes (*proektnyi instituty*) of the various trusts or glavki under VSNKh and, after its dissolution in 1932, the Commissariat of Heavy Industry. After the planners set output targets and allocated capital among the different branches of the economy (*planirovanie*), it was up to the engineers in the project institutes to determine how best to use those resources to produce the given outputs (*proektirovanie*). Most of these engineers were not products of the new system, but had graduated from the elite Moscow State Technical School and Leningrad Polytechnic. As noted previously, the engineering education at MVTU included an extensive economic component. Many had been involved in the first
Soviet plan, the State Commission for the Electrification of Russia (GOELRO). They were almost exclusively specialists in hydropower, the flagship technology of the electrification campaign, and road and railroad building—all extremely capital-intensive industries that had been identified as the infrastructural core and accelerating flywheel of industrialization. In engineering journals, far from the eyes of the ideologues and even most economists, they struggled to find criteria by which to judge alternative projects in order to most efficiently utilize the scarce capital to fulfill the impossible targets.

In a capitalist system, as Kaplan (1952) dissects the problem, a variety of allocation problems are unified: choice among baskets of future output, choice of ways of producing a particular output, optimum size of plant, determination of the horizon over which comparisons are to be made, and determination of proper rate of return on capital. They all receive the same answer: undertake a project if its “internal rate of return” is greater than the interest rate. When engaging in a project that extends into the future, future revenues have to be valued in the present. The degree to which future money is less valuable than present money is the discount rate. The internal rate of return is the discount rate at which all future cash flows and all initial and future investments and operating costs balance out, i.e., the discount rate at which the investment breaks even. The interest rate is the cost of acquiring capital. So, more simply put, do the project when it makes more money than it costs. An alternative formulation applies to the comparison of projects with identical outputs: sum the costs over time, using the market rate of interest, and choose the variant with minimal costs. This variant was the starting point for most of the early Soviet proposals.
The interest rate and the discount rate play two roles in a capitalist economy. On the one hand, interest rates are a cost. They reflect rate of return capital in other uses, and compensate alternatives that are sacrificed, in other words, *opportunity cost*. And as *compound* rates, interest and discount rates make commensurable outlays and receipts that occur at different point in time. On the other hand, discount rates are an allocative criterion, they make possible choices among project. Comparing internal rates of return ranks projects by their efficiency, and then comparing these internal rates of return to the market interest rate functions as a criterion to accept or reject the projects. But without financial markets and capital markets, a socialist economy has no interest rate. And Soviet planners allocated capital without charging for it. Furthermore, in Soviet socialism, the first question as to choice of future output disappears, because the planner has already determined what to make. So how is the engineer to choose among variants of the project to produce what the planner has ordered without an interest rate or capital charge?

Economists had debated the question of the rate of return on capital at the ends of the 1920s as the first five year plan was debated and began to be implemented;\(^88\) the purges ended that. But the engineers began to search for a solution immediately.\(^89\) The problem was discussed in *Gidrotekhnicheskoе stroitel'stvo* [Hydrotechnical


Construction, the journal of the hydroelectric station building industry, throughout the thirties, and the railroad industry recognized it in its methodological guidelines document of 1931. The great engineer Ivan G. Aleksandrov, a member of the GOELRO commission and the presidium of Gosplan from 1921, as well as the main engineer of Dnieprstroii, came out in favor of capital charges in 1933. In the 1930s and subsequently, many design and engineering institutions seem to have used a simple criterion to choose between two projects with identical outputs called the rate of recoupment. If one project has a single capital outlay \( K_1 \), and another capital outlay \( K_2 \), with yearly operating costs \( V_1 \) and \( V_2 \) respectively, and \( K_1 \) is greater than \( K_2 \) (i.e., the first project is more capital intensive), then the first project should be chosen if the ratio of \( K_1 \) minus \( K_2 \) to \( V_2 \) minus \( V_1 \) is less than the criterion, the period (measured in years) \( N \) defined in advance as the maximum acceptable period of recoupment. A related criterion, called the coefficient of efficiency is the reciprocal of this one, \( 1/N \), and functions roughly analogous to an interest rate. However, these two criteria (or two forms of one criterion) were highly limited. They enabled only pair-wise comparison of projects. They could not render commensurable different temporal patterns of outlays of labor or capital or returns. And different proposals for period \( N \) were highly arbitrary. Another discussion took place on the pages of Gidrotekhnicheskoe stroitel’stvo in 1937–1938, and in Elekrichestvo in 1938–1939.

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Engineers sought more sophisticated criteria that addressed some of these difficulties, their discussion reaching a peak as war exacerbated problem of capital scarcity into crisis. The problem would by no means disappear; to the contrary, it became a standard area of specialization in economic theory. Economists would elaborate increasingly sophisticated, nuanced, and sometimes convoluted treatments, but I am concerned with this moment of breakthrough in the formulation of the problem. I will not attempt to survey the entire discussion, but will focus on three contributions of prominent hydroelectric engineers in *Gidrotekhnicheskoe stroitel'stvo* in 1945, and the subsequent reactions from economists which are both among the most sophisticated and sufficient to lay to out the patterns of reasoning. As Grossman notes, discussions proceeded within strict limits: participants were not concerned with enterprise profitability, just with return on incremental invested capital realized as operational savings, and they were usually not concerned with guiding the final bill of goods produced by the enterprise, only the choice between technological alternatives that produced a given output. While their criteria functioned analogously to interest rates, the engineers and economists often asserted that they had nothing in common with that capitalist category, as they were merely calculating devices for designers, not prices actually paid for capital, or a form of personal income. And, in contrast to later debates, these ways of defining a cost for capital were not proposed to enter into the way that the products of an actually completed project were to be priced.

The most important innovation was to introduce a compound discount rate in order to render comparable projects with different temporal patterns of investment and
operating costs. In this, proposals differed little. Where they differed was in 1) the scope of the acceptable comparisons; 2) in the source of the interest rate analogue, if they had one; 3) scope of application of the interest rate analogue. Differences along these dimensions reflected both technical difficulties in coming up with a conceptual coherent and practically tractable criterion and the conceptual strictures of planning practice and ideological orthodoxy.

The hydroelectric engineer Ayvazian’s strategy is to calculate an interest rate analogue in terms of the possible increments of output that could be realized if the resources devoted to a given project were instead devoted to other uses in the industry. What is important about his reasoning here is that it is based on an intuition of opportunity costs. By making the assumption that savings in operating costs per ruble of investment outlay will be equal to the increment in output per rubble investment outlay, he constructs a measure of the rate of return on capital in terms of savings in operating costs. This allows him to maintain the appearance of ideology orthodoxy that would forbid attributing value creation to capital. His criterion is also industry-specific, rather than economy-wide. This reflects the belief that it is up to the highest level politicians and planners to determine the direction of the structural transformation of the economy, the intersectoral proportionality of production. As a directed structural transformation, it is not a decision that can be made economically, within the framework of choice of given by present preferences and scarcities.92

92 V. G. Aivaz'ian in "Osnovnye polozheniia energo-ekonomicheskikh raschetov pri proektirovanii gidrostantsii", Gidrotekhnicheskoe stroitel'stvo, 1945, Nos. 1–2, pp. 8–12. This is apparently a condensation of his preprint, "Metodika i technique energo-ekonomicheskikh raschetov pro proektirovaniigidrostantsii" (VNI Hydrotechnology 1942 and Moscow Energy Institute 1943).
The great engineer Boris E. Vedeneev, also a veteran of GOELRO and the Dnieper Hydroelectric Station and subsequently leading the hydroelectrical construction work within the Commissariat of Electrostations, constructed a criterion in some ways less sophisticated, insofar as it did not contain a compounded interest factor enabling comparison of different temporal patterns. His cost formula included initial capital outlay, a yearly depreciation charge to replace the capital, and yearly operating costs. To compare projects, he then adds a profit, justified as funding future investment (“expanded reproduction” is the Marxian category). The period over which two projects are to be compared is determined as that period over which the most quickly depreciating component of the project would fully depreciate. (He proposes that this is about 15–20 years for the power industry.) The yearly average profit is set so as to allow expanded reproduction (full replacement of the projects capital, over and above accounting for depreciation) over that period. His criterion was then to minimize costs per unit of power among projects that produce an equal amount of energy per year.93

Fedor F. Gubin also proposed a rate of profit-based criterion, this time with a compounded rate. Another MVTU graduate (1920) with extensive experience on construction sites, he headed the kafedra of water energy at the Kuibyshev Moscow Engineering-Construction Institute and his monograph summing up the field of hydroelectric economics would win the Stalin Prize in 1951. He constructed a function very similar to the internal rate of return to decide among all hydroelectric products yielding an identical amount of energy. He then assumed an economic horizon for

comparison given in advance, that operating costs and capital costs are actual, but that output is priced such that, with the required rate of return, costs and receipts balance (equal zero). Rather than solving for the discount rate, the equation for each project is solved for the output price, and the one with the smallest output price is chosen. But the true novelty is that his required rate of return is determined as that rate of profitability which will ensure the planned rate of growth of industrial enterprise for the whole economy. This implies that the best of the projects will itself only be embarked upon if its output price is in fact smaller than the current output price, or the average expected price. Kaplan reports that Kenneth Arrow supplied the proof that this criterion would select the same projects as does the use of internal rate of return with respect to interest rates in a capitalist economy.  

The broader economics profession became aware of these debates with the publication of Stanislav Strumilin’s and Viktor Novozhilov’s papers of 1946. Both were economists close to planning practice. Strumilin of course had been the planning economist *par excellence* of the first decades of the Soviet Union. He studied at the St. Petersburg Electrotechnical Institute, the first such specialized institution in Russia, and which would become the first institution in the Soviet Union to be renamed after Lenin. After being expelled in 1899 for participating in politics, he was active in the revolutionary underground, first as a Social Democrat, and then as a Menshevik. In 1916 he led the statistical department of the Emergency Fuel Council, and in 1921 became deputy chairman of Gosplan, a post which he held until 1937. A Gosplan he was one of

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the principal planners of the industrialization drive. From 1932 to 1934, he combined this position with that of deputy chief of the former Central Statistical Administration, then named the Central Administration of National Economic Accounting. In the 1940s he was a member of the Gosplan Council of Scientific Technical Expertise.

Due to his article, the whole problem of capital charges became known as the problem of “the time factor.” He did not give a single method for selecting variants, but rather some principles to guide project designers and eight suggestions for criteria. A veteran of vicious ideological battles, in contrast to most of the engineers he employs the categories of Marxist-Leninist political economy of socialism and tries to operationalize them. Aware of the engineers’ discussions, he castigates them for using devices that he considered inapplicable to socialism. Thus, he evaluates everything in terms of homogenous labor units (that is, labor is the numéraire), in the two forms of living and embodied labor (variable or operating capital). He for the most part avoids marginalize reasoning and avoids talking in terms of opportunity costs. Among the criteria he discussions were the ratio of accumulation to value added in any year, the physical output per unit of direct labor input over the life of the equipment, and, his stated preference, the ratio of cost to average value of a unit of product in the economy. The ingenuity of the criterion which he choses to work out algebraically, which is formally identical with the capitalist way of viewing the problem, is worth explicating in full. Let $K$ be the capital outlay in year zero, $L$ is the expenditure of living labor per year (assumed to be constant), $J_n$ the expenditure of embodied labor in year $n$, and $R_n$ the output in year $n$. Expenditures are assumed to be constant valued in labor with present productivity. Labor productivity
increases by a compound rate $a$, so the annual costs and receipts are respectively $J_n = J(1 + a)^n$ and $R_n = (1 + a)^n$. In accordance with the labor theory of value, a rise in economy-wide labor productivity causes a physical unit of a product to be proportionately devalued. The operating costs thus also fall over time, as the products of which they consist come to embody less labor, while the annual living labor costs stay constant. The rate of labor productivity increase thus appears as the annual rate of change in the price index with constant real wages. His criterion is the sum of the net returns that each project promises over some time span. From the sum of expenditures of embodied labor minus output, “depreciated” at the rate of increase in labor productivity $a$, subtract capital and living labor times the number of years in the period of evaluation. Though Strumilin only discusses applying his criterion to choice between projects with identical annual output or between projects yielding different amounts but the same kind of output, nothing about his criterion prevents it being applied to the general case of choice among projects.  

The two other economists taking part in the debate at this stage were Aleksandr Lurie and Tigran S. Khachaturov, both transport economists. Khachaturov had engineering training and was director of the All-Union Scientific Research Institute of the Railroad Industry of the Ministry of Roads and Communications (1945-1949) and subsequently the director of the Institute of Complex Transportation Problems of the Academy of Sciences (1954-59). His interest rate analogue is determined by estimating the average coefficient of relative efficiency within an industry over some preceding

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period, i.e., the estimated current savings in operating costs attributable to investment, divided by investment over some period. Given this interest rate analogue, projects with the same output are then compared, and the one with minimal costs chosen. In his theory, the scope of acceptable comparison is limited to projects producing an identical and given output, and it is sourced from within a single industry.\textsuperscript{96}

The transport economist Aleksander Lurie, whose career from 1930 until the founding of CEMI was spent in the institutes of the railroad commissariat and its specialized higher education establishments, took a similar strategy. He began by refining the coefficient of efficiency criterion to handle projects with different temporal patterns, enabling the comparison of cost patterns. He justified his use of a compound interest factor by the opportunity costs of the expenditures on a project to the rest of the economy. However, his heretical novelty is that his interest rate is to be determined not statistically but by the highest planning organs so as to equalize demand for and exogenous supply of investment funds. But if industrial demand is to be sensitive to this minimum admissible rate of efficiency, it cannot be limited to one branch of the economy, as the other criteria surveyed above were. He envisioned his criterion as equalizing marginal efficiency of investment in all uses, and setting a minimum such marginal efficiency that projects must meet to be considered. However, because his

criterion can only compare two projects at a time, and with identical outputs, it is not clear how it could possibly serve as he imaged it would.\textsuperscript{97}

With the opening of debate to economists, the backlash came quickly, mostly on the pages of the Institute of Economics’ journal \textit{Voprosy ekonomiki} and that of the Gosplan, \textit{Planovoe khoziaistvo}. Treating this as a wholly new debate, they ignored the literature on investment efficiency from the 1920s. The charges leveled against the engineers and practical economists were various. First, they were accused of adopting bourgeois concepts and smuggling them in: the notion of compound interest, which, for very nearly accidental reasons had become taboo; “idealism” (mathematical formalism); the use of concepts of scarcity and the margin (as opposed to the orthodox average). Second, their theories were said to contravene accepted principles of Soviet planning. They were accused of misunderstanding the meaning of socialism: subjecting the bill of goods to the test of profitability when profitability was not a criterion for investment under socialism. Even if they were not using a criterion of profitability, they were accused of trespassing on the prerogatives of planners and politicians, of overstepping their epistemic jurisdiction, in passing judgment over the bill of goods. But as we have seen, most of them carefully avoided talking about the final bill of goods, even when their criteria were applicable to it. Following from both of these considerations, they were accused of disagreeing with a policy principle, the predominance of investment and growth in heavy industry over consumer goods production. This was a sore point. In the post-War period, the leadership felt increasing pressure to raise long suppressed standards

\textsuperscript{97} A.L. Lur’e, “Metody sopostavleniia eksplotatsionnykh raskhodov i kapitalovlozhenii pri ekonomicheskoi otsenke tekhnicheskikh meropriiatii” in in E.D. Khanukov and V.I. Chernyshev, \textit{Voprosy ekonomiki zheleznodorozhnogo transporta} (Moscow, 1948), pp. 3–70.
of living and contain social unrest and stimulate labor productivity. Economists were aware of these issues in a way that the engineers probably were not, and in any event had not even discussed. In the most blanket condemnation, and fully in accord with Stalinist political economy, Chernomordik denied that choice among investment alternatives can be subjected to a criterion. It is not a purely economic decision, and cannot be formalized. Rather, leadership must take into account the all circumstances in the country that seem relevant to them, and it is not for the economist or engineer to question. But for all that, many of the economists did try to offer their own criteria for which they claimed orthodoxy. Many of the results were tortured.

By 1954, a review article in *Voprosy ekonomiki* had declared in principle in favor of the comparability and calculability of investment expenditures in intra-sectoral decisions, though against a minimum effectiveness ratio (an analogue to a market interest rate). In 1956, however, Gosplan issued a “temporary standard method,” and in 1957 a Scientific Council on the Effectiveness of Capital Investment was created. 1958 saw an All-Union Scientific-Technical Conference on Problems of Determining the Economic Effectiveness of Capital Investment, at which Khachaturov gave the plenary address and Kantorovich, Nemchinov, and Novozhilov were in attendance. At the 21st Party Congress, Khrushchev even spoke of the importance of the “time factor” in the question of electrical power construction, making the issue definitely not merely academic. And

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finally, in 1960, a definitive “Standard Methodology,” developed jointly by the Institute of Economics and the Scientific Research Economics Institute of Gosplan was adopted.  

By the late 1950s, however, the problem had already started to bleed into that of price formation.

3. PRICE FORMATION: THE RATIONALITY OF ECONOMIC RELATIONS

From the middle of the 1950s, the political economists’ discussion of the law of value and the planning-oriented economists’ interest in price reform began to dovetail. In 1956, 1957, 1958, and 1962, major conferences addressed the two questions. The traditional point of view blankly refused the project of rationalizing prices, arguing that under socialism prices are directly political instruments for the Party to realize its goals. But more practically oriented economists were ready to fix incentive problems, and more interested in sparring about the correct way to do so. They proposed a variety of formulas for “price formation”: ways to derive the final price of the good as imputations of various of its inputs.

Economists’ interest in prices were driven by the complete overhaul of Soviet pricing following the Second World War, and continued less extensive reforms up

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99 It is summarized in Planovoye khoziaistvo, 1960, No. 3, and published as Tipovaia Metodika Opredelenia Ekonomicheskoi Effectivnosti Kapitalnykh Vlozhenii (Moscow, 1960).

through the mid-1960s.\textsuperscript{101} The war had introduced two important problems into the price system. First, the government had financed the war with a fourfold expansion of the monetary base, and controlled the inflation that would have resulted by instituting a rationing system. At the same time, consumer goods production fell steeply. The result was enormous suppressed inflation, represented in accumulations of personal savings, and weak labor discipline and correspondingly slow productivity growth. Retail prices in their two modes, commercial and rationed, were completely out of correspondence to the money supply. Second, wholesale prices did not correspond to costs. During the war, costs had risen precipitously, as raw materials were used up, efficiency was ignored, enterprise losses monetized, and quality of intermediate goods fell. Before the war, heavy industry had been generally profitable, if not by much, but by the end of the war many priority sectors were loss-making. During the war, and in the immediate postwar years, subsidies to enterprises from the central budget increased dramatically. Enterprise took on debt to the point where it was clear that they did not expect to be forced to pay it back. With prices set at levels that made profitability impossible, enterprise ignored *khozraschet*, and planners could not control them with “economic levers.” At the same time, and unrelated to the war, production technologies had considerably changed since the last system-wide price reform of 1926–7. Planning was impossible in current prices, but the 1926/7 prices no longer corresponded to reality, further entrenching the practice of planning in physical terms.

\textsuperscript{101} The next four paragraphs draw from Malafeev, Aleksei N. *Istoriia Tsenoobrazovaniia v SSSR (1917-1963 Gg)*. Moscow: Mysl’, 1964, pp. 233–57.
1946 saw rapid reconversion of industry to peacetime production, and by 1948 mass produced consumer products had nearly reached prewar levels, which helped to absorb some of the inflationary overhang in consumer savings. But the scale of emissions had been too large. The rationing system, which worsened the excess savings problem, also lowered labor incentives and gave rise to a thriving black market. But the government, committed ideologically to constantly increasing living standards and falling nominal prices, could not end it. In 1946, the government lowered commercial prices and raised rationing prices, offsetting the blow to incomes with onetime bonuses to pensioners, students, and low-paid workers. The solution was a confiscatory monetary reform in 1947 that largely wiped out savings. The same legislative act eliminated rationing prices, and set new nominal commercial prices on basic consumer goods at roughly the same, and in some cases lower, nominal level as the rationing prices. At the same time, the highly geographically differentiated system for agriculture prices was substantially decreased, while the number of prices which would be set centrally increased. All of this helped boost labor productivity, controlling costs of production and increasing profitability.

In 1949, the retail price reform was followed by a wholesale price reform in my sectors of heavy industry as well as a railroad tariff reform. The plan was to build profitability of about 3–4% into industrial production, after the planned cost reductions in the 1950 plan. Most of the sectors affected were intermediate products to other production, the profitability of which was maintained by reducing turnover taxes. The reform was a success: all sectors became profitable and state subsidies immediately fell
to almost nothing. In the following years, costs dropped substantially as productivity and output increased, helped by large capital investments. In 1950 and 1951 prices were adjusted back downward, though. It is unclear what the significance of this was. One hypothesis is that it was a reflection of a change in policy consequent upon the arrest and execution of the Gosplan head Nikolai Voznesenskii and the subsequent purge of Gosplan in 1950. But it is not clear what the rationale for a reversal would be. Malafeev argues that the decreases merely reflected fine tuning, and took into account success in cutting costs. As a result of these movements, the price level approached that of 1948, but the relative prices between industries were transformed.

These two major price overhauls were not the final word. Retail prices were continually altered over the next several years, wholesale prices were decreased again in 1955, and a revision of wholesale prices was initiated in the early 1960s that would not be completed for years. But all of this early activity proceeded without any significant input from the political economists of socialism, without any explicit theorization beyond that already implied by the categories of Soviet accounting practice. But economists were under pressure to prove their practical worth. The price reform debates of the 1950s and 1960s, which focused on wholesale prices, represented a multi-sided confrontation between various sorts of practitioners and theoreticians by which rationales were worked out for how prices ought to be set that implied propositions about what prices actually are.

On the “Gosplan Affair” and “the Voznesenskii Affair,” see Khlevniuk, Oleg V. “Sovetskaia Ekonomicheskaia Politika Na Rubezhe 1940–1950-X Godov I ‘Delo Gosplana.”’ Otechestvennaia Istoriia 3 (2001): 77–89. Khlevniuk argues that these were an intersection of Politburo politics and a new administrative-repressive campaign to accelerate industrial growth, and that Vozensenskii had no particular reformist principles.
There were three important types of wholesale prices in the Soviet Union in this period. Enterprise wholesale prices (optavaia tserna predpriatiia), the prices at which producers sold, were the comprised of the branch average cost of production (sebestoimost’), including direct and indirect labor, materials (including fuel and power), depreciation, short term bank loan interest payments, but not including rent or interest on capital, plus a profit markup of 5–10% over the branch level. They had no allocative meaning, they merely provided income for the state. The buyer of those goods bought at a different price, the industry wholesale price (optavaia tserna promyshlennosti), which included any turnover tax, a markup for the sales organization, and sometimes transportation charges. (In the absence of tax, and if the sale was direct rather than through an intermediator, it equals the enterprise wholesale price. Finally, some branches of production in which production costs were highly variable, had a accounting price (raschetnaia tserna) instead of an enterprise wholesale price when selling to the sales organization. While these prices were set within the planning organizations by a variety of means and then regularly tweaked, Soviet economists analyzed them into Marxian categories that depended on the labor theory of value (which, recall, was not in orthodox Marxism meant to apply to non-capitalist societies). Marx analyzed the the price of a product into its variable costs (labor), \(v\), constant costs (materials), \(c\), and surplus value, \(m\), which varies in proportion to labor. Soviet economists took sebestoimost’ as \(c + v\), and total profits plus turnover tax as \(m\).

Soviet price structure had two particularities that had begun to appear as problems. First, the level of consumer goods prices was systematically higher than that of
producer goods, i.e., industrial goods like machinery that were inputs into further production processes. Prices in Second, the relative prices of producer goods were highly arbitrary because of decades of industrial lobbying. Expressed in Marxian terms, the twofold problem with prices was that 1) industrial wholesale prices of producer goods were set such that they contained much less \( m \) proportionately to sebestoimost’ than did the industrial wholesale prices of consumer goods, and are thus priced below their value and that 2) surplus value was not evenly distributed among the prices of different goods, so their relative prices did not correspond to their relative values.

These distortions of the price structure began to appear as the nexus to which all the other problems discussed in this chapter pointed. The distortion interfered with the ability of planners to understand economic activity, both at the enterprise and aggregate levels. Many indicators were in physical terms, there were yet many in monetary terms. Because of the distortions, these indicators were unreliable means for inter-enterprise or intra-temporal comparisons of performance of, for instance, level and rate of profits or losses.\(^{103}\) They also affected the problem of macroeconomic measurement, preventing an accurate synoptic picture of the economy. Because part of the value produced by producer goods was “realized” in the prices of consumer goods, the share of heavy industry in national income versus light industry was underestimated, and accordingly so was investment relative to consumption in the national product.\(^{104}\) But additionally, the price structure also interfered with decision-making. Take the problem of relative

\(^{103}\) L. Gatovkii, "Ob ispol'zovanii zakona stoimosti v sotsialisticheskom khoziaistve" Kommunist, No. 9, 1957, p. 45.

\(^{104}\) "O metodakh pereotsenki obshchestvennogo produkta v tsenakh priblizhennykh k stoimosti," Voprosy ekonomiki, No. 8, 1959, pp. 137–44.
producer goods prices. First, despite physical planning, there was still scope for choice of alternative inputs and outputs, to which prices were relevant. Indeed, planners were unable to turn away from physical planning at least in part because they knew that the prices would lead to inefficient choices.\(^{105}\) Second, the prices distort calculations of the economic effectiveness of capital investment or the introduction of new technology, because such calculations rely upon \textit{sebestoimost'} for figures of annual operating expenses.\(^{106}\) Thirdly, and also related to the capital problem, materials and machinery were systematically undervalued with respect to labor, because wage rates were set in accordance with the price level of consumer goods, and the latter was systematically higher than that of producer goods. This incentivized the choice of more material- or machinery-intensive modes of production.\(^{107}\)

Those who wrote in favor of keeping the pricing system unaltered argued that prices will not always equal values because they have other functions under socialism than reflecting labor. They advocated piecemeal changes in prices only. Lev Gatovskii, a political economist with planning experience and then chief editor of the Institute of Economics’ journal \textit{Voprosy ekonomiki}, argued for instance that prices should reflect a modest profit, as incentive for the enterprises, so prices that were too low should be raised.\(^{108}\) Maizenburg, the Deputy Chief of the Price Bureau of Gosplan, argued that near substitutes should have similar prices, regardless of whether this forces different profit


rates for their respective producers that are inverse to the expenditures of labor.\(^{109}\) Others promoted the continued underpricing of machinery to facilitate the introduction of new production technologies.

The new proposals aimed to rectify some of these problems. The existing pricing structure they categorized as “arbitrary,” “subjectivist,” “empirical,” or “voluntarist.”\(^{110}\) Proper pricing would raise the level of wholesale prices with respect to consumer goods by a shift of surplus product (profits and turnover taxes) from the prices of consumer goods to those of producer goods. The aimed to both adhere to the law of value, by introducing a rule for price-setting, while allowing limited divergences from it as “conscious utilization” of it. Anticipating objections, they argued that underpricing machinery with respect to labor, they argued, does not promote technological progress, but retards it. Further they argued that larger profits would not relieve beneficial pressure on enterprises to reduce costs; those profits could be soaked up with taxes. But while they agreed on the direction of policy change, while disagreeing on the basis of pricing, particularly on the basis for allocating surplus profit.

The three bases for calculating and allocating surplus profit were 1) labor costs; 2) *sebestoimost’* (labor and materials); 3) and capital. This generated a four-way argument amongst the proponents of each of these proposals and those opposing any systematic change. The first group of authors argued that prices should be equal to the sum of the branch average cost of materials (including depreciation), the branch average wage cost


per unit, and a profit equal to \( v(M / V) \), i.e., the labor cost-weighted ratio of the total surplus value to be distributed to the total wage bill of all productive workers. Another group of authors made the profit markup proportional to \( sebestoimost': (c + v)(M / (C + V)) \). This proposal had the advantage of being most similar to current practice, which set prices with respect to \( sebestoimost' \), but called for a uniform percentage markup on all consumer and producer goods. Finally, the last group essentially proposes that prices should include a capital charge: profit is a capital-weighted ratio of total surplus product to total capital: \( k(M / K) \).

The labor cost-based proposal had the advantage of appealing to ideological orthodoxy, which held labor as the only source of value. Its proponents, Strumilin and Kronrod first among them, could argue against the other schools that they allocated surplus product on the basis of past labor embodied in materials or capital, contrary to the labor theory of value.\footnote{S. Strumilin, “K opredeleniu stoimosti i ee primenenii v usloviakh sotsializma,” \textit{Voprosy ekonomiki}, No. 8, 1959, p. 83; trans. \textit{Problems of Economics}, No 2, 1960, 3.} But they were attacked because their proposal would increase the prices of goods from labor-intensive branches of production relative to those from capital-intensive branches, making the former seem more profitable, with the result that a branch’s profitability would decline as in the process of productivity-enhancing technological upgrades it substituted capital for labor. Within a branch of production, this proposal would generate a theoretical conundrum. More highly capitalized enterprises, with above average productivity, would have lower labor costs per unit of output than the branch average, and thus would have higher profits. That is, contrary to the intent of the theory, while employing less labor they would seem have higher profits, and seem to
create more surplus product. Finally, this proposal would distort the choice of output assortment and production technology, because enterprises would have higher profits if they produced more labor-intensive (and thus higher-priced) goods or used as inputs goods the production of which was highly capital-intensive, which would thus be lower-priced.  

The *sebestoimost’*-based proposal, associated most closely with D. D. Kondrashev, had in its favor not theoretical orthodoxy but similarity to current practice. *Sebestoimost’* was already the notional basis of pricing policy; the primary innovation was to call for a uniform percentage makeup on all consumer and producer goods. This proposal pleased no one: traditionalists did not like the uniform rate; labor-costers did not like relating the markup to “past labor”; and the capital-costers claimed that it did not recognize “time factor,” the capital tied up in the enterprise.

In the last group, we see a convergence of the earlier (and still ongoing) capital debates with the pricing debates, with an important advance. Its major proponents were I.S. Malyshev, Deputy Chief of the Central Statistical Administration, V.A. Sobol’, the Editor in Chief of *Vestnik Statistiki*, L.A. Vaag, a Gosplan economist with extensive experience in the hydroelectric industry, and his regular co-author, the monetary specialist Z.V. Atlas of Moscow State University, V.D. Belkin of the Institute of

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113 D. D. Kondrashev, *Tsenoobrazovanie v promyshlennosti SSSR* (Moscow: Gospolitizdat, 1956), and *Tsenha khoziaistvenny raschet* (Moscow: Sotsekgiz, 1961).
The various proposals in the capital cost debates were hamstrung in two ways. First, the proposed criteria for investment choice were just and only that, they did not propose that the cost of capital enter into the accounting costs of the enterprise, nor into the prices of its products. Therefore, decisions based on these criteria had different effects depending on the degree of vertical integration of the industry in question. While a project-maker might choose a more efficient production process for one enterprise, with the costs of capital not reflected in the prices of the product of the enterprise they were not relevant to the decision-making process of the buyer of that product. Secondly, the criteria were of limited utility in any scope as long as relative prices were arbitrary. Getting comparisons of capital efficiency off the ground required a rational price structure. By incorporating capital into pricing, these economists accordingly laid the foundation for the criteria of capital effectiveness to function as they were intended to. The ratio of surplus product to invested capital, the “average norm of profitability,” could serve as a criterion for evaluating investment projects.

They defended their formula by arguing that though only labor creates value, it is more productive with more capital. They pointed out that their formula was analogous to the “prices of production” in the third volume of *Capital*. In fully developed capitalism, according to Marx, surplus value is distributed according to the “law of the average rate of profit” among capitalists in proportion to their fixed and working capital. Using one of

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the evasions already established in the discourse of political economy, they claimed that their “planned prices of production,” were similar in form but different in content to Marx’s prices of production. The critics did not buy it, asking why profits should guide the distribution of resources in socialism. Making profits attributable just to capital, i.e., to past “dead” labor seemed to attribute all new value to capital. And proposing a single economy-wide figure like M/K seemed to overstep the circumscribed bounds of economic jurisdiction by deciding inter-branch proportions, supposedly a purely political decision.

4. A PROBLEMATIC MECHANISM: INDICATORS, STIMULUS, AND GOVERNMENT BY INTEREST

The debates from the late 1950s to the middle 1960s on success indicators overlapped with and were confusingly intertwined with those on price formation. The deeper problem raised in these debates was how to guarantee the coincidence of enterprise interests with the global interest as expressed in the plan. Admitting the very existence of such a lack of coincidence of interests, and then locating in that non-coincidence the possibility of governance represented a deep shift in the imagined political ontology of socialism away from a vision of the fusion of all individual and partial wills with the universal will embodied in or realized by the Party.

The model of the system underlying the thought of most Soviet political economists was what has been called the “single factory” model. A planned economy, the Soviet economy, is a single factory, with each actual enterprise being one of its workshops or shop floors. These enterprises are not economic agents, they are not centers
of decision-making, only of execution. According to this model of the system, all processes can be managed from the single center via direct commands. Any shortfalls or accidents are only explainable in two ways: as technical failures or mistakes of planning, or irresolution on the part of those executing the plan. Either the techniques of planning had to be improved, the plans themselves were “unbalanced”, or execution was suffering from “bureaucratism,” or enterprise executives were conservative, politically immature, lacking in responsibility, or, at worst, wreckers. The question of the interests of different agents could not arise except as pathology. And in fact there was good doctrinal basis for this: without class antagonism, presuming that everyone was interested in the building of socialism, there could not be conflicting interests. The plan, as expression of the will of the Party and thus of the people, was thus in the interests of the people, and should be fulfilled “at any cost.” Any conflicts of interest could only be survivals from the pre-socialist past. To the extent that any agency had to be left to the enterprise, this was merely a measure of technical imperfect of planning.

Accordingly, immediate post-War attempts to “perfect planning” turned to endless administrative reorganizations of the ministries, to the devolution of operative planning from Gosplan to the ministries in 1947, to measures that increased the responsibility of managers for plan fulfillment in 1947 and 1949, and to a dramatic increase in the number of plan indicators. At the same time as planners and industrial administrators struggled to exert greater control over the enterprises to make them work harder or more efficiently, a countervailing discourse began to argue for decentralization. They claimed that the enterprises themselves had greater knowledge of their “reserves”—
their resources, the capacities of their plant and workforce—and the detailed attention of administrators was in fact getting in the way of enterprise initiative. Enterprises thus had to be given more freedom, but with this would come the risk that they would use it for only their own good. Enterprises therefore had to be induced to uncover their reserves, guided to use their new freedom toward the global good, via what were called “economic methods” of management. Attempts to perfect this managerial mechanism proceeded along two lines, first the attempt to devise the correct system of indicators of enterprise performance, and second, slightly later, attempts to link the indicator system with monetary incentives for the enterprise. Starting from these highly localized and technical problems of enterprise accounting, the entire institutional system of Soviet production gradually came into focus in a new way.

**Indicators: Overthrowing the Despotism of Val**

The Soviet management system depended on two types of numbers: plan figures (such as the *limity* and *kontrolye tsifry*, limits and control figures) grasped the economy as an aggregate and stated what should be produced; success indicators (*pokazateli*) were given to each enterprise to assess and control its behavior. These indicators were the primary means of directive planning. They included not only “quantitative” indicators of output volume and assortment, but “qualitative” indicators such as labor productivity and profitability. They were the means by which the different productive units became non-separable components of the Soviet single factory. Across the 1940s and 1950s the number of success indicators had dramatically increased as the central planning apparatus
tried to maintain control of an increasingly complex industrial structure. In Soviet economic parlance, enterprises had “reserves,” additional material or zeal that they were failing to apply. The proper planning system and the right set of indicators conjoined with “taut”—high, or even impossible—plans would force them to “reveal” these hidden reserves. But enterprises would game the system of indicators in order to fulfill the most important at least cost to themselves and receive bonuses for fulfillment and overfulfillment. The planners would then yet again add more indicators, or re-weight them, to attempt to head off this behavior.

There was already evidence of managerial discontent with the existing planning system before the war; Mau cites a letter from four Leningrad executives in Pravda in 1940 that argued for a drastic decrease in the number indicators, increasing the rights of enterprises, and allowing investment from retained earnings. And in the immediate postwar years there were some calls from Gosplan economists to increase the role of “economic methods” of management: by means of incentives, prices, credit, profit, and ‘commodity-money’ relations. The evergreen theme of khozraschet also experienced a boom in proponents at the turn of the decade. Interest in khozraschet, or “economic accounting,” dated at least to the 1920s, and there were regular attempts to strengthen it or institute it at different levels of hierarchy or in different sectors of the state. It was a nebulous and ill-defined concept, but its core was some notion of financial self-sufficiency, minimum profitability, and management towards those ends. Through the many managerial and planning reforms that followed Stalin’s death, it is possible to

discern a general decentralizing line. From April 1954 through 1955, a series of decisions and legislative acts of the Central Committee and the Council of Ministers devolved more and more rights to the ministries, union republics, and enterprises, and increased the role of “economic levers.” The number of indicators was also pared down, the number of centrally planned products was reduced by a factor of three. These changes stimulated economic research.

Economists and planners were increasingly coming to an understanding of the problems of the system. Mau summarizes their diagnosis as 1) an insufficient system of indicators, especially the shortcomings of the key output quantity indicator; 2) disagreement between the planning system and the stimulus system; and 3) planning “from the achieved level” rather than toward some sort of longer-term goal disinclined enterprises to innovate in management or technology. He demonstrates that the turning point in this research was how, from the middle of the 1950s, some economists began to grope their way from arguments about the number of indicators or the value of this or that indicator to a new understanding of the mechanism as such.

Already in the 1930s there had been some discussion on the insufficiencies of the gross output indicator (valovaia produktsiia, known as “val”), the sum of the wholesale prices of the output, but the real start of the discussion Mau dates to a June 1956 conference on measuring labor productivity (then based on gross output) at the Institute of Economics. The gross output indicator functioned at both levels of planning: it was

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117 See the list of legislative acts in Mau, Vladimir Aleksandrovich. *V Poiskakh Planomernosti*, pp. 80–1.
119 Subsequent milestones were a 1957, conference on planning and accounting of industry product at NIEI Gosplan, a 1957 inter-university conference at the Leningrad Financial Economic Institute on
at the same time used in aggregate planning, and for assessing enterprises. In the latter function, the use of gross product disincentivized anything that could reduce output while raising quality, such as the introduction of raw materials, or economizing on inputs. Furthermore, changes in gross product could move in the opposite direction to the contribution of labor, making it a bad base for determining enterprise labor incentive funds.

Some economists advocated jettisoning the use of val at the enterprise level, maintaining it only at the plan level. Others proposed a host of new indicators, to use in addition to or instead of val, to better express the labor contribution and depend less on the circumstances of production. Some were variations on gross output, like commodified or realized product (tovarnaia or realizovannaia produktsiia), respectively the sum of the prices of completed products only, and that of those not just completed but actually transferred; normative labor intensity (normativnaia trudoemkost’), which is measured in normative labor time per unit of product; or physical measures of output expressed in normative units (uslovno-natural’nye edenitsy). Other indicators supposedly better expressed the components of the cost of production, especially labor, and thus value added: net output (chistaia produktsiia), which subtracts the costs of non-labor inputs and depreciation from the output; gross revenue (valovoi dokhod), which includes labor costs and profits but not materials; normative cost of processing (normativnaia stoimoisti obrabotki), which includes labor costs and depreciation; and real production (realnaia produktsia), which subtracts the costs of materials and energy. Those that tried to express

labor expenditures did not take into account whether the products were needed by
customers, or whether the production was in accord with the aggregate plan. But most
importantly, the discussion on indicators was not able solve the problem of correlating
national planning and that of stimulating the enterprise to fulfill the plan.\(^{120}\)

*Stimulus: An Interest in Socialism*

More perspicacious economists saw that the problem was not the insufficiencies
of one or another indicator, but the existing form of planning. Rather than giving the right
indicator to the enterprise as an order, the enterprise had to be interested in achieving
success however measured. The two questions were connected: what indicator could
serve as also a means to incentivize plan fulfillment? The decentralization reforms raised
the stakes of the question. If lower levels of hierarchy were to gain greater operative
control over production, then planning would have to take place via enrolling the
enterprises in plan fulfillment. Without an overhaul of the indicator and incentive system,
*de jure* decentralization could not involve a devolution of *de facto* agency.

In the existing stimulus system, enterprises received bonuses for fulfilling or over-
fulfilling plans. But the problems of indicators and of enterprise incentive funds had not
been deeply connected. Basing the incentive, the bonus, primarily on gross output gave
the enterprises perverse incentives. By hiding their capacities to receive lower plan
targets, they could more easily receive bonuses. The multiplicity of conditions for
bonuses led to gaming the bonus system. And the primacy of the output volume

\(^{120}\) Mau, Vladimir Aleksandrovich. *V Poiskakh Planomernosti*, pp. 91–6
indicators disincentivized economizing or innovations in quality. Though many other economists were writing along the same lines, best remembered from this debate are the contributions of Kharkov economist Evsei Liberman, because it was his article that launched the debate into public attention in 1962. He proposed profitability (defined as ratio of profits to working capital) as the key indicator, and linked it directly to incentive funds and thus worker incomes.

Like many economists of the time, Liberman sought to strengthen centralism and increase the scientifically of planning. For him, this meant re-centering the planner’s role on strategic planning, instead of focusing on details that the center did not have the information to solve. There was widespread recognition that short-term plans were being constructed based not on the planners’ goals, but by a slow ratcheting up of plans from year to year, called “planning from the achieved level.” planners spent most of their time continually revising annual or quarterly plans and moving materials around to make good various shortfalls. Annual plans were disconnected from five year plans. Liberman wanted to relieve planners of these onerous labors to focus on creating scientifically-grounded long-term plans. What motivated proposals for overhauling the system of enterprise planning, management, and logistics was need to create a mechanism by which enterprises could be guided to fulfill these new long-term plans.

The then-shocking proposal at the heart of Liberman’s plan was that profitability should become the primary indicator of enterprise assessment. Profitability, he argued, best synthetically expressed the various desired properties of plant management. He proposed reducing the indicators, aside from profitability, to only the volume, assortment, and delivery period of production. The enterprises would then be free to work out for themselves all the other elements of the final plan. Assessing enterprises by profitability would not only lead them to produce the desired quantities, but also to attend to the various “qualitative” indicators like labor productivity and efficiency in use of energy and materials that did not incentivize. Liberman then went further. Stimulus funds should be related to profitability, to be instituted as a “normative”. In Soviet planning, normative were parameters by which quantitative relationships were established between centrally-determined plan indicators and either enterprise-specific accounting quantities or aspects of the productive process. Liberman proposed that contribution to the stimulus found should be the product of the normative and the logarithm of profitability, and set for five years. This was an important innovation. First, because the profitability criterion for receiving stimulus funds does not depend on plan fulfillment, it does not create incentives for the enterprises to try to lower their quantitative targets. On the contrary, the enterprise is stimulated to make its production plan as “taught” as possible. Second, by setting the normative on an industry-wide basis and over an at least five year term, the normative became less an order given to the plant and more of a parameter for its profit-maximization. That it was industry-wide meant that it decreased the micro-management of the enterprise by the ministries; that it was long-term meant that it allowed the
enterprise to plan further ahead, making it easier to introduce technological and managerial advances, and bringing the enterprise’s horizon of action into accord with that span of the five year plan.

However, the radicalism of his proposal has been overstated on account of the totemic significance of "profit". This was not a market socialist or liberal proposal. He maintained the use of gross output as the primary means for setting enterprise goals. While Liberman did propose profit as the key assessment indicator, it was completely divorced from the question of resource allocation. He also did not grasp that profitability needed to be linked to a rationalization of the price structure. And he did not propose a shift from the fixed linkages between suppliers and consumers to wholesale trade, whereby consumer demand would drive profitability. It is symptomatic that even at this stage that the questions of economic stimulus, success indicators, and price formation were not always understood as facets of one problem of governing by means of interest.

THE NEMCHINOVIAN SYNTHESIS AND THE KOSYGIN REFORMS: SOVIET MARKET SOCIALISM

On the 25th of June, 1987, the General Secretary of the Soviet Union, Mikhail Gorbachev gave a long speech announcing the “radical reconstruction” (koreennaia perestroika) of the Soviet economy by the introduction of market mechanisms. He cited as his inspiration a twenty-three year old article by the deceased statistician Vasily Nemchinov that argued strongly against centralized directive planning:

“The reconstruction of economic management is ever more insistently on the agenda. The question is discussed in scientific and public circles. I could cite the
article of Academic V.S. Nemchinov in the journal *Kommunist* in 1964. Even then he wrote: ‘The primitive understanding of relationships between large and small economic systems can only build an ossified and mechanical system in which all control parameters are given ahead of time, and the entire system is structured from top downwards at each moment and each point. Such a topdown structured system will slow social and technical progress, and, under the pressure of the real forces of economic life, will sooner or later break.”¹²²

This article of 1964 in *Kommunist*, “Socialist Economic Management and the Planning of Production,” (reprinted in the same journal following Gorbachev’s speech) is at once the capstone of post-War economics, and moves beyond it toward what mathematical economics will become.¹²³ It was a contribution to the centrally-instigated public debate that broke out in the main newspapers, and was part of the lead up to the 1965 reforms. Such public discussions, often led by articles in *Pravda* and *Izvestiia* indicating official sanction, often preceded major policy changes. The editors and the patrons in government would shape the discussion, guiding it toward a usually pre-determined conclusion, but often honestly soliciting feedback. Insofar as different editors might have different patrons, the discussions could become authentically contentious. In this discussion, the wider public became aware for the first time of the ideas that had been percolating among the economists, and for the first time since the 1920s the latter


were asked to speak as a profession to the broader public in a mode other than the exhortatory. In 1962, Aleksei I. Adzhubei, Khrushchev’s son-in-law and editor of the daily Izvestiia with a taste for pushing the ideological limits, brought Khrushchev Liberman’s article “Plans, Profits, Bonuses.” Khrushchev decided to launch a public discussion and gave the article to Pravda, a clear indication to the public of official sanction. After several months of publications, the discussion petered out, and was dormant in 1963 before breaking out with renewed energy in 1964. Throughout this period the questions of reform gave rise series of government commissions Izvestiia and Pravda traded articles back and forth every couple of days from January to October, accompanied by a growing chorus of lower circulation publications, until on October 15th Khrushchev was removed from power and the editors of both papers replaced.

Nemchinov’s article proposed what he called the “khozraschet system of planning.” It included a new system of prices, and a new system of incentives, but it went far beyond anything else suggested. He proposed replacing the administrative command system by a combination of a purely value-based system of control and a contracting mechanism, and replacing the system of material-technical supply by wholesale trade. He argued that it is incorrect to simply sum up enterprise-level indices into the national plan, for the two levels of figures are meant for very different and reducible tasks. The existing mechanism gives rise to the idea that planners should direct production, and inevitably leads to “metabolic diseases in our economic organism” (79). To this idea, long unquestioned and seemingly unquestionable, Nemchinov counterposes one that employs cybernetic language: “The national economic [narodnoe khoziaistvo] is a complex
economic system \textit{[ekonomicheskaia sistema]}, and it is not identical with a simple sum total of its elements and primary cells. It consists of a number of smaller systems… in turn made up of primary production (enterprises) and consumption (families) economic cells. But then always arise not only direct but also feedback connections…It is impossible to measure the entire complex of such relations by merely summing up planning and accounting indicators” (76). Against “a mechanical and arithmetical identity” of the controlling and controlled systems, he envisions a “transformation of the flow of economic information that will ensure uninterrupted operation of the economic feedback mechanism (reactions correcting deviations from the program)” (77).

Proper economic design is to “adjust this feedback mechanism ahead of time” so as to ensure the coincide of interests upon its operation (77). He makes an explicit appeal to the history of control engineering to which cybernetics can be traced back: “at the time of Newcomen, prior to the invention of Watt’s governor, the movement of steam in the engine was regulated by a special man who pulled the handle of the slide valve at the proper moment” (84). The system had to be reduced to accommodate an integral governor that would be response to feedback. What are these feedback relations? \textit{Khozraschet} relations, the reactions of a profit-seeking enterprise to an environment. Translating his basic thought nimbly from cyberspeak into the discourse of political economy, Nemchinov claims that his scheme will harmonize the operation at the macro-level of the law of planned proportional development and operation at the micro-level of the law of value, or, blatantly referencing the invisible hand but reversing the
formulation, that which is profitable to society must be profitable to the enterprise (78, 85).

The mechanism works as follows. Each enterprise composes a series of possible production plans and presents them to the center. Introducing mathematical methods into a theoretical structure that otherwise reflects the non-mathematical proposals of the 1950s, the plan is to be calculated with input-output models. This is a massive innovation: the previous reform thinking did not rethink the very notion of the plan itself, and thus the role of the theoretical economist, in the way that mathematical planning required. However, at this early stage, we see little evidence of the optimization-oriented thinking—price setting for instance is not via an optimization model—that will soon sweep over the nascent mathematical economics. The center then decomposes its plan into a series of plan-orders, specifying only quantity, assortment, and time of delivery, and surveys the available production plans. It then concludes contracts for those orders with the enterprises for price and terms of delivery. This process happens continuously, not on a calendrical basis. (“Continuous planning” was another debate of the 1950s, which I have not surveyed, that took as its problem the pathologies generated by the calendrical system, like end-of-period “storming.”) Enterprise costs include a capital charge, fixed as a long-term normative. Enterprises are then free to maximize profits. These profits are compulsorily split between its various funds (material stimulus, new technology, and expansion), also according to long-term normatives. Prices need only be fixed on basic consumption goods, the costs of which are subsidized by the center, and basic industrial inputs. Other mass-produced commodities will have controlled prices
worked out by the ministries and enterprises and confirmed by the center. All other prices are calculated by the enterprises on the basis of approved methodologies. Wholesale prices are fixed at what is calculated to be the average branch cost. A state insurance fund hedges the profits of agriculture. The path of economic development is guided not only by the composition of the plan, but also by transfers from the state budget to various other enterprise funds (wages, fuel and power, raw materials, spare parts, depreciation, material incentives, etc.) according to long-term normatives.

Nemchinov’s article thus knits together the different strands of research that I have surveyed into an integral interpretation of the existing system and lays out a possible reform vision that goes beyond anything else suggested, and which is importantly different from the other Eastern European reform socialisms. At the same time, its language betrays the influence of cybernetics, unremarked upon explicitly in the article. It also shows Nemchinov’s absorption and incorporation of Novozhilov and Kantorovich’s conception of optimal planning, and Nemchinov’s own study of input-output methods. It is the hinge between pre-mathematical Soviet reformism, and what will come. And, as Gorbachev’s speech shows, it is largely though not entirely determined the limits within which mathematical economics would be for the next several decades, until the the generation of the 1980s, the generation of Yegor Gaidar, came of age.

TOWARDS A POST-STALINIST POLITICAL ECONOMY
The reformist thinking of the 1950s and early 1960s resuscitated a properly economic mode of reasoning through the connections among people, numbers, productive apparatuses and materials, and ideas. In this mode of reasoning, the world as presented to agents in the Soviet production hierarchies is a milieu of resources and information within which they make decisions that involve tradeoffs, which appears first of all as prices. The actions of these agents have consequences for this milieu, and thus for the actions of other agents. The structure of this milieu, which for each agent includes the actions of the others, presents an objectivity internal to the choices of each agent. The economist’s study objectifies it, makes clear the structure of the tradeoffs, totalizes the partial perspectives of the agents, and thus the unintended consequences of their actions. For the economist, action upon this milieu is the means to shape their decision-making. A diacritic of this shift is the growing appeal to “economic stimulus” and “economic modes of management,” phrases which make use of the then unusual Greek-derived adjective *ekonomicheskyi* instead of the older Russian quasi-synonym *khoziaistvennyi*.

This is the economic that was lost during the 1930s, that collapsed into the political. From this Stalinist point of departure it is easier to observe, as was clear to the Soviet participants of these debates but is not always to inhabitants of capitalism, that the painstakingly reassembled economic mode of reason represented not just or only a new means of organizing the relationship of human collectivities to the surrounding world from which they drew their means of survival and flourishing, but a new way of organizing power, of organizing people. That is to say, the reemergence of economic
reason itself was not a apolitical or depoliticizing technical or economic change, but a political one, one of governmentality, or to use an older idiom, one of political economy.

Note the “economy” has not been named as such, but the conceptual space for it exists. Soviet economists did have available the phrase narodnogo khoziaistvo, “national economy,” the translation from the German nationalökonomie, but this is not a structured whole. It is the sum of various industrial outputs. More commonly they stay in the Marxian language of “productive forces” and “productive relations.” Across the 1960s, as I will show, this will change for three reasons. From cybernetics, the concept of system, and thus of “econonomic system” becomes available. With the adoption of input-output analysis, the national economy becomes a new type of sociotechnical object, one with a structure and dimensions of measurement. And, in implicit reflection with Eastern European experiments in alternative communisms, the assemble of means of management and things managed thematized by the debates summarized above will be baptized by a new generation of political economists as “the economic mechanism.”

In Nemchinov’s 1964 article, one of the last before he died, we see not only the mature product of pre-mathematical reformist economics, but the signs of things to come. Beginning in 1958, the order of knowledge of Soviet economics rapidly mutated, the subject of the next two chapters. A generational wave of mathematically-trained young scientists began to study economic problems, out of either a deep-seated interest in social or humanist problems that they had suppressed during Stalinism in the corresponding disciplines, ambitions of pushing the frontiers of a new universal cybernetic science, or for more happensttance reasons. They brought with them advanced mathematical abilities,
but also the discursive armament of cybernetics, grounded in its semantic primitives: system, information, feedback, communication, control. These students were able to quickly assimilate the products of the mathematicization of American economics that had accelerated a decade earlier. But the young physics- or mathematics-trained converts learned their economics from this older generation of reform economists, and it is the latter’s understanding of the nature of their pursuit that undergirds the former’s use of the new mathematical tools. And it is this understanding that is lacking among those cybernetic enthusiasts who applied themselves to the problems of reform without having absorbed the economic lessons, and thus treat them as purely technical-managerial problems. The next two chapters accordingly develop the histories of cybernetic reformism and mathematical economics and the distinctions between them.
I went looking for Ilya Muchnik just to tie up a loose end. I had been interviewing Petr Aven, an original member of the Gaidar government, the former Minister of Foreign Economic Affairs. Now he was an oligarch, the President and then Chairman of the Board of Alfa-Bank, the largest Russian commercial bank. I was asking about his intellectual evolution. I heard about his student years, about his family, about the formation of the circle of people who would become the Gaidar government, and about his fellowship at the International Institute of Applied Systems Analysis at the end of the 1980s, where he first involved Western mathematical economists directly in the planning of reform. In this dense narrative, he mentioned that in the early 1980s, he and his friend and laboratory-mate Slava Shironin briefly left their positions in the elite Moscow-based Institute for Systems Analysis to go do fieldwork on collective farm management in the remote Altai region. From this experience ultimately came their celebrated co-authored article, one of the first and deepest statements of the point of view of the young reformers, “The Reform of the Economic Mechanism: Realism of the Proposed Transformations” (1987).

Aven, sitting in his enormous office decorated with famous Russian artwork before a tray of constantly buzzing mobile phones, told me about his dissertation work.

“I was working on the analysis of big arrays of economic data. It's similar to multidimensional scaling, factor analysis, it was called functional scaling. But it's
silly, it's just some sort of analysis of big data to find some indicators. You can have a big numbers of indicators and you try to find out or to build a new one which really can describe the object you are investigating. What is important and what is not. For example in medical science after many years you understand that blood pressure is an important indicator. You don't care about the size of your nose, for example, to understand whether you're sick or not. So by experience somehow you refine what is important or what is not. In economic science it is still not very clear what is important and what is not, because the economy is new. Compared to man it is a new object. So we tried to build important indicators to comparatively describe economic systems by mathematics. More precisely I used to work with big arrays of agricultural data, because in agriculture they publish a lot of data. So I tried to analyze these big arrays of international agricultural data, and to build a typology of countries. And then I also tried to build some indicators to describe economic systems, how to describe more informal systems. For example, the reason why I went with Shironin to Siberia, I had big surveys, and I tried formally with mathematics to understand what types of decision-making models there are in these counties. There are some counties where there is a single boss who is making all decisions and there is a party chief, there are others with more democracy.”

This was incongruous. Why were highly-trained mathematical economists doing fieldwork? And what could possibly induce such a representative of the cream of the Moscow intelligentsia to voluntarily visit Siberian collective farms? He mentioned the
name of his dissertation advisor, Ilya Muchnik, a man I had never heard of, and I dutifully noted it down.

Returning to the United States, I tracked down Ilya Muchnik, with some difficulty, to Rutger’s DIMACS Center for Discrete Mathematics and Theoretical Computer Science and arranged a meeting. Ilya Borisovich picked me up from the New Brunswick train station and brought me to his small one-bedroom condominium. Books overflowed bookcases onto the floor, and framed canvases of artists he had known leaned against the walls, stacked two or three deep. We sat in the kitchen (of course) and as Ilya Borisovich began to tell me his story, it quickly became clear to me that despite his present employment he was not in fact a computer scientist. He was a cybernetician.

He had been born in 1936 in the northern Ukrainian town of Berdychev, whose most famous residents were the writers Shalom Aleichem and Vassily Grossman, but his father, a military engineer, soon moved the family to Moscow. In 1947, however, Stalin launched what has been called the “anti-cosmopolitan campaign,” which closely identified the triumph of Soviet socialism with ethnic Russian nationalism, and was accompanied by a surge of anti-Semitism. To protect his family Boris Muchnik applied to transfer to the provinces, to the city of Gorky (now Nizhnyi Novgorod) a hub of military engineering.

His mother and grandmother were great singers, and Ilya dreamed of skipping university and roaming Eastern Europe to preserve Jewish folk songs. But when Ilya took his exams for university, exams that were often made simply impossible for Jewish students, by sheer luck the radiophysicist Gabriel S. Gorelik, a former professor at Gorky
then working at the new Moscow Physical Technical Institute, intervened and Ilya was accepted into Gorky University’s Radiophysical Faculty. This faculty, headed by Aleksandr A. Andronov, and descended from the pioneering physicist Leonid N. Mandelshtam, was an exciting place, combining education in new branches of physics with immediate attention to their applied technological possibilities. Above all, these were possibilities for military science, and from the first year of their coursework students were involved in secret military projects.

“Look,” he said, “you have to understand, what we were taught was fundamental science, but the military was a career. In Minsk they built an enormous radiotelescope, and the money came from the military, but there was another aspect. Academic [Iosif S.] Shlovsky used it to think about other intelligent life in the universe. So the military was why the government was interested, but real science was interesting for analyzing the universe.” Shlovsky conjectured that the decay in the orbit of the Martian moon Phobos might indicate that it was an artificial satellite, which caught the imagination of the world. In 1966, a second, English edition of his book *Universe, Life, Intelligence* (1962) was reissued in co-authorship with Carl Sagan as *Intelligent Life in the Universe*, contributing enormously to the contemporaneous American fascination with alternative forms of intelligence and the imaginative possibilities of outer space. “Things you could not talk about at this time were discussed by everyone in our department. In Moscow, people spoke about ‘the bourgeois science of mathematical logic,’ but we had an exam on it. Officially one could not talk about cybernetics, but there it was discussed openly. I was in the group of fifty students who built our first computer there. It was amazing, it broke
every minute or two, but it worked. Mathematical logic became not just mathematics, but
also rules for how this system worked. This was emotionally very strong.”

Inspired, Ilya had a “crazy” idea: he would build a model of the mind. He found
one Moscow professor who agreed to supervise the work, the theoretical biologist
Mikhail L. Tsetlin. Testlin and the mathematician Israel Gelfand ran a seminar on
theoretical biology. Together two of them developed a model of “collective automata.”
With game-theoretic foundations, their model looked at the interactions of very simple
finite automata to represent decentralized control. The model, inspired by the
physiologist Nikolai A. Bernshtein, was as one of the interactions among nerve cells that
could give rise to purposive motion.

The “game” that each automaton played was to minimize its interaction with an
environment that randomly distributed rewards and penalties. Each automaton interacted
only with a limited number of others, yet if each followed this principle of avoidance,
together they would achieve an equilibrium without any global direction from above. The
model is called “the little animal in the big world.” Slava Gerovitch has argued that this
represented not a model of socialism, but a model of the intelligentsia within socialism,
where individual efforts to escape the system led to to “cooperative”-appearing behavior
among the escapists.125

Tsetlin found Muchnik a job at a psychiatric clinic, in which the psychiatrist and “neurocyberneticist” Samuel N. Braines had a laboratory, to study abnormal cognition. He also worked with chimpanzees and tried to model their behavior. From there he came to the Institute for Problems of Control, founded in the 1930s to study automation and process control, and now deeply engaged with both analog and digital computing and automated management systems. “From this point on, all my work became about mathematical simulations of intelligent system. This is my basic knowledge, how can a system learn to do something better just by observation, by analysis, how the system can autonomically grow knowledge and skills. Machine learning, this is my subject.” At the Institute, Muchnik quickly established an impressive scientific reputation, and also, due to his work on pattern recognition algorithms that became part of missile guidance systems, among other projects, a high security clearance that would have made ever leaving the Soviet Union impossible. It was here that he met Petr Aven’s father, Oleg, a specialist in systems analysis and automated information systems, and became fast friends.

“Let me tell you about life in those years. Let’s say people have an interest, maybe biological, an absolutely instinctive interest in thinking. In Russia, it did not matter, if you spoke about science, people listened with intensity, with thanks. Completely different people, drunks, workers, the illiterate, professors, it didn’t matter. People had nothing, all they could do was tell fairytales. People wanted some kind of life that was fantastic, interesting, about which they could wonder. They had such a hunger, I can’t tell you, I don’t have the ability to tell you about these Russian people. I could talk
about cybernetics, say that a machine could think, people’s eyes would light up like learning about the cosmos. I think people in the West underestimate this. Gorbachev thought up a simple word, ‘glasnost’, transparency. I would state that nothing greater has ever been done for Russia.”

During this period Muchnik first became acquainted with economists. His officemate, Eduard Braverman, was working on disequilibrium models on the side, in prescient work similar to American work of the 1980s. “There were so many seminars. I went to various places where people presented. And we all read one another. It wasn’t important that people were in different subjects. Mathematics was universal.” In these cybernetic circles he met people like Viktor Volkonskii—“a very deep man!”— and Yurii Gavrilets, who we will meet at length.

Sometime somewhat later he met Tatiana Zaslavskaya, one of the founders of Russian economic sociology. In her third year of university, after taking a course on political economy with Aleksandr V. Sanina, Zaslavskaya had switched from physics to economics. She became a disciple of Sanina and her husband, Vladimir G. Venzher, an almost populist agrarian economist, who together had proposed dramatic expansion of farm self-management and agricultural markets, and been immortalized by Stalin’s censured in his *Economic Problems of Socialism*. In 1963, invited by Abel Aganbegian, she had moved to Siberia to head a division on social problems at the Institute of Economics and Organization of Industrial Production. She was, Muchnik says, concerned with the problem of famine, “because she was from a deeply intelligentsia family, three or four generations of professors, all in the human sciences, this is why she came to that.”
She led a group of nearly one hundred researchers doing systematic questionnaires, interviews, and life histories in the villages of Siberia, generating an enormous amount of data. Muchnik went to Novosibirsk to meet her and another sociologist, Vladimir Shlapentokh, who was trying to analyze newspapers. “These seemed to me to be the most interesting new applications. It was not quantitative measures, but qualitative.” He became a constant collaborator of Zaslavskaya’s, working with her data as well as thinking about the theory of sampling and the correcting of sample bias. “When you work out some method it’s important to have an application that proves it works, if it is just mathematics you don’t know, maybe it is artificial.”

Petr Aven was Muchnik’s student only informally; his formal advisor was the prominent economist Stanislav Shatalin, with whom Muchnik was good friends. “His father, Oleg, came to me and asked me to take Petr and ensure that he would become a person, care for him. To be a person, this means a lot. Decent, fair. In science, for example, when you do real work there are ideas and there are concrete small things, but all are identically important. When you write a book, it takes five years, and you won’t have a new idea every day. But you must every day sit, work, correct. This is the point of my life. To be a person is to understand everything from the inside, not to take someone and say, ‘you should do so and so.’ And how do you teach this? Very simply, you do it together. I worked with him on concrete problems, comparative analysis of agriculture in different countries.”

INTRODUCTION
In the wake of the Second World War, cybernetics facilitated a deep transformation of Soviet technoscience. Cybernetics, an aspiring universal science of “communication and control in the animal and the machine” (as Norbert Wiener's 1947 founding book is subtitled), experienced a moment of explosive growth, leaped over the Iron Curtain, and then almost as quickly seemed to disappear, while leaving traces in the science and culture of both East and West. The Soviet chapter in the history of cybernetics has recently begun to be reassessed; nevertheless, the degree to which it was part and parcel of the creation of the post-War military-scientific complex remains little appreciated. In this essay I emphasize the military origins of Soviet cybernetics, for only by so doing is it possible to refocus attention from cybernetics' highly salient discursive patterns, terms, metaphors, and metaphors toward then-novel engineering problems. This refocusing is crucial, I suggest, because these technoscientific tasks forced scientists and engineers of various stripes into fertile new collaborations. The technical and social details of applied research are not mere diacritics of radical transformations in Soviet science and political culture, rather they are the very mechanism by which these transformations occurred.¹²⁶

The paper as a whole consists of four sections. In the first, I briefly situate the transnational phenomenon of cybernetics, East and West, at the intersection of engineering and mathematics, before examining the context of Soviet military science in

¹²⁶ In addition to published sources, this study is based upon on two years of ethnographic fieldwork carried out in the economics institutes of Moscow during 2010–2012. I conducted oral history interviews with, among others: Eduard F. Baranov, Yuri N. Gavrilets, Vladimir V. Kossov, Mark I. Levin, Boris Saltykov, Aleksandr I. Stavchikov, Viktor A. Volkonskii, Academic Valerii L. Makarov, Academic Viktor M. Polterovich, all of whom worked at CEMI at various times; Emil B. Ershov, Lyubov Strichkova and Gennadii Kuranov (Gosplan Research Institute); and Ilya B. Muchnik (IPU).
detail. I attribute the social power of Soviet cybernetics to its position in the structure of Soviet military science and to the dynamics of that complex's growth in the post-Stalinist decades. The second section offers a narrative of how, under the umbrella of cybernetics, networks of mathematicians and engineers formed alliances that generated new kinds of knowledge in the process of developing novel technologies. Mathematicians with considerable practical experience modeling physical processes were drafted into the bomb project and drove the development of Soviet digital electronic computers. Defense engineers and early computer scientists became fascinated with cybernetics at the same time as they were turning computers from instruments of *calculation* to means of *control* of man-machine complexes, in the first instance anti-aircraft and anti-missile defense. In the third section, I summarize how cybernetics rearticulated the macro-relationship between science and technology in the institutional structure and epistemic order of Soviet science.

In the final section, I show how some cyberneticians reflected on their society, and in the process catalyzed the mathematicization of Soviet reformist economics. Among the many Soviet sciences changed by the encounter with cybernetics, economics has a special status. As the science of Marx, economics was the privileged and arguably the only Soviet social science. It was thus a central mode by which the Soviet polity worked out theoretical understandings of itself and its possible futures. But in Norbert Wiener's original conception, cybernetics aimed to be much more than a technical science: it was also to be a science of society. The inevitable encounter between
economics and cybernetics was thus an important episode in the political epistemics of the Soviet Union, that is, the way that Soviet socialism knew itself.

The final section of the essay thus explores how cyberneticians transferred their cybernetic interpretations of anti-aircraft systems to that social system in which they lived, dreaming of a state/economy as a centralized automatic control system. But a non-intersecting network of reform-oriented economists had also been imagining alternative forms of economic organization throughout the 1950s, a history I tell elsewhere. As I show here, these reform-oriented economists achieved institutional recognition and garnered resources by allying with the military mathematicians-cyberneticians. The highpoint of this alliance was a 1963 decree initiating planning of a never realized statewide computer network for economic management and control. But the reform visions of cyberneticians and economists differed, hinging on their respective understandings of computers as instruments of control versus instruments of calculation. This difference led to the breakdown of the alliance. However, I argue that across the temporary bridge provided by the idea of the computer network flowed personnel, metaphors, and techniques that transformed part of Soviet economics from a numerical, statistical, and verbal discipline to a proof-theoretic mathematical one. The field of economic knowledge production thereby became polarized between “mathematical economics” and the “political economy of socialism.”

In broader perspective this story is also part of a larger history of the growth of the post-war Soviet military-scientific complex, and thus of the scientific-technical

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intelligentsia in its late Soviet guise. From this social strata and milieu, created by the state to invent its Cold War armory, would emerge critiques of Soviet power contributing to the pro-democracy movements of *perestroika* and 1990s liberalism.

**COLD WAR TECHNOSCIENCE**

Soviet cybernetics was the vehicle and result of interactions between engineering, mathematics, and physics that not only reconfigured all of these fields, but transformed seemingly unconnected ones, including economics. This was the assembly of the post-war Soviet military-scientific complex. The articulations of science, technology, and politics are always historically specific, and the era of the Second World War and the start of the Cold War, that of cybernetics, was a watershed in their ongoing co-constitution on both sides of the Iron Curtain.

Cybernetics was made possible, David Mindell has shown, by pre-existing engineering cultures—focused on control systems, industrial automation, instrument making, analog computing, and communications technology—and this was equally true in the Soviet Union.¹²⁸ Central cybernetic concepts of feedback, information, and system arose *within* the practical matrix of local engineering problems. Mathematicians abstracted the engineering problems with different standards of mathematical rigor. “Cybernetics” was the name for the synthesis of the nascent theorizations born in these engineering contexts. Soviet cybernetics was accordingly not merely a Western import. When, in June of 1960 (two months after the mathematical economics conference),

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Norbert Wiener gave his keynote address to the first congress of the International Federation for Automatic Control at the Moscow Polytechnical Museum, a mere two years after his *Cybernetics* had been translated, the auditorium to his astonishment was standing room only. He was forced to repeat the lecture several days later. Deep domestic engineering traditions make Wiener’s reception intelligible.

In this trans-Atlantic light, differences also become more visible. In the United States, cybernetics arose from control engineering and analog computing. But when Wiener’s *Cybernetics* reached the USSR approximately ten years later digital computing was already flowering, and those who championed the one championed the other. In the USSR, computer science was not called cybernetics: rather, there was cybernetics, and one of its basic areas or strata of research was digital computing. Accordingly, computer *qua* calculating machine, rather than servomechanism, became the basic tropic resource.

Other differences follow from general features of Soviet science: extreme centralization, Marxist-Leninist dialectical materialism as a philosophy of science, and the legacy of the Stalinist science wars. Under Stalin, Bolshevik political culture had

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permeated science.\textsuperscript{132} Political culture requiring unanimity combined with a philosophy of science claiming a political ground of science to create the conditions for enforced monopolies within research areas. Marginalized or forbidden research areas thereby accumulated and these could be reactivated as allies for cybernetics. In such a centralized system, the mathematicians who pushed cybernetics, having achieved administrative power (partly thereby), could leverage it to reorder the balances of power, prestige, and funding across disciplines. In the United States cybernetics was merely one heir to the engineering traditions amid other “systems sciences” or “cyborg sciences”—operations research, systems analysis, control theory, etc.—that underwent intertwined discipline formation and institutionalization. But in the Soviet Union cybernetics not only encompassed these, but also nurtured and translated mathematical economics, structural linguistics and semiotics, genetics, ecology, and others. To its enthusiasts it could embrace all of science. Cybernetics thus allowed a temporary but remarkable porosity of disciplinary borders to individuals, research groups, metaphors, mathematical tools, and instruments. This entailed an ambiguous challenge to the metadisciplinary position of Marxism-Leninism. While usually careful to make formal obeisance to orthodoxy, cybernetics offered itself as an alternative scientific metalanguage. It thereby allowed the sidestepping of both the taboos sedimented over years of fighting and the official philosophers, political economists, and sundry ideologists who enforced them. This is the heart of the story told with extraordinary detail and sophistication by Slava Gerovitch.

These contexts help to understand the seemingly paradoxical nature of the Soviet cybernetic efflorescence, at once the spontaneous philosophy of the post-War military-scientific complex, vehicle for the de-Stalinization of science, and *lingua franca* of underground milieux of proto-dissidence. Understanding it as one or the other would replicate in the Soviet context the divergent interpretations of American cybernetics as a dystopian "ontology of the enemy"\textsuperscript{133} or "closed world" of military command and control\textsuperscript{134} *versus* as an organic moment of 1960s emancipatory counter-culture in science.\textsuperscript{135} The reflex to import this (itself questionable) dichotomization is a symptom of the difficulty of emplotting histories of Soviet society that do not depend for their narrative coherence on a basic vocabulary of liberal political culture: repression and liberation, state and individual, and so on. To the options with which this paragraph begins we should reply that Soviet cybernetics was neither one nor the other, it was all of the above, and that is because in the late 1950s and early 1960s these aspects were not opposites: these are partial perspectives on a single network within which scientists and engineers were trying to imagine alternative futures of the Soviet polity.

*The Soviet Post-War Military-Scientific Regime*


\textsuperscript{135} Andrew Pickering, *The Cybernetic Brain: Sketches of Another Future* (Chicago, IL: University of Chicago Press, 2010).
That Soviet cybernetics was a creature of the military remains underappreciated.\(^{136}\) Adding to the problem of still-secret archives, scientists who worked in military industrial institutes omit such work from their curricula vitae and even in interview often say only that they worked at a “post office box” (pochtovoe iashchik) or “closed organization.” Ethnographic fieldwork in Moscow only gradually revealed these prosopographical regularities. In the 1950s the number of young scientists and engineers sent to military institutes rose dramatically. These institutes also regularly gave contract work to Academy of Sciences institutes, also never mentioned in yearly reports. And in many cases, ostensibly civilian institutes were dedicated almost entirely to military research. At times, whole institutes were transferred from one sector to the other. (A major reshuffling happened in the early 1960s, described below.)

In the 1950s and 1960s both military/ministerial and Academy institutes grew in size and number at a tremendous pace, absorbing an enormous wave of graduates.\(^{137}\) Institutes were predominantly founded according to three patterns, all occurring in the narrative below.\(^{138}\) First, in both military-industrial science and the Academy, a division or laboratory (the two lower levels of administrative hierarchy) of a pre-existing institute

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\(^{136}\) Military institutes mean those of “the nine,” the ministries serving the military industrial complex: aviation, defense, shipbuilding, machine building, “medium machine building” (the nuclear industry), radio, electronics, electrotechnology, and chemicals.


could hive off into a new institute. Second, in the Academy (but not in industry) several laboratories in different institutes could launch a “scientific council,” lodged at some level of the Academy administrative hierarchy, which would subsequently become an institute gathering in the sponsoring laboratories. Third, in the military-industrial sphere (but not the Academy) institutes, a factory could be upgraded to a design bureau (konstruktorskoe buro, KB), and a design bureau to an institute. This reflects the relatively technology-driven nature of these institutions, even when ostensibly engaged in fundamental science. (It also recapitulates the institute-design bureau-factory structure of industrial research and development.)

Because of this growth pattern “discipline” does not adequately capture the Soviet institutional organization of knowledge. Disciplines are anchored by the structures of parallel research groups. To the extent that disciplines remained salient, this was due to the analogous organization of the Soviet university system. But post-graduate education and socialization occurred at institutes with quasi-monopolies on their research areas. When university faculties and the research domains of institutes were relatively aligned with each other, some degree of disciplinarization still existed; when they were less so, especially in times of rapid change, the concept of discipline becomes a far less useful lens. In this context, network structure is not the subversion or secret of hierarchy, as the shadow economy was to the plan or samizdat to the unionized official arts, but only its obverse, a normal part of its internal communication and pattern of growth.  

In the post-war era, the best funded and thus most rapidly growing sectors were those of the three military crash programs, nuclear weapons, rocketry, and radar/anti-aircraft defense, each under a special Main Administration. These could cut across the vertical siloing of Soviet industry to secure scarce human and material resources. This administrative form, the megaproject, accordingly became invested with the grandest dreams of would-be reformers of all stripes. At the intersection of the three projects was computation, which, whether military or ostensibly civilian, served the Administrations’ demand for a new level of computational power. The new institutes of these four sectors were integrally extradisciplinary spaces. While Kojevnikov has noted that the imbrication of science with the state—“Big Science”—in the Soviet case pre-dated World War Two, it was from these sectors that grew the Soviet analogue of what Pickering has called “the World War Two regime.”

At their intersection was the epicenter of Soviet cybernetics. The dynamics of the military-scientific complex have four important aspects. First, the sheer speed of the expansion granted the small generation of cybernetics’ first proponents outsized influence over the much larger generation that they taught in the 1950s and 1960s. They inculcated values and modes of acting in enormous numbers of young scientists. (This is what justifies drawing broad conclusions from the study of these small groups.) Second, institutes sedimented out of these networks were inherently extradisciplinary spaces because of the technological tasks that called them into being. This was the cybernetic efflorescence proper. But third, subsequent generations, those of

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the 1970s and 1980s, were socialized in already much more stable institutional environments, the localized subcultures of giant institutes. Their professional identities were formed more narrowly, and the universalizing ambitions of cybernetics thus had far less attraction. It was for them that cybernetics was mere “cyberspeak.” Fourth, young scientists of the 1950s and 1960s ascended to newly created positions of institutional power very young, blocking the career trajectories of the following generations and creating pressures that would lead in some cases, including that of economics, to sudden reversals of power during the upheavals of perestroika.

A narrative beginning from the explosive buildout of the Soviet military-scientific complex as a sociotechnical phenomenon—one producing novel patternings of social action in making and then living with new technoscientific ensembles—provides an alternative or at least complement to Gerovitch’s seminal account of the rise and decline of cybernetics. By understanding cybernetics as a discursive field, Gerovitch aimed to sidestep the mapping of a sharp science vs. ideology dichotomy onto that of freedom vs. repression, which underlay the earlier historiography of “totalitarian” science. He transposed to the history of science the new cultural history of the Soviet Union as influenced by the work of Stephen Kotkin. Cybernetics thus becomes a “cultural medium within which Soviet scientists lived and worked.” On the basis of this understanding, Gerovitch offers a narrative in which cybernetics wielded mathematical

142 Gerovitch, From Newspeak to Cyberspeak (ref. 6), 3, 6. While some formulations of “discourse” insist on its materiality, in Gerovitch’s it seems essentially linguistic: repertoires of terminology, rhetorical topoi, and genres of their deployment.
and algorithmic rigor against the obfuscatory “newspeak” of Stalinism, a politics via science, but ended up, under the dual pressures of rapid expansion across the sciences and of accommodation with power, becoming an equally labile façon de parler amenable to reproducing the status quo.¹⁴³ Content became pure form, and optimism gave way to disillusionment. Gerovitch thus fits cybernetics to a sophisticated version of the readily available narrative frame for the post-Stalinist history of the Soviet Union as reform thwarted, as “thaw” (ottepel’) becoming the diminished Stalinism of “stagnation” (zastoï). The arc of this “parabola” is what leads Benjamin Peters to call cybernetics’ story a “normal” Soviet one.¹⁴⁴

This nullified history, a trajectory beginning and ending at the same altitude, is the result of the dematerialization of cybernetics qua discourse. But cybernetics was inseparable from the sociotechnical phenomenon of the military-scientific expansion: a novel, deep sociological transformation inextricably bound up with equally novel technological systems. The creation of large-scale technological systems, driven by and forming part of the continued process of Soviet state-building, brought together different sciences and engineering cultures for prolonged periods of time in new configurations. In the late Soviet era, some even speculated as to whether “the Soviet Union does not have a military-industrial complex, but is such a complex.”¹⁴⁵ As a moment of this broader history, cybernetics’ had myriad consequences well past its heyday, from the

technological infrastructure of Soviet life to the social imaginary of the last Soviet generations, from the articulation of the order of knowledge to the modalities of rule of the post-Stalinist state.

**MILITARY CYBERNETICS**

*Some Mathematical Preliminaries*

If the mathematicians were the center of the cybernetic network, then the center of the mathematical network was the famous Moscow mathematical school, its core formed by the generation of students of Nikolai N. Luzin (1883-1950). Their positions at the flagship Steklov Institute of Mathematics have led to their applied work being overlooked. In the 1930s, these mathematicians, and those of other centers of research, including Leningrad and Gorky, became involved in the modeling and control of physical processes arising in engineering tasks. This work accustomed them to militarily-funded, interdisciplinary, and applied work in concert with engineers. Further, it conditioned their later intellectual courses in or alongside cybernetics.

Luzin made breakthroughs in mathematical analysis, descriptive set theory, the theory of functions, trigonometric series, and integration. He studied in Göttingen and Paris, forming enduring relationships with the major mathematicians of the day, before returning to teach in MGU’s famous Faculty of Mechanics and Mathematics.

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He worked in informal seminars and social gatherings as much as the classroom, and his pedagogical practices would be reproduced across the decades, becoming both an interactional infrastructure and a conveyer of values. Luzin and his students called their society, the mathematician’s promised land of the 1920s, Luzitania.

But that ship went down: Luzin and his own teacher Dmitri F. Egorov were attacked during the 1930s. The first assault, in 1930, in fact had two objectives: it was aimed at both the Moscow mathematicians, and the numerate planning economists. Arrested in 1930, Egorov became ill in jail and died a year later, while Luzin was forced into applied work, first at the Central Aerohydrodynamical Institute (TsAGI), the center of the Soviet aviation industry, and then in 1939 at the newborn Institute for Automation and Remote Control (IPU), the world’s first institute for control engineering and a later center of cybernetics. During the purges of the 1930s the leading economists almost all perished, but the mathematicians survived relatively unscathed. The younger generation, by turning on their teachers, gained the Party’s trust. Dancing a perfect Stalinist two-step, they managed to have it all: institutional power, political enfranchisement, and a degree of scientific autonomy. The culture of Moscow mathematics, of the Russian intelligentsia—many mathematicians came from intermarried scientific dynasties—was

149 S.S. Demidov and V.B. Levshin, *Dela Akademika Nikolaia Nikolaevicha Luzina* (St. Petersburg: Russkii Khristianskii Gumanitarnyi Institut, 1999).
150 Ernest Kolman, *Na Borbu Za Materialisticheskuiu Dialektiku v Matematike* (Moscow: Gosudarstvennoe Nauchno-Tekhnicheskoe Izdatel’stv, 1931).
thus not extinguished and did not have to be reinvented during the Thaw, as Vladislav Zubok argued was the case with the literary intelligentsia.\textsuperscript{152}

A constellation of problems from fluid mechanics guided the mathematicians' research. Fluid mechanics, flowering because of early aviation, had long been on the border of pure mathematics, physics, and practical engineering. It was at the heart of military science both in this period and throughout the subsequent Cold War, requiring the collaboration of experimenters and theoreticians. It also employed the newest techniques of mathematical analysis, reciprocally driving their development.\textsuperscript{153} In the first half of the twentieth century, the gap between the engineering art of hydraulics, and the mathematical formalization called hydrodynamics, was thereby rapidly closing. At the same time, the re-centering of physics from the phenomenal to the atomic level was separating physics from mechanics and aligning the latter more closely with mathematics.\textsuperscript{154} For all these reasons, mechanics became key to negotiating the boundary between applied and pure mathematics.\textsuperscript{155}

For present purposes, the most significant group was Sergei A. Chaplygin's theoretical department at TsAGI, including Mikhail A. Lavrentiev, Mstislav V. Keldysh,


\textsuperscript{153} Fluid mechanics was a core part of the curriculum in Göttingen, to which Luzitania was closely connected.

\textsuperscript{154} Examining these articulations—of science and the military, pure and applied science, science and technology—through the case study of Ludwig Prandt, see Michael Eckert, \textit{The Dawn of Fluid Dynamics: A Discipline between Science and Technology} (Weinheim: WILEY-VCH Verlag GmbH & Co. KGaA, 2006).

Lazar A. Lyusternik, Anatoly A. Dorodnitsyn, and Sergei A. Khristianovich. They studied problems of fluid dynamics, ballistics, and associated mechanical issues, such as wing flutter. During the war Lavrentiev would study explosions and shock waves. Other mathematicians were working on related problems. Sergei L. Sobolev at the Seismological Institute worked on the propagation of waves in non-homogenous media. At the Geophysical Institute Andrei N. Tikhonov studied electromagnetic methods of prospecting, while Andrei N. Kolmogorov led a group on turbulence. Aleksei A. Lyapunov briefly worked at the Gas Prospecting Institute, and then the Institute of Experimental Medicine. Aleksandr A. Andronov led a group at his Radiophysics Faculty of Gorky University investigating radio and electrical networks.

The Gorky group envisioned a science of nonlinear oscillations that would embrace many seemingly disparate areas of physics. They became tightly connected with theorists of control and analog computing at the Institute of Automation and Remote Control.

As these mathematicians mathematically abstracted diverse problems of mechanics, the latter were progressively understood to be unified (pointing towards the synthesis of continuum mechanics).\(^\text{160}\) Two consequences for the mathematicians followed from this pre-war work. First, the conceptual similarities underlying the mathematical generalizations—especially regarding the problems of stability, phase transitions, and nonlinearity, and the technical apparatus of differential equations—predisposed the mathematicians to find cybernetics interesting and intelligible (even as some of them, such as Keldysh himself, would later view askance its grander pretensions). Secondly, as many of the problems did not admit of analytic solution, these researchers became \textit{nolens volens} early developers of numerical methods, and thus proponents of computing technology.\(^\text{161}\)

\textit{Critical Mass}

During and immediately after the war, the key members of the mathematicians' network became central to nuclear weapons development.\(^\text{162}\) They thereby became both

\(^{160}\) See Gérard A. Maugin, \textit{Continuum Mechanics Through the Twentieth Century: A Concise Historical Perspective} (Dordrecht: Springer, 2013), and especially 167-99 on Soviet contributions.


\(^{162}\) Sobolev worked under Igor V. Kurchatov, the leader of the bomb project, at the Academy Laboratory No. 2, 1945–48. S.S. Kutateladze, “Sobolev i Bomba,” \textit{Nauka v Sibir} 9 (2008). It was founded in 1943, in 1949 renamed the Laboratory for Measuring Instruments, and is now the Institute of Atomic
closely allied with the academically and politically powerful physicists and integrally involved in developing electronic digital computers. Initially, brigades of girls with Mercedes and Rheinmetall calculators performed the computational work. The First Main Directorate created an Interdepartmental Commission on Computing Technology to coordinate and devise means to speed it up.\(^\text{163}\)

Two new establishments were founded in 1948. At Lavrentiev’s behest, the Academy founded the Institute of Precision Mechanics and Computer Technology (IMTVT).\(^\text{164}\) The Ministry of Machine Building and Instrumentation (MMP) founded its competing SKB-245 on the basis of the Moscow Tabulating-Analytical Machine Factory.\(^\text{165}\) Both initially focused on analog mechanical and electrical computing equipment, mostly for the Main Artillery Directorate and TsAGI. But these tools were inadequate to the computational demands of nuclear research.

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\(^{164}\) On the basis of the Department of Precision Mechanics of the Institute of Machine Sciences (13 people), the Laboratory of Electromodeling (19) of the Energy Institute, and the Department of Approximate Calculation from the Mathematics Institute.

\(^{165}\) In 1958 renamed the Institute of Electronic Mathematical Machines.
The mathematicians took upon themselves the challenge of creating the computers that the project demanded. Over the next two years, via a special commission of the Technological Sciences Division of the Academy chaired by Keldysh and Lavrentiev’s lobbying of Khruschev, the mathematicians took over IMTVT. Lavrentiev (1949–52) and Lyusternik (1949–1955) became director and department director respectively, and in 1950 they brought Sergei A. Lebedev, a specialist in modeling high-voltage power networks, to Moscow.\footnote{Ichikawa, “Strela-1” (ref. 38), 21–4.}

Lebedev had already been working on a digital electronic computer, the MESM, at the Energy Institute of the Ukrainian Academy with the active support of Lavrentiev (then the Vice President of the Ukrainian Academy).\footnote{Gregory D. Crowe and Seymour E. Goodman, “S.A. Lebedev and the Birth of Soviet Computing,” \textit{IEEE Annals of the History of Computing} 16, no. 1 (1994): 4–24.} At ITMVT he began the MESM’s successor, the BESM. SKB-245 initiated a competing digital electronic computer, the Strela. The dark horse, a third group working with hardly any institutional support but with the Sobolev’s personal patronage was Isaak S. Bruk’s Laboratory of Electro-systems at the Energy Institute of the Academy, finishing first with the M-1 and M-2 computers.\footnote{In 1958 it became the Institute of Electronic Control Machines (IECM) of the Academy.}

Sobolev immediately pressed the M-1 into service at Laboratory No. 2 in 1951. Laboratory No. 2 built its own small computer, the TsEM, operational from 1953.\footnote{Boris N. Malinovskii, “Mikhaylov’s Unusual Computer,” in \textit{Computing in Russia: The History of Computer Devices and Information Technology Revealed}, ed. Georg Trogemann, Alexander Nitussov, and Wolfgang Ernst (Braunschweig: Vieweg, 2001), 125–26.} The first users of the MESM in 1952 were from the OPM under Keldysh, and in 1954 it took
delivery of the first Strela.\textsuperscript{170} The next seven Strelas were destined for other centers of the nuclear project.\textsuperscript{171} The first BESM was installed in the new (only ostensibly civilian) Academy Computing Center (VTs) under Dorodnitsyn in 1955. On 22 November 1955, the mathematicians from OMP stood alongside the physicists at the Semipalatinsk proving ground to witness the explosion of the hydrogen bomb.

*The Cybernetic Colonels*

Concurrently, the chair of higher mathematics of the Artillery Academy of the Ministry of Defense, held by Lyapunov, was ground zero to another explosion. Lyapunov gathered a circle of bright engineers who became central to Soviet cybernetics, including Nikolai P. Buslenko, Modest G. Gaaze-Rappoport, Mikhail D. Kislik, Anatoly I. Kitov, Nikolai A. Krinitskii, Ivan B. Pogozhev, Igor A. Poletaev (who had been sent to MIT at the end of the war to study radar), and Sergei I. Vilenkin.\textsuperscript{172} Many of them also commuted to Moscow to take evening classes with Kolmogorov. Kitov found an English copy of Wiener's *Cybernetics* in the classified library of SKB-245 in 1952. He spoke about cybernetics at seminars around Moscow, military and civilian, even while it was


\textsuperscript{171} VTs-1 of the Main Artillery Administration, VTs of the Academy of Sciences (founded 1955 on the basis of OPM, with Dorodnitsyn as director), VTs of MGU, KB-11 at Arzamas-16 (Andrei D. Sakharov's employer), and NII-1011 (Chelyabinsk-70). V.A. Kitov, “Prezident Akademii Nauk SSSR” (ref. 37).

still officially a “bourgeois pseudoscience.”” Through these mathematically-adept military engineers cybernetics entered the wider mathematics world.

In 1952 Kitov defended the USSR’s first dissertation on programming at NII-4, and that same year founded the first military computation center at the Artillery Academy.173 Becoming independent as Computing Center 1 (V Ts-1) in 1954, Kitov led it until 1960, with Krinitskii and Buslenko among his deputies.174 It often worked jointly with OMP, including on calculations for the space program.175 (Lyapunov had positions at both institutions.) VTs-1 became the center of military computing. Scientists and engineers trained there had founding and leadership roles at all subsequent military computation centers.176 Some members of Lyapunov’s study group continued their military careers, but by the mid-1960s most had transferred out of the military to leading roles in civilian institutes, carrying cybernetics with them.177

In 1953 Kitov gave a presentation on cybernetics to the Scientific-Technical Council on Radioelectronics, at the request of its chairman, Admiral Aksel’ Berg, who

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173 This important institute (founded 1946) moved from ballistics and offensive rocketry to ICBMs and space flight, and led anti-ballistic missile research. Kitov’s dissertation was entitled “Programming tasks of long range external ballistic rockets.”

174 Krinitskii later was deputy head of Gosplan’s VTs (founded 1959) from 1971 to 1981. Buslenko spent his entire career in the military, working in turn at VTs-1, VTs-4/TsNII-45, TsNII-27, NII-101/Institute of Automatic Apparatuses.


177 Kislik worked at NII-4 and VTs-4/TsNII-45, and Gaaze-Rappoport and Poletaev at NII-5 (focused on anti-aircraft systems), where they would be rejoined by Kitov in the 1960s, while Vilenkin and Pogozhev worked at military proving grounds.
led the radar megaprogram. Berg had a pre-existing interest in control science, having participated in the first All-Union Conference on Automation and Remote Control in 1935 under the auspices of what became the Institute bearing that name, and he was to become an enthusiastic patron of cybernetics. The immediate effect of Kitov’s report was the founding in 1955 of VTs-2, the Naval Computing Center (later part of TsNII-24), and VTs-3 (later TsNII-30), the Air Force Computing Center, which became important think tanks for systems analysis and operations research.

While nuclear research kickstarted digital computing, anti-aircraft and anti-rocket research, radar, and rocketry would be its next frontiers, and the colonels were at the vanguard. The multiplying military institutes worked out different aspects of complex weapons systems integrating scientific and engineering specialities in entirely new ways. They overlapped at the computing centers, which not only performed calculations and developed computer hardware and software to knit together the weapons into systems, but also began to reimagine decision-making at the interface of man and machine.

“Cybernetician” (kibernetik) as an identity was anchored in this extradisciplinary environment. The colonels gave their scientific and engineering tasks cybernetic interpretations; reciprocally, those tasks motivated propagandizing cybernetics as a general theory of scientific socialism beyond the “post office boxes.”

178 Poletaev's friend from his visit to MIT, K.N. Trofimov, then Berg's assistant, connected them. Trofimov became an important patron of operations research and computerization in command and control.
180 Cybernetician Ilya Muchnik cautioned the author that while the flagship technology was radar, from the point of view of cybernetics, the problem was the more generalized one of modeling and engineering sensing and perception.
If the nuclear project midwifed electronic digital computers, anti-aircraft and anti-ballistic missile rocketry brought together the novel technologies of radar, rocketry, and computation in a new way. They forced development of realtime networked systems and decision support systems. While the first military computers in the nuclear project performed numerical calculations, here the issue became control.

The organization of work was entirely different from the small teams of mathematicians working on nuclear calculations. Hundreds of programmers worked to realize operational requirements past the edge of what seemed technologically possible. Computers had to yoke together radar and missiles into a system that could seamlessly alert, track, launch, guide and destroy in a matter of minutes. To provide coverage over extended areas these multi-component systems had to be combined into the first Soviet computer networks. In the late 1950s ITMVT began work on System-A, the first anti-missile system, with an M-40 computer based on the BESM at its heart, and in March 1961 it shot a missile out of the sky, the first such feat by any military. Chief engineer G.V. Kisun'ko reacted with the following lines:

I will never forget how in early March
In our computer
Three minutes to launch

Occurred a random fault.
But that very minute the computer
We restarted, barely breathing,
and all the same we shot the rocket
down onto the wild shores of the Balkhash!
This effort led to a proliferation of networked defense systems.¹⁸²

In these man-machine systems—and more and more systems came to seem
analogous—the engineers converged on the problem of engineering decision-making
itself. A core cybernetic insight was that any goal-directed system could be described in
the same terms, man or machine. Automation and intelligence were intersubstitutable (the
manned space program, for instance, aspired to completely automated missions).¹⁸³ Here
again there were pre-existing roots ripe for cybernetic interpretation. Naval fire control
systems, for instance, combined the inputs of multiple sensors, transformed by analog
computers, into a decision-context for the gunner. Quickly they expanded into systems
for tactical decision-making, on first the ship and then the battle group level.¹⁸⁴ Decision-
support systems, implementations of multi-criterial choice theories combining aspects of
systems engineering, operations research, and artificial intelligence spread to tactical

¹⁸² Boris Nikolaevich Malinovskii and E.N. Filinov, “Mikhail Alexandrovich Kartsev and the ‘M’
Computer Series,” in Computing in Russia (ref. 44), 205–10; Vsevolod S. Burtsev, “Distributed
Systems: The Origins of Computer Networks in the USSR,” in Computing in Russia (ref. 44), 215–20;
Slava Gerovitch, “InterNyet: Why the Soviet Union Did Not Build a Nationwide Computer Network,”
(SORUCOM, Velikyi Novgorod, 2011).

¹⁸³ Slava Gerovitch, “Stalin’s Rocket Designers’ Leap into Space: The Technical Intelligentsia Faces the

¹⁸⁴ On Soviet naval fire control and combat data systems, sometimes called “second captains,” Norman
troop control, procurement, and theatre-level strategic modeling. Alongside providing computational support for other organizations, research and development of such systems became a primary occupation of military computing centers. Virtually doubling the nexus of computation at the intersection of rocketry, nuclear research, and air defense, systems analysis and decision research became a fifth direction of cybernetics' growth. A collective of authors has recently outlined the development of a “Cold War rationality” in the United States, in which rationality becomes reduced to rule; they claim that there was no Soviet analogue, but if there was, it is to be sought here.

These systems, created for realtime control of spatially distributed man-machine complexes, were conceptually very different from the purely calculative vision of early computing, and more properly cybernetic in its original inspiration. It was by analogy with this evolving vision of cybernetic control of large-scale systems that the military cyberneticians would hope to radically reform the planned economy.

**CYBERNETIC SCIENCE**

*From the Big Seminar to the Scientific Council*


In 1955, with Lyapunov and Sobolev’s revision, assistance, and signatures, the overview of cybernetics that Kitov had been presenting at various institutes was finally published in the arbiter of orthodoxy, *Voprosy Filosofii*. Its publication was an unmistakable sign that the campaign against cybernetics had to abruptly stop and be quickly forgotten. Lyapunov and his collaborators could now proselytize through the infrastructure of Moscow civilian mathematics: the seminars.

Lyapunov’s seminar at the Artillery Academy had been paralleled by one at his home. It became what is remembered as “the Big Seminar,” which met 121 times at MGU between 1954 and 1964. The military connection remained important: one participant remembered that at the first meeting the known informers (*stukachi*) stiffened upon the entrance, in full uniform, of the cybernetic colonels. At this seminar all of the disciplines that were to receive cybernetic reframing—from computer engineering to biology, from economics to linguistics—met and mingled. Lyapunov’s seminar begat numerous others. Through the seminars, Luzin’s genres of interaction and forms of

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189 Gerovitch, *From Newspeak* (ref. 6), 118-131.
pedagogy, the uninterrupted forms of pre-Soviet intelligentsia sociality, became thoroughly enmeshed with cybernetics. With the prodigious production of mathematicians and physicists trained therein and then moving into more applied fields—including economics—cybernetic *intelligentnost’* would permeate the late Soviet military-scientific complex.192

The cyberneticians were not shy in proclaiming their new science. In 1958 Polataev’s popularization of cybernetics, *Signal*, made the subject accessible and exciting to a wider reading public.193 In 1959, his letter published in *Komsomolskaia pravda* in response to an article by Ilya Ehrenburg ignited one of the most memorable debates of the Thaw, “the discussion of physicists and poets”—in which the physicists in question were in fact cyberneticians. Often read as a “two cultures” quarrel, the debate reflected both exhaustion and disgust with the humanist intelligentsia so complicit in the culture of high Stalinism and a new self-consciousness among the “scientific-technical intelligentsia,” who were coming to see themselves as not mere technicians but rather as truer heirs to the intelligentsia tradition and the first flowering of the culture of the future.194


Key members of the mathematical community rose to leadership of the Academy on the wings of their atomic successes and the public campaign for cybernetics: Keldysh became President of the Academy of Sciences in 1961 and Lavrentiev led the new Siberian Division from 1957. In 1961 Berg became the director of the Scientific Council on the Complex Problem of Cybernetics under the Academy Presidium, with Lyapunov as his deputy. This body aspired to coordinate cybernetics across all the disciplines. The cybermathematicians ascendent, they became a “universal passage point,” their institutional power an organizational realization of the imperial ambitions of mathematics. The two together—social power and claims to epistemological universality—constituted the ground for the rapid diffusion of cybernetics as discourse in the Academy throughout the 1960s.

The Post-Stalinist Order of Knowledge

It may seem paradoxical that, even as mathematicians via cybernetics reached the apogee of their involvement in applied research, they preached theoreticism. Yet it must be understood as strategy to ensure the autonomy of science from political control while nevertheless retaining the levels of funding enjoyed in military research. Such a strategy involved a complicated re-articulation of the relationship between the scientific, the technical, and the political. With their newfound power—and Stalin safely buried while Khrushchev had abdicated the title of “coryphaeus of science”—physicists and

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195 On Lavrentiev’s career and the founding of the Siberian Division, see Ksenia Tartarchenko, Calculating a Showcase,” this issue.
mathematicians challenged the reign of the philosophers and other guardians of orthodoxy. The battle was waged on two fronts: the normative status of Marxist-Leninist philosophy of science with respect to scientific practice, and the subordination of theory to technology and thence to the needs of economic development. The direction of struggle was promulgated at the close of the War, but only at the end of the 1950s could victory be achieved. The resulting epistemological and institutional reconfigurations had important implications for economics.

Stalinist Marxism had struggled over the relationship between politics and science: were there socialist and capitalist, proletarian and bourgeois sciences? From the 1930s, a class theory of science reigned. Party philosophers exercised normative power over science, and reciprocally the language of “dialectical materialism” (“diamat”) entered scientific dispute. But beginning around 1954—on the eve of the explosion of the hydrogen bomb—mathematicians and physicists confronted the philosophers, using the latter’s recent opposition to quantum mechanics, relativity, and cybernetics as evidence of their wrongheadedness.

This was of a piece with a reappraisal of “fundamental” science. Post-Great Break philosophical dogma stated that the productive forces drive technological development and science is an abstraction from or reflection upon this; scientists were thus enjoined not to stray too far from technological practice lest they be seduced by idealism. Egorov

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198 Vucinich, *Empire of Science* (ref. 13), 205-10.
and Luzin had been accused of just that, and the Moscow mathematical school was thus very sensitive to the charge. But mathematicians and physicists now argued that the new mathematics seemingly so far from practice—set theory, mathematical logic, algebraic topology, probability theory, etc.—had been revealed by nuclear physics and computing as crucial drivers of economic progress in the “Scientific-Technological Revolution” that the advanced countries of the world were then entering.

On both fronts a turning point was the 1958 All-Union Conference on Philosophical Problems of Natural Science, at which the philosophers were routed. The new settlement proposed, first, that philosophers must now study science and philosophize on that basis rather than prescribe to it. Second, science was given an equal status to technology, which was enshrined in the 1961 Party Program that stated that “science will become, in the full sense of the word, a direct productive force” rather than part of the superstructure. Keldysh, upon becoming Academy President in 1961, swiftly enacted reforms under discussion since the early 1950s. On April 12th, 1961, as Yurii Gagarin was launched into space in the machine he had helped design, Keldysh dissolved the Division of Technological Sciences of the Academy, its largest division, ejecting over 50 institutes.

With the Academy renouncing its claim to be the supreme coordinator of all research, a newly empowered and renamed State Committee for the Coordination of

Scientific Research Work was to become the hinge between the realms of fundamental and applied science and also coordinate the latter. The Academy retained only the heart of cybernetics in a new Division of Automation, Remote Control, and Radioelectronics.

Lyapunov, Sobolev and Kitov had framed cybernetics as more than mere engineering by rephrasing Wiener’s claims in the language of fundamental science. They also claimed computers as their domain against the engineers by basing cybernetics around the computer as tool and metaphor, and conversely framing cybernetics as a general theory of computing. Computer science, probability, and other “applied” specialties banished to other disciplines in the United States accordingly remained within mathematical departments and institutions. The Hilbertian image of the role of formalization and axiomatization that dominated Soviet mathematics provided an additional rationale. In contrast to the later Bourbakist image equating mathematics with *mere* formalism, for Hilbert mathematics and the physical sciences were in dialectic: mathematics could axiomatize any already sufficiently mathematically sophisticated areas of physical science, and thereby provide a springboard for their further development. Hilbert thought mechanics ripe for such treatment; von Neumann axiomatized quantum mechanics; one of Kolmogorov’s early feats was an axiomatization of probability. We can thus understand the simultaneous burgeoning of mathematized applied sciences and rejection of engineering from science proper: cybernetics, at least its theoretical, general, mathematical part, was the properly *scientific* complement to new engineering practices, with a home in the Academy. Cybernetics was on the way to

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202 Gerovitch, *From Newspeak* (ref. 6), 177-9.
becoming an alternative scientific metalanguage, and mathematicians universal scientists.204

Despite its importance to the bid for scientific autonomy, cybernetics was far from apolitical. As Rindzeviciute argues, cybernetics was a political project in two senses.205 First, mathematics, computing, and cybernetics involved a reflection upon the relationship between the scientific and the political. They are thus a privileged site to observe the changing political ontology of truth in the late Soviet Union. Mathematics, largely preserving a position exterior to politics even under Stalin, was the lever by which science as a whole could be pried loose from the political. In a second sense, cybernetics was a theory of government, a science of it, a toolbox for it. It gave tools, concepts, and apparatuses to those who governed, as well as an overarching conception of the nature of government. Scientists thereby asserted a claim to jurisdiction over political problems. Stalin had attempted to stamp out the technocratism of elite engineers and economists during the Great Break.206 But under the new dispensation, politics and politicians were excluded from science, while scientists themselves demanded that they and their expertise be taken into account by the rulers. Such a vision of science, one with its own legitimacy not founded in the political, suited the Khrushchev government’s need for non-charismatic sources of legitimation after the Secret Speech at the Twentieth Party

Congress of 1956, “On the Cult of Personality and its Consequences,” revealed and denounced (some of) the atrocities perpetrated under Stalin’s rule.

By Stalin’s death the Soviet order of knowledge was capped by three meta-disciplines: *dialectical materialism*, general philosophy, including the philosophy of science; *historical materialism*, the philosophy of history; and *political economy*, which studied the “laws of motion” of different historical formations. In his 1952 *Economic Problems of Socialism*, Stalin had excoriated a young economist for suggesting that economic science be involved in the “rationalization” of planning.\(^{207}\) The political economy of socialism had thus completed its transformation into an elaborate apologetics equating Soviet reality with socialist ideality by scholastic hermeneutics of the writings of Marx, Engels, Lenin, Stalin, and Party decisions. But just as cybernetics challenged *diamat*, so did mathematical economics/economic cybernetics shake political economy. It refused the compromise offered it—that it become mere “methods” to political economy’s orthodox “theory”—and asserted itself as a rival science under the umbrella of cybernetics.\(^{208}\)

**FROM THE HEAVENS DOWN TO EARTH: A REALISTIC UTOPIAN PROJECT**

In the 1960s and 1970s mathematical economists and cyberneticians proffered elaborate schemes of mathematical models and institutional reforms that would make use of them. It is easy to see these as quixotic. The literature is filled with reasons of


institutions, interests or ideology as to why the Soviet Union was unlikely and finally unable to address its institutional failures. But it is important to understand why would-be reformers did not anticipate failure at the time.

So great was the awareness of the need for change that reforms of economic administration began the very day Stalin died. Calls for more radical change came quickly.²⁰⁹ Beginning April 1954, a series of acts delegated rights from the union ministries to the republics and enterprises, increased the role of economic incentives, and repeatedly reorganized the economic bureaucracy.²¹⁰ Khrushchev’s 1957 law drastically reorganized the sectoral planning apparatus to a territorial model, abolishing twenty-five ministries in the process.²¹¹ These reforms occurred before and during the period of the “Thaw,” which combined relaxed ideological controls, sharply reduced state violence, and massive investment in both science and consumer goods and services. While Khrushchev’s Secret Speech inaugurated the Thaw, at the same Party Congress the speeches of powerful Politburo members Suslov and Mikoyan explicitly criticized the state of economic science.²¹² To any economist of the period the possibility of change would have seemed very real.

²⁰⁹ At the 1954 February-March Plenum of the Central Committee, the first session of the Supreme Soviet of 1954, and the 1955 July Plenum.
In this context—of a decade of continual economic reform, Khrushchev's declaration at the 1961 Party Congress that “scientific calculations” showed that communism would be built by 1980, and the massive, lavishly funded projects in atomic weaponry and space exploration—the expansive vision of the May 31, 1963 joint decree of the Central Committee of the Communist Party and the Council of Ministers becomes both more intelligible and more remarkable.\(^{213}\) It was the result of the machinations of Viktor M. Glushkov, a rapidly rising star of cybernetics, who had conspired to get a letter to Khrushchev warning of a catastrophic lag behind the United States in the computerization of economic management.\(^{214}\) Glushkov freely admitted that this was a plan for a new megaproject, like the three Main Administrations, and would be more complicated than the rocketry and nuclear programs combined. The decree outlined an enormous coordinated program for the computerization and automation of economic accounting, planning, and management: the United State Network of Computer Centers (EGSVTs). Its immediate predecessor was Kitov’s rejected 1959 proposal for a dual-use nationwide military and economic planning network.\(^{215}\) The roots of these network visions were the anti-aircraft and anti-rocket realtime networks rationalized with the nascent techniques of systems analysis and operations research.

\(^{213}\) Postanovlenie TsK KPSS, Sovmina SSSR ot 21.05.1963 N. 564, “Ob uluchshenii rukovodstva vnедрением вычислительной техники и автоматизированных систем управления в народное хозяйство.”

\(^{214}\) This story is told in V.V. Shkurba, “V Komande Glushkova,” in Akademik V.M. Glushkov - Pioner Kibernetiki, ed. V.P. Derkach (Kiev: Junior, 2003), 351–56; Nikolai Prokofevich Fedorenko, Bospominaia Proshlooe. Vgliadivaiu v Budushchee (Moscow: Nauka, 1999), on 147; Kuteinikov, Proekt OGAS (ref. 85) on 48-51.

\(^{215}\) Poletaev, “‘Voennaia Kibernetika’” (ref. 47), 523-4. A.I. Poletaev writes that Buslenko, Poletaev (his father), and Lyusternik were co-authors, but Isaev insists that, while they were important interlocutors, Kitov was the sole author. Vladimir P. Isaev, “Vspominaia A.I. Kitova – Nazad v Budushchee,” in V.A. Dolgov, ed., Kitov Anatolii Ivanovich - Pioner Kibernetiki, Informatiki, I Avtomatescheskoj Sistemy Uprvalenija: Nauchno-Bibliograficheskie Ocherk, 2nd ed. (Moscow: KOS•INF, 2010), 122–45, on 139-41.
The centerpiece was to be a new organ under the State Committee for the Coordination of Scientific Research Work, the Main Administration for the Introduction of Computing Technology. This institutional location at the fulcrum between technology and science mirrored the position of cybernetics in the order of knowledge. Its membership reads like a *Who’s Who* of computing and military cybernetics. The new Administration was to organize the production of computers, build a nationwide network of computing centers, and coordinate computerization and automatization at every level of economic hierarchy. Gosplan’s Main Computing Center (founded 1959) would be the heart of the new system; the Central Economic Mathematical Institute—very nearly named the Institute of Economic Cybernetics—would be its brain. Cybernetic inspiration shaped CEMI’s very architecture: the building, designed by Leonid Pavlov, was itself a cyborg of two superimposed rectilinear forms, one for people, and the other (with double-height floors) for computers. Considering CEMI in isolation from this larger project, as all of its previous historians have done, as though it were a Western economics department or a Soviet version of the Cowles Commission, distorts beyond recognition its role as envisioned at the time of its founding.

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216 Kuteinikov, *Projekt OGAS* (ref. 88), 65-6, 75.
217 By the time the building was erected, computers no longer required such spaces—and CEMI was no longer to be the head of the network. These rooms became the spaces of embodied sociality that Pavlov had thought obsolete, such as the library and auditoria. See Anna Bronovitskaya, “NII Periorda Stroiteli’sva Kommunizma,” *Projekt Rossii* 4, no. 46 (2007): 145–52, on 50-52. Pavlov, fascinated by computing, also designed the computing centers for Gosplan and the Central Statistical Administration; Anna Bronovitskaya, ed., *Leonid Pavlov. 1909-1990: Vystavka K 100-Leitiu Arkhitektora* (Moscow: Gosudarstvennyi nauchno-issledovatel’skiu muzei arkhitektury im. A.V. Shchuseva (MUAR), 2010).
218 CEMI, IPU (mentioned above), and the Computer Center were among the principle institutes of cybernetics within the Academy. On the activities and changing missions of CEMI and IPU in the 1960s, Simon Kassel, *Soviet Cybernetics Research: A Preliminary Study of Organizations and Personalities* (Santa Monica, CA: The RAND Corporation, 1971).
Economics and/or Cybernetics

Because of economics’ origins in the human sciences, its mid-twentieth-century American mathematicization and formalization has often been decried as a bout of “physics envy,” scientism, or worse. The more complex reality is that during the Second World War and afterward physicists, some applied mathematicians and engineers began to approach economic problems from new positions of institutional power. Philip Mirowski has recast the entire history of mathematical economics in the United States by examining its postwar encounters with operations research, cybernetics, and systems analysis; this work provides an entrée to the Soviet case. Hitherto, the cybernetic language surrounding Soviet mathematical models, if noted at all, has been dismissed as ideological camouflage or mere fashion, obscuring mathematical economics’ entangled histories.

While it is beyond the scope of this article to explore its composition in any detail, there had been a loose community of individuals concerned with applying mathematical methods to the economy even under Stalin, though many of its members could not be called economists, and their methods may more properly be called numeric (or even just numerate) than mathematical. They included economic (originally agricultural) statisticians, engineers (especially in hydroelectrical and railroad engineering), and practical planning economists. They were distinguished more by their politics than by their methods: they were interested in reforming the institutions of Soviet socialism rather

than celebrating their perfection. Such reformism had been nearly impossible before Stalin's death in 1953, by which time economics had become dominated by an apologetic “political economy of socialism” (*politikonomiiia sotsializma*), but afterward the limits to discussion quickly broadened. Eminent statistician Vassily Nemchinov functioned as a self-conscious organizer of this reformist network. Through Kantorovich he became aware of cybernetics and in turn himself became known to the rest of the cybernetic network.

In 1957, with the support of Lavrentiev, Nemchinov organized the first Laboratory for Economico-Mathematical Methods (LEMM). While located in Moscow, it was formally subordinated to Lavrentiev’s newly-founded Siberian Division of the Academy. By April 1960, a mere seven years after Stalin's death, Nemchinov hosted a large conference in Moscow on “the Application of Mathematical Methods in Economics and Planning,” the proceedings of which filled seven volumes. Such an event, in the Soviet theater of signs, trumpeted political favor. We are now in a position to understand why nearly half of the members of the organizational committee were not economists at all, but superstars of mathematics and computer science (including ten full or corresponding members of the Academy) with no work before or since in economics. Every one of them can be tightly linked to either Kantorovich, Kitov, and Bruk, the only three with any sustained interest in economics; there can be no doubt that these links account for their

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attendance. This was a simply unprecedented show of scientific and administrative force at an economics conference, the significance of which could not have been lost on the political economists in attendance.

After three years of politicking, and with the aid of Glushkov, as discussed above, Nemchinov managed to found his institute, CEMI. It gathered his network of numerically-oriented reformist economists into one place. It was based on LEMM (54 researchers), but also absorbed a group devoted to the study of the effectiveness of capital investment from the Institute of Economics (11), the Department of Transportation Cybernetics from the Institute of Complex Transportation Problems (16), Nemchinov’s former laboratory at SOPS, and the department of mathematical economics of Dorodnitsyn's Computer Center of the Academy of Sciences.²²²

Very quickly, CEMI recruited large numbers of newly graduated Mekhmat-trained mathematicians, especially Jews barred from the anti-Semitic pure mathematics establishment, those with tarnished political records, and those looking to escape the strict environment of the military institutes. Two of my primary informants, Yurii Gavrilets and Viktor Volkonskii, spent two years in NII-5 after graduating from Mekhmat with some political black marks, before Nemchinov poached them for LEMM in 1960. Volkonskii accordingly called CEMI a “Noah’s Ark.”²²³ As Nemchinov remarked, he could only freely discuss economics with people over sixty-five or under thirty-five years of age.²²⁴ The first cohort were reform-minded economists by training,

²²² Fedorenko, Bspominaia Proshloe (ref. 89), 164.
²²³ Interview 14 October 2011.
the latter included idealistic young mathematicians and physicists. These economists did not initially have a self-conscious identity as mathematical economists opposed to the “political economy of socialism.” They acquired one only through their traffic with cybernetics.

Yet the alliance forged between nascent mathematical economics and military cybernetics at the end of the 1950s was very brief. The reform-oriented economists and the mathematicians and engineers who received a second education at CEMI had entirely different understandings of the task of CEMI, the EVGTs, and economic reform from the military cyberneticians.\(^{225}\) (The economists’ reform economics will be the subject of future publication.\(^{226}\)) In Kitov and Glushkov’s military cybernetic version, the problem of planning became one of creating sufficiently pervasive, reticulated, and high-bandwidth information channels and sufficient computational capacity that the fused state/economy could essentially be a well-controlled dynamical man-machine system, akin to the anti-missile systems.\(^ {227}\) Even insofar as it would have subsystems, and they have local criteria of optimality, the problem of divergent interests could not arise, as it does not in a military situation in which all agents have the global goal of preventing a nuclear missile from detonating.


\(^{226}\) It is a mistake to take CEMI’s flagship project, the System of Optimally Functioning Economy, as akin to the Kitov/Glushkov conception.

The military cyberneticians were never able to realize this cybercratic utopian (or dystopian) dream. The EGCVTs, slowly dismembered by various bureaucracies, became “automated management systems” (автоматизированные системы управления, or ASU) in different enterprises and state organs. These statistical, communications, and database systems assisted management while leaving its structure entirely unchanged. The mathematical economists became the voice for more radical reconfigurations. In the vision of Novozhilov and Kantorovich the nationwide network would be a technical means to calculate an optimal national plan from an enormous linear programming problem. Solving the linear programming problem would generate prices and assorted “normatives” which would be set into law. The administrative management system could then be dismantled. Enterprises would then maximize their profits on their own, steered indirectly by these stable parameters toward fulfilling the optimal plan. In sum, while the cyberneticians imagined a single well-controlled goal-oriented system, the economists imagined calculating parameters to steer an evolving economy of independent agents.

But the short-lived alliance allowed the network of mathematically-oriented economists to coalesce as an institutionally powerful force. And the young mathematicians that crossed the cybernetic bridge into economics brought with them norms of behavior, metaphors, techniques and problems, and those international standards of mathematical rigor and sophistication—the Hilbertian axiomatic formalism—that are the very conditions for misrecognizing Soviet mathematical

economics as belated Western neoclassicism.\textsuperscript{229} This economics, born in the encounter with cybernetics, remained deeply marked by the experience. Emil Ershov, a Mekhmat-trained mathematician who spent the formative years of his career focused on input-output modeling at the Research Institute of Gosplan, remembered cybernetics’ impact on the economists thusly, running together its various problems and techniques:

“But then materials became available connected with optimization methods and their application. Not only from Kantorovich’s work, but because the military paid attention, and interest rose, due to the position of Academic Aksel’ Berg. In other words, the state recognized the danger of lagging behind not only in mathematical methods, but also in what is now called computer science [informatika]. Then arose the problem of pattern recognition. It was necessary to discover the position of enemy submarines in the ocean. To differentiate them from something else, like a whale. Not easy. At the same time mathematicians were working on similar questions. How to send a rocket somewhere. For example, a body with changing mass is flying to the moon and must gently set down upon it. They began to think that such equations could also be used to control the economy. This, I would say, was the mathematical optimization direction in combination with the theory of control, using differential equations.”\textsuperscript{230}


This younger generation brought with them a vision of their field as merely one application of cybernetics, of the economy as merely one system to be studied. As one of the founding members of CEMI, economist and cybernetic enthusiast Aron Katsenelinboigen reminisced,

“The basic subjects of my conversations with [physicist and co-author] Faerman were various problems in the general systems theory. We were both interested on the whole in questions of cognition and the creation of an artificial intelligence. However, we understood that this interest could be satisfied to a certain extent if the principles of the construction of any one complex system were understood. However the difficulties in receiving initial information interfered with applying this to natural systems, especially the biological system. From this point of view it seemed that the process of cognition in economics was simpler than in natural systems, because economics was a relatively recent artificial system with a short and visible history; the groundwork in many respects lay on the surface. All this predetermined our decision to attempt a mutual study of the economic system in order to branch out to the investigation of another system.”

This attitude—blithely ignoring disciplinary boundaries and with a technological optimism that would be unwarranted even today—appears repeatedly in the interviews

and writings of mathematicians and physicists who around the turn of the 1960s refashioned themselves as economists. It would be easy to propose cultural antecedents in Russian history that exhibit a similar impulse toward holism; in a sense it was overdetermined. Searching for cultural or ideational origins is not irrelevant, but what forged them into something new and peculiar to the moment, so powerfully generative of new horizons of possibility, was the structure of the conjuncture of particular socialized dispositions and institutional changes at different scales.

CONCLUSION: A PROLIFERATION OF COMMUNISMS

The failure of cybernetic communism and birth of mathematical economics captures the moment in the growth of the late Soviet scientific technical intelligentsia when it began to dream alternative socialisms. Past studies have explored in detail the contribution of the artistic and literary intelligentsia to late Soviet reformism, as well as that of the political dissidents, yet these were but tiny minorities. The numerically more massive, and, I would argue, more consequential stratum, was the scientific-technical intelligentsia, which evolved distinct attitudes, modes of sociality, and political relationships to the Soviet regime. Implicitly liberal historiography, always looking for pro-democracy or liberal forces “outside of” or “in opposition to” the state, founders on the thoroughly étaticized society of the Soviet Union. It tends to miss or misconceptualize

emergent critiques from those, like military scientists or economists, located in the heart of the state.\textsuperscript{233} Employing a recurring historical trope for such forms of ambiguous relationship to the state, cybernetician Ilya Muchnik said to me, “we were new Decembrists, of a sort.”\textsuperscript{234} The question is what sort; this essay has sketched a prelude to an answer. During this period, the number of available positions that could be assumed with respect to the officially formulated goals of the state begin to multiply.\textsuperscript{235} In specific locales, an openness toward alternative Soviet futures, suffused with moral and political ideals but with concrete programs for institutional change, could be fashioned out of the available intellectual and cultural resources. Cybernetic mathematical economics was one crucial such locale. Soviet economics, after three decades of fervid internal evolution, would gain purchase in the first Yeltsin government—its own base of support the larger scientific-technical intelligentsia of which the economists were one fraction—and thus guide the final dismantling of the Soviet Union.


\textsuperscript{234} Interview May 5, 2014. Gerovitch suggests the felicitous term “considence,” due to a cybernetician, for one such stance, \textit{From Newspeak to Cyberspeak} (ref. 6), on 257.

\textsuperscript{235} Kevin M. F. Platt and Benjamin Nathans, “Socialist in Form, Indeterminate in Content: The Ins and Outs of Late Soviet Culture,” \textit{Ab Imperio}, no. 2 (2011): 301–23.
THE LONG ROAD TO ASYMPITOPIA:
SCIENTIFIC PLANNING AND THE PLACE OF THE SOVEREIGN

TRIBES FROM MARS

Yurii Gavrilets put down the phone and turned to me, sighing.

“A former coworker of mine here at CEMI died, Zavel'skii. There was such a man here, Misha Zavel'skii...” He trailed off. Mikhail Zavel'skii had worked at CEMI for decades. He and Gavrilets had engaged in friendly polemic about basic issues in mathematical economics across their adult lives. Then he looked up and asked, “But what were we talking about?”

Yurii Nikolaevich remembered, and turned back to his computer screen. The whole time we had been talking, a blob in the center of the screen had been slowly changing color, from blue to red and back again. “Look,” he said, gesturing at the model on the screen, “it depends on altruism, let us say when a person has fallen into trouble and cries out for help. If those nearby hear him, depending on their altruism, they might help. There is a congenital element to it, and it is also acquired by communication with good people. Really what we did was we modified a model from [archaeologist, Charles] Spencer. Here,” he said, pointing at the colored regions on the screen, “we have about thirty or forty tribes. And each has its own resources, degree of altruism, degree of cruelty, power. They interact with each other and either enter into alliance or war. The model was made by my son, Sergei Gavrilets, and Petr Turchin, who are mathematical
biologists who teach in America. But their model lacked altruism. I am interested in the impact of altruism. That's the work, that's what interests me. You're an anthropologist, and you see it is not unrelated.”

He must have seen the look on my face, because he paused and smiled. “By the way I am not favorably inclined toward evolution. I think life came from other planets. From Mars. But I have a cybernetic view of society. How is it that all of a sudden a primitive tribe develops into something else?”

This was my first meeting with Yurii Nikolaevich, and I was nervous. He was one of the last three people alive who had been members of Nemchinov's first Laboratory of Economic and Mathematical Methods, the predecessor to CEMI, and the first of them that I had met. The bulb had burned out in the corridor outside his door, and when he had opened it the sunlight from the floor and ceiling windows blinded me. When my had eyes adjusted, I was sitting across from a tall erect man with sharp features, his white hair standing up straight like a brush, and eyes cloudy with cataract behind huge thick glasses. The office was small, and shared with another economist. I sat on an old sofa, tape covering the holes to keep the stuffing in. We had now been talking for about five minutes and I was thoroughly confused. Mars? Altruism? Tribes? Cybernetics? I want to preserve the sense of disorder of this first meeting. In the way topic followed topic, through a logic I could not then follow, different threads of the past were being woven together into something coherent in the present.

Yurii Nikolaevich brushed all those threads—Mars, cybernetics, and altruistic tribes—to the side and began again, telling me about his personal story.

“The Objective Function of Socio-Economic Planning, from 1983, look, this is my little book.” He waved it at me and then dropped it back onto one of the mountains of paper that threatened to collapse onto his computer. “It was my doctoral dissertation in memory of Nemchinov. I worked in one establishment and studied probability theory. I had come across a book, The Theory of Games and Economic Behavior, by John von Neumann—a famous book. It interested me so much that I began to study game theory right after university. I was working in an establishment that made electronic instruments to control airplanes and similar things. And then from [Viktor Volkonskii], who was working there as well, I learned that this laboratory of Nemchinov's existed. I transferred there and Volkonskii came a couple years later, and then [Evgenii Grigorevich] Gol'shtein and Markovich.”

This information was only slightly easier to parse. His book was mysterious. What was the objective function of planning? And why mention this late book, rather than those from the first twenty years of his career? How did this connect to game theory? It was interesting enough that he had taken an interest in game theory, given that American economists had ignored it for decades after it was invented.

The institute he had worked in had meant nothing to me. It would only be four years later that I began to suspect that it might be a military establishment, and that this might be important, and longer still before I was able to triangulate which institute it was. In his reminiscences about his teacher, a student of Kantorovich's recalled giving a lecture on
linear programming at which Gol'shtein was present at NII–5 of the Main Artillery Administration, later renamed the Institute of Instrument Automation. During the 1950s and 1960s, it was a key locale for the radar program, including the signal processing aspects of the problem and computer systems. In short, NII–5 had had exactly the right complex of technologies and problems that had given birth to cybernetics in the United States, and it turned out to have been one of the hothouses of military cybernetics in the Soviet Union.

Volkonskii and Gavrillets were two of the first mathematician-cyberneticians to make the move into economics, and they would be leading figures in the decades that followed. When they first came to Nemchinov's new laboratory, though, they were nearly alone. Yurii Nikolaevich then told me a story I was to hear again and again.

In 1948 Trofim Lysenko had taken control of Soviet biology at a conference at the Timiriazev Agricultural Academy. Nemchinov had then been the Academy’s director. Economics in pre-Stalinist Russia meant agricultural statistics. Nemchinov openly opposed Lysenko, and lost his job. Your Nikolaevich recalled, “He came home and said to his wife, 'Let's pack our bags and get ready for prison.' But Stalin knew Nemchinov and forbid Beria to do anything. Stalin had used Nemchinov's data to argue that larger agricultural establishments would be more effective, and thus for collectivization. And this is what saved Nemchinov, and Nemchinov hired me when I was basically just a tyke. He loved us.”

This story is the founding myth of CEMI. In Nemchinov's moment of defiance, mathematical methods were not just an insistence on epistemological truth against a
moment when Stalinism seemed to eclipse it. And it was not just a rejection of the idea of a separate socialist science in favor of scientific internationalism, though it was that too. Standing for mathematics was a moral stand that gave worth to the man.

“CEMI was founded before my eyes. Nemchinov was a Marxist, but he wanted to plan on the basis of mathematical models. And Kantorovich showed that solving the optimal planning task for the national economy yielded Langrange multipliers that are really market prices. So we were all proponents of market economics. In the sense that central planning was unequal to the task of control. However now many of us who wanted the market are against all these financial institutions and such unbridled extreme forms of the market, like those that turn medicine and education into the market. Personally I am against such a broad market. It's a position of principle. Volkonskii, Polterovoich, and I were never members of the Party. We were critical of it in the same way that we are critical of the present.”

Yurii Nikolaevich paused to let that a sink in. I waited for him to continue and watched over his shoulder the war between altruism and selfishness playing out on his screen, blue and red growing and absorbing each other and being absorbed in cycles.

**INTRODUCTION: TECHNICAL COMMUNITIES**

The extremely rapid formation of Soviet mathematical economics was not an inexplicable rupture, and neither was it a wholesale conversion or transformation of what came before, some sort of paradigm shift or scientific revolution. The existing discussions among economists of the problems of the Soviet economy prepared the
questions—as well as the general atmosphere that something new was needed, that changes were inevitable—to which the new mathematical techniques, and the inferences they supported, could appear as possible answers. At the same time, because of the growth of military science, this was a period of rapid development of mathematical technique, equally rapid training of cadres with the cognitive habits for employing them, and fantastical optimism for what would result. The language of cybernetics provided the bridge by which these techniques and personnel (and hopes) flowed from military science into the pre-existing problematics of Soviet reform economics of the 1950s.

However, neither was this process one of smooth assimilation of mathematical economics. Space had to be created—negotiated, fought for—in the institutional, ideological, and epistemic orders of Soviet economics. Likewise, the new techniques and people did not simply slot into the pre-existing problems. The mathematical forms, and the means for working with them, constituted a set of cognitive affordances that made it possible to grasp the problems in new and unforeseen ways. The resultant of these two vectors is the subject of this chapter.

This moment has never been studied. Beginning in the immediate post-World War 2 period, American economists noted some revival of vitality in Soviet economics discussions. During this period, reviews of recent Soviet literature were a regular feature in American economics journals (as well as those of other disciplines). Several survey articles were written for each of the debates covered in Chapter XXX, from which I drew. The American survey articles on these debates never truly achieved synthesis. As such synthesis was incipient, the rapid mathematization of Soviet economics began. Perhaps
because of their inability to handle the new standard of mathematical complexity, this
induced a turnover in the Western experts who studied Soviet economic thought. Most of
the experts who had studied pre-mathematical Soviet economics had done so primarily
out of interest in the recent history and immediate future direction of Soviet economic
policy and institutions. The new (and few) students of Soviet mathematical economics—
Michael Ellman and Alfred Zauberman foremost among them, and soon Pekka Sutela—
paid little attention to Soviet economics before Kantorovich. They were mathematical
economists by training, and they were looking for something that would seem useful or
exciting to the Western, especially American and British, economics professions. In their
narratives, Soviet mathematical economics thus appears as though *ex nihilo*. Accordingly,
the two bodies of Western historiography never met up. The recombinatory moment
never even appeared as a historiographical problem.

The particular dynamic between the pre-existing economic field and mathematical
form is thrown into relief by that which took place parallel to or alongside of it. One the
one hand, 1950s non-mathematical reformist economics reached its apogee with the so-
called Kosygin reforms of 1965. Its contemporaneity with the steep ascent of
mathematical economics has served to confuse its true roots in that brief and then
departing preceding epoch. While mathematical economics gradually attracted more and
more of the practical planners who had driven the pre-reform discussions into its orbit,
the political economists either fought or made accommodations with the newcomer. They
rephrased its reform proposals in political economy’s language, and continued to
(re)produce proposals within the limited repertoire that their orthodoxy and changing
political limits allowed. This was not without fruit. Perestroika was more indebted in its inspiration to 1950s reformism and the subsequent evolution of political economy of socialism alongside (and in reaction to) mathematical economics than to the mathematically-induced innovations, even as it drew support from the latter.

On the other hand, cybernetic economics *a la* Glushkov and Kitov turned out to be a dead end, a fantasy space. Glushkov was a true enthusiast, who never ceased to re-propose his nationwide network under new acronyms to every iteration of the Politburo, but it never came much closer to realization than it did in 1963. Cybernetics economics was a *purely technological* or technocratic solution to properly economic problems. It was utopian in the strict sense insofar as it did not respond to those problems, it did not work within the reality they defined, but rather proposed an alternative reality. Malyshev, the vice chairman of the Central Statistical Administration, offered a reformist economists’ response to Glushkov:

“Strange as it may appear, there are people who would like to employ the central computing centre as a vantage point from which to keep account of all the production processes taking place in our immense territory. They would just like to… push buttons so that, at their commands, the processes of production, exchange, distribution, and accumulation, in all their manifold … manifestations would develop without any breakdowns or complications. But suppose, all of a sudden, a signal is received: something went wrong, say, in Khabarovsk. Then they’d promptly push the proper button and correct the mistake right away. To me all this is nothing but a utopia. …Central planning must give the broad goals, the
general direction of activity, and enable the people to find for themselves the best
means for reaching these goals.”

Stripped of this utopianism, computerization and automation were reduced to a series of
tools that could be applied to rationalize any institutional structures, including the
existing, economically insufficient ones. These tools were sometimes incorporated into
the larger aspirations of mathematical economics, its self-image as a field, as with shop-
level optimization, the system of automated plan calculations (ASPR), and management
theory.

Mathematical economics cannot be reduced to the one or the other of these, nor to
their conjunction: it was constituted in the recombination of these two fields at the end of
the 1950s. In this chapter I focus on the first decade of Soviet mathematical economics,
which saw the coalescence of two interlinked communities grouped around two
techniques: input-output modeling, and linear programming.

The scholarly arguments on the origins of input-output are knotty, and like many
scientific priority disputes impossible to settle. But for most intents and purposes, the
relevant origin is Wassily Leontiev’s work on the structure of the American economy in
1941. Input-output was the first modeling technique to become popular in the Soviet
Union. It was relatively easy to assimilate ideologically; it also required a lesser level of
mathematical training than optimizing models. It was the macroeconomics of the Soviet
Union, but compared to macroeconomics as it developed in the West in interaction with
the system of macroeconomic statistics, it worked at a higher level of structural

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resolution. It did not begin with macroeconomic aggregates. It saw the productive powers of the Soviet Union as a series of technologies of production interconnected by material flows. It thus accorded with the orientation of Soviet economics to production over consumption, and with the further tendency to understand production first of all as a technological, rather than economic, problem. But neither was it microeconomics, which is concerned with the subject of economic choice, the firm or the individual. It is actually rather precise to call it, as contemporary Russian economists now sometimes do, mesoeconomics.

Work with input-output models was fundamentally data-work. Compiling the data required for an input model meant not just a detailed knowledge of existing statistics. It required re-opening all the black boxes of the infrastructures of planning and accounting statistics, understanding how the numbers were constructed, taking them apart and recombining them. The community that developed around it was accordingly close to the organs of production planning: the Central Statistical Administration (TsSU), the Council for the Study on Productive Forces (SOPS), the Institute for Economics and Organization of Industrial Production (IEOPP), but above all the Scientific Research Economic Institute of Gosplan (NIEI Gosplan) and the Main Computing Center of Gosplan (GVTs Gosplan). Input-output remains almost entirely understudied by historians of economic thought, both in its Western and Soviet versions. It reached a level of maturity very quickly, did not thenceforth generate many advances that counted as “theoretical” in the newly evolving and hyper valorized sense of ‘theory,’ and it was quickly overshadowed by general equilibrium theory, which did. Yet it remains an essential substratum of
practical economics worldwide. And to this very day, it remains a primary technology of Russian economic governance, the basic forecasting apparatus of the Ministry of Economic Development, and the primary school in which the vast majority of Russian practical economists were educated. Today, many of the most important policy makers at the Ministry of Economic Development, who favor a pro-growth state-directed investment policy, are scions of the input-output planning community.

The Soviet planning work of the 1920s was very close to input-output analysis in its basic point of view though not in its mathematical power. Conversely, input-output represented the rebirth of a synoptic vision of the productive forces of the Soviet Union, and constituted them as not only a realm of reality, but as a sociotechnical object. It gave entirely new content to the ideal of planning. While the ideal of scientific planning was integral to that of socialism from the revolution onward, this ideal was filled out by different processes of actual planning at different periods. Perversely, the period of the first five year plan was also the eclipse of any real synoptic planning. The plan became merely the more or less uncoordinated list of tasks to be done in striving to realize specific relatively uncoordinated priorities, above all the growth of industrial output. Imbalance was actually celebrated until the late 1950s, as forcing the economy to develop at the fastest rate possible by revealing bottlenecks and then overcoming them. Gosplan’s planning practice had only a loose coupling to planning, its plans were partly attempts to introduce some minimal degree of balance and coherence post hoc to the administrative management of production, partly means to constrain or guide administrative bargaining. By the 1950s, the inadequacies of the existing process were obvious: output and
investment targets changed continuously, priorities are constantly reshuffled, huge unfinished and frozen construction projects dotted the landscape, uninstalled equipment rusted in warehouses, and inventories of unwanted consumer goods piled up. The pre-mathematical reform discussions of the 1950s had had no means to grasp the problem of synoptic planning itself, and largely ignored it. Input-output analysis finally offered an answer to these problems, which gave new content to the idea of planning itself. But input-output did more than this. First, it enabled forecasting, the projecting of possible futures of the Soviet Union that would have to be considered by policymakers. And second, the way it grasped the Soviet economy made possible new visions of economic reform.

Linear programming, on the other hand, not only came from and required a properly mathematical, proof-theoretic training, but unavoidably touched on ideological sensitive notions. Abstractly, linear programming is a technique to find the best satisfaction of some goal, mathematically expressed. One way of formulating this—“maximize (or minimize) the objective subject to constraints”—for a long period of the 20th century in American economics nearly became synonymous with the definition of economic reason itself.

At the micro-level, linear programming was among the tools available to the operations researcher for the reflexive rationalization of institutional processes. In the United States, linear programming was invented in the context of operations research; and in the Soviet Union a plurality of the most important researchers in the direction of linear programming similarly came from military cybernetics background.
In the West, at the scale of the economy, the technique underlay the grand synthesis of general equilibrium theory, the formalization of the intuition often attributed to Adam Smith that the competitive market produced the greater good out of individual self-interest. General equilibrium theory became the hard core of Western neoclassical economics, as it developed in mid-century. Its basic propositions are the welfare theorems, and the (attempted) proofs, under certain conditions, of the existence, uniqueness, and stability of an economic equilibrium, the state in which prices balance supply and demand of all interconnected markets. Not an empirical theory, general equilibrium is a highly abstract structure to which real markets are assumed to approximate.

In the Soviet Union, linear programming underlay an enormous research program centered around the ideal of optimal planning. Optimal planning envisaged the application of the technique to the creation of the national plan. Linear programming’s economic interpretation explicitly introduced to Soviet planning choice among alternatives, the problem of optimality, and hence a normative judgment with respect to politics. IO only posed the problem of choice indirectly, and cannot phrase the problem of optimality, of the uniquely correct choice. These were merely technical issues, butt undergirded a unique vision of institutional reform.

At the level of mathematical generality of general equilibrium and linear programming, the differences between competitive markets, central planning, and all the permutations between them, disappear. The mathematical techniques are a prism that projects different institutional frameworks onto the same problem of efficiency. Different
ideal institutional setups for the coordination of productive life become means to understand and explore each other.

In this chapter, I trace the evolution of Soviet mathematical economics properly speaking from the formation of the first Soviet Laboratory for Economic and Mathematical Methods in 1958. I examine first the community centered on input-output analysis, and then that taking its inspiration from linear programming. Institutions, modeling techniques, their theoretical interpretation, and the problems they were meant to unpack all grew together. In the conclusion, I argue that Soviet mathematical economics evolved an original attempt to solve the problem of economic government in the post-Stalin era. This vision was never put into practice, for reasons that the economists of this generation were never able to deeply analyze.

**LEMM: FATHERS AND SONS**

At the end of 1957, with the support of Lavrentiev, Nemchinov organized the first Laboratory for Economico-Mathematical Methods (LEMM). Though based in Moscow, it was formally subordinated to Lavrentiev’s newly-founded Siberian Division of the Academy in order to get around the opposition of the political economists who controlled the corresponding division of the central Academy. It was a small affair at first. Its first researchers were Vladislav S. Dadaian, Boris L. Isaev, Iurii R. Leibkind, Lev E. Mints, Boris Mikhalevskii, Anatolii A. Modin, Iurii I. Cherniak, and Vladimir V. Kossov, to be joined within the next couple years by Viktor A. Volkonskii, Iurii N. Gavrilets, Eduard F. Baranov, Nikolai V. Makhrov, and Aleksandr I. Stavchikov.
Almost all of them had a practical economist’s education. Mikhalevskii was the odd man out, with a history degree from MGU, and Gavrilets and Volkonskii were Mekhmat-trained mathematicians transferring out of NII-5. But the plurality were graduates of the Moscow State Economic Institute (MSEI), with one each from the Moscow Economic-Statistical Institute, Timiriazev Agricultural Academical, and Institute of Foreign Trade. MGEI was founded in 1930 on the basis of the planning-statistical division of the Moscow Institute of the National Economy (MINX) to provide cadres for Gosplan in the time of industrialization. In 1961 the two recombined, but it was MGEI who produced a generation of leading economists. Eduard Baranov explained to me why Nemchinov hired so many of its graduates, including himself. “The exceptional quality of MGEI was its all-around preparation of specialists: besides the basic economic disciplines, students also studied technology, from metallurgy to husbandry. The mathematical education, it’s true, was limited to analysis and the theory of probability, but we had a very solid statistical education, which required students to do research projects with data. This is why the new mathematical methods aroused so much interest in us.”238 Besides Nemchinov himself, only Lev Mints represented the previous generation, having worked in the statistical bureau of Narkomtrud through the 1920s.239

“When I first visited the laboratory and met the boys who were working there, none of whom unfortunately now live, I said to myself that there is no way that I would

238 It may have been the first program to begin purposefully training mathematical economists, from December 1958. Rossiiskaia Ekonomicheskaiia Akademiia Imeni G.V. Plekhanova. Vek vo Blago Rossii. Moscow, 2007, on 28, as cited in Dmitriev 2012.

239 He was arrested in the Industrial Party Affair, returning to Moscow in 1940 under the protection of Strumilin being re-sentenced in 1949, finally rehabilitated in 1955, and working with Nemchinov in SOPS before taking a position in LEMM.
work there, because I had no idea what they’re talking about. They were talking about
‘Leontiev coefficients of final expenditure,’ about ‘linear programming’, and asked me if
I knew English, which I didn’t,” Kossov told me. We were sitting in his office at
premises that the Higher School of Economics rents from Rosstat, the renamed TsSU, for
its department of management. The offices had been newly renovated in neutral blue and
white, meant to seem Western, or, better, global. I wondered whether the students here,
preparing for corporate jobs in the best and largest firms operating in Moscow had any
idea that their aged professor had once been one of the top planners of the USSR for
eighteen years, deputy director of the Consolidated Department of the National Economic
Plan of Gosplan (“the Gosplan within Gosplan”), director of the Gosplan Main Computer
Center, and member of its Collegium—a full “member of the world” as Kossov had put
it, switching to English.

Out the window and directly over his shoulder I could see the tower of the
Pavlov-designed TsSU Computer Center. Which was especially appropriate, since
Vladimir Viktorovich was a graduate of Timiriazev Agricultural Academy, since Tsarist
times a feeder to the statistical apparatus. “I had lived in a rural place, and I understood
what a good and a bad harvest was. I had some invitations to work in the agricultural
sector, but my advisor smiled and said to me that I wasn’t an experienced enough person
to make such a decision, stop thinking and go to Nemchinov. So I did. In a half a year I
could read English well enough. My first task was to edit Lev Mints’ translation from
Hungarian into Russian of the little book of Bela Kreko, it was nearly *samizdat,
Introduction to Linear Programming* (1957). I read it and understood nothing. But then I
read it and re-read it until I did understand it, and then I taught it to Nemchinov. And then be began to respect me.”

Other young members of the Laboratory had rather different experiences. Volkonsky had become a mathematician because of his ability, but despite his interests. A four-time Olympiad winner, he was admitted directly into Mekhmat MGU without sitting for the exam, but nearly chose the philosophy faculty. His mother had to enlist powerful family friends to convince him that he could not learn anything valuable there. But his inclinations repeatedly led him politically astray. “Saltykov-Shchedrin wrote a fairy tale, critical of the Tsarist system. One goes like this: One person is telling another how to catch a carp. You have to go to the pond and knock on a board and yell, “Hey! Carp! Come to freedom!” And the carp is a dumb fish and he will swim right out and you can grab him with your bare hands. And we were doing everything right, but we overestimated our freedom.” As an editor of a wall newspaper in his first year of graduate school that printed material on the edge of the acceptable, his article on the Russian Revolution and the Thaw aroused the ire of the university party bureau. Kolmogorov, his dissertation advisor, protected him from expulsion. But Volkonsky then fell into the dissident history circle of Lev N. Krasnopevtsev. When this circle was exposed and many of its members received prison sentences, Volkonsky was finally thrown out.

After two years, Kolmogorov managed to have him be allowed him to defend his dissertation, but his career as a mathematician was stymied. “The first years after I was thrown out I worked with Gavrillets in a post office box. There I studied the problem of how to defend against a massive air attack, especially with nuclear bombs.” This “box”
was NII-5, I was later able to infer, a hotbed of cybernetics. Volkonsky’s name similarly appears on the attendance lists from the seminar on cybernetic biology of mathematician Israel Gelfand and theoretical biologist and game theorist Mikhail Tsetlin. Volkonsky was searching for his vocation: “And when I finished my degree my desire for the humanities was only increasing. When I learned that I could apply my mathematical knowledge to such a discipline as economics, off I went! I wanted to go because it was a very young laboratory. Academic Nemchinov himself we called Grandfather, and he was our grandfather and gathered the young for an altogether new direction. Mathematical economics already did not seem ideologically dangerous. This was under cybernetics, and that all was under Stalin. Everything already seemed legal and free. I knew mathematics, but I wanted to understand those processes going on in our society. What else could I have looked for?”

I asked Kossov what the mood was like in the laboratory, and he burst out laughing. “What do you mean? I’m sorry but that is a hilarious question. We lived it. For all of us, life consisted of these exercises in economico-mathematical methods. It was the meaning of our lives.” He had become very serious. “Look, in the political economy of socialism, there were people in full seriousnessness debating the difference between the immanent essence of socialism and the immanent incidentals of socialism. In contrast, from the final product of an input-output balance, I could work out how much to produce of this or that. We felt like people defending ourselves with weapons against the savages. We could read, formulate the task, propose calculations. It gave us a sense of enormous moral superiority. We piously believed that it would be possible to essentially raise the
level of planning. We of course understood that we were blind kittens who knew and understood very little, we were smart enough to see that. But we had Papa Nemchinov. Our task was to do in good faith whatever he told us to do. We believed in him.”

Nemchinov had immense moral authority to his young charges, not only scientific stature and institutional power. Kossov told me the story I had heard several times already, a sort of founding moment. During the 1948 discussion at which Lysenko had asserted control of biology, Nemchinov, then the rector of the Academy, had stood against him, arguing that the statistical and experimental facts should be allowed to decide the truth or falsity of the doctrine of genetics. This moment has become emblematic of the effect of authoritarianism on science, no matter that it was in many respects exceptional, and anchors a whole discourse in both the West and the former Soviet Union about freedom and knowledge. He packed his bags, and every night he and his wife waited anxiously, expecting his arrest, but Stalin remembered Nemchinov’s service in providing agricultural data in the 1920s, and he lost only his job. After a half a year of unemployment, he became the director of SOPS. His integrity and fortitude were stories that Kossov had heard since his university days.240

240 One of the first tasks given to the laboratory may have been secret. In 1957, the U.S. Navy Special Projects Office developed the Program Evaluation and Review Technique (PERT), a graph-theoretic and statistical means to plan a complicated project, a watershed in program planning, to coordinate work on the Polaris submarine-launched missile system. Soviet spies were able to obtain some of the PERT diagrams, but did not know how to interpret them. LEMM was among the organizations tasked with their decipherment, and did so successfully. This source is the only one that I am aware of that mentions this. Ivchenko, V.V. “Neizvestnaia Stranitsa Istorii Otechestvennikh Islledovanii.” Vestnik Baltiiskogo Federal’nogo Universiteta Im. I. Kanta 3 (2010): 90–94. However, Yurii R. Leibkind and Boris P. Suvorov did publish two booklets on the topic, somewhat corroborating this story: Leibkind, Yurii R, and Boris P Suvorov. Kriticheskii Otbor Proektno-Planovych Reshenii. Metod KOPPR. Moscow: Ekonomika, 1964, and Metod Setevogo Planirovaniiia I Upravleniia. Moscow: Ekonomika, 1965. Eduard Baranov confirmed to me that they did work on PERT.
1959 was the year of breakthrough. Signals were flying from on high. In 1959, Nesmeianov, then still president of the Academy wrote in Kommunist that “we may expect a sharp increase in the role of mathematics in science, technology and planning of the national economy.” And at the Extraordinary 21st Party Congress said that economics must become “an exact science in the full send of the word, widely using the newest means of computation, becoming a floodlight on the planning of the national economy.” Nemchinov published the volume The Application of Economics in Mathematical Research, reprinting Kantorovich’s 1939 paper and another, what amounted to a short book by Novozhilov, articles on input-output modeling by Oskar Lange and himself, and one by Lur’e on transportation. It was the first widely available book on mathematical economics; along with the translations of the American books on operations research, it set the agenda for the first wave of work. In that same year, Kantorovich with Nemchinov’s help finally managed to print his famous book, The Economic Calculation of the Best Use of Resources, which carefully laid out linear programming, the tasks to which it might be applied, and the vision of national optimal planning.

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242 Vneocherednoi XX s’ezd KPSS. Stenograficheskii otchet, volume 2. Moscow, 1959, on 215.
In the academic year of 1959–1960, Kantorovich with the support of the rector, mathematician and physicist Aleksandr D. Aleksandrov, organized a “sixth course,” an additional year of study, for students in the economic faculty of Leningrad State University. Aleksandrov saw cybernetics as a mathematicization of the sciences; the decision of the LGU leadership to create the sixth course also started a program in mathematical linguistics. Contrary to any supposed opposition to applied work, the mathematicians, including Academic Smirnov, stumped for locating the new program within the mathematics faculty, but lost. Twenty-five students from LGU, and another twelve from other institutions (two from Czechoslovakia), including future academics Anchishkin and Shatalin from NIEI Gosplan, took the crash course. They were put through six to eight hours of lectures six days a week in a ten courses: analysis, linear algebra, probability and statistics, computing technology, operations research and game theory, dynamic programming (the last two taught by N.N. Vorob’ev, who would be the foremost Soviet game theorist), the application of economic methods and electronic machines in planning and economic analysis (Kantorovich), price-setting, and economic models (again Kantorovich). In the final weeks, they did applied projects, including optimizing the distribution of passengers on steamships. That same December, LGU created a department of economic cybernetics (among whose initial appointees was a young Ivan Siroezhin, future mentor to the Leningrad branch of the reformers) and a laboratory of economic mathematical methods.\footnote{Dmitriev, Anton L. “L.V. Kantorovich I Ekonomicheskii Fakul’tet Leningradskogo Gosudarstvennogo Universiteta.” In Kantorovich L.V. Ekonomika I Matematika: Izbrannoe, edited by Anton L. Dmitriev and D.N. Kolesov, 24–36. St. Petersburg: Nestor-Istorii, 2012.}
The 1960 Conference: The Dialectical Unity of Quality and Quantity

The massive conference of April 1960 was the coming out party. As already discussed in the previous chapter, Kantorovich marshaled an impressive show of mathematical and cybernetic force to buttress the economists. The proceedings, published in seven volumes, give a sense of the perceived scope of mathematical economics as well as its breakdown into subject areas: after a general volume on mathematical methods, containing plenary addresses by Nemchinov, Novozhilov, Kantorovich, Belkin, Bruk and Mstislavskii, and records of extended discussion of them, followed volumes on expanded reproduction (growth models), input-output models (both interregional and intersectoral), linear programming, transportation planning, “technico-economic calculations” or plant- and shopfloor-level planning and optimization, and statistics.

Nemchinov’s introductory remarks, and the preamble to his plenary address, are virtuosic performances of Soviet scientific self-positioning. In his remarks, Nemchinov addresses two criticisms of mathematical methods, but attributes them to wrong-headed Western observers, thus inhibiting the Soviet critics that he is actually addressing from owning those positions. First, he claims that planning cannot be reduced to programming, to calculation, but is a “complex system of measures.” This is part of his positive vision of the reform of planning as involving the engineering of the system, against the reduction of planning to the list of plan tasks; it also conversely hints at his expansive understanding of the applicability of mathematical methods. Second, he explicitly rebuts

the notion that the adoption of these methods in any way betrays a lack of Marxist-Leninist conviction. In his plenary, he makes three arguments to this effect. He cites Marx’s dictum that any sufficiently developed science eventually becomes mathematized. He argues for Soviet and Russian roots to Leontiev’s input-output analysis, first in the 1923/24 balance of the national economy of TsSU, and second to the almost forgotten 1904 work of Dmitriev. He then cites Lenin’s endorsement of the appropriation of bourgeois science as long as one critically strips them of their ideological inessentials, and makes this into a challenge: worried economists ought to learn the mathematics to be able to recognize and fend off ideological impurity. He finally deploys a quotation from Lenin stating that competent bourgeois economists have many concrete innovations to offer, and it is only their general theoretical pronouncements that should be ignored as “as much a partisan science, in contemporary society, as is gnoseology.”

But the plenary begins by situating mathematical methods as called forth, required, by the developing complexity and progress of socialist construction. The economist is a “social engineer,” but one so far underequipped with the necessary tools for turning knowledge of economic laws into effective planning. Mathematical methods, he says, respond to the task posed by history. The retarded development of such tools he likens to a production process held up by shortages: their lack has become a “bottleneck” in the production of economic science itself.

Nemchinov them adroitly begins to carve out a niche for these methods. Here there is a certain ambiguity, with which mathematical economists will strategically play as political needs dictate, between positioning mathematical economics as secondary or
derivative with respect to the political economy of socialism versus as replacing or transcending it. Nemchinov begins by claiming that of course quantitative economics must be guided by properly worked out qualitative theory, the political economy of socialism. What did this mean? The economic statisticians, mostly agricultural statisticians, of whom Nemchinov was a leading member, had been criticized in the 1920s and 1930s for their purely “quantitative” approach to economic phenomena. Their opponents meant that statistical investigations had no means to talk about the causal structure of the economy, they were too positivist. Such an approach was not only inadequate, but corresponded to a capitalist social formation in which the phenomenal appearance of the economic life was generated by the anarchic or random processes of the market, and the essential structure was occluded. Marxist theory, in contrast, did study this qualitative side, by constructing (verbal) models of causal relationships.

But then Nemchinov develops this line of thought toward a different conclusion. The conscious use of economic laws requires not only attention to the “qualitative” and “quantitative” sides of economic phenomena, but also quantitative theory. This was an innovative argument. The new methods of input-output modeling and linear programming allowed Nemchinov to answer this criticism. With these methods, economists could depict properly causal structures amenable to quantitative economic measurement. Mathematical methods had not just a “narrowly technical” role, but were means for developing theory. On the one hand, mathematical economics therefore could not be reduced to positivist statistics, and on the other, economic science could not be reduced to its purely “qualitative” side, if that meant verbal formulation only. Economic
science did include a quantitative side, insofar as it was becoming an “exact [tochnaia] science” via the mathematicization of its qualitative side. Mathematical economics, in the knockout punch, thus represented the dialectical unity of quantity and quality.

Nemchinov then develops a similar dialectic along different lines, using the vocabulary of pure and applied science and a topological metaphor. Sciences can be divided into the general and the specialized, the self-sufficient and the auxiliary, the theoretical and the applied. Economics, statistics, and mathematics are all examples of the first of each pair of dyads. They each have their own basic principle. Mathematical economics will lie at their intersection, or in a region just beyond each of their edges. This intersection will be dominated by the principles of economics, just as mathematical physics is dominated by the principles of physics. But then Nemchinov begins the dialectic. Such intersections are only “mechanical” at first, they soon develop their own unity, their own principle. Such regions of knowledge, he wrote, and he cannot but have had in mind many of those researches then flourishing under cybernetics, are in fact the major “growth points” of modern science. Mathematical economics is currently achieving its first unity. It just has no name, but is variously and tentatively called “econometric methods,” the “theory of planning calculations,” “Soviet econometrics,” etc. Nemchinov’s arguments walk a line between accepting a conciliatory rhetorical and epistemological subordination of mathematical economics to the political economy of socialism, and asserting its self-sufficiency as a new—and perhaps more advanced—form of economic theory. Across the ensuing decade, the tide of battle for jurisdiction between the mathematical economists and political economists could be
registered by the aggressiveness with which the mathematical economists would push the latter definition.

Institutionalization, 1961-1963

The organizational work after the conference proceeded quickly, while founding the institute remained frustratingly out of reach. A month and a half after the conference, in May 1960, Nemchinov founded the Scientific Council for the Application of Mathematical Methods and Computing Technology in Economic Research and Planning. The Scientific Council on the Complex Problem of Cybernetics added a Section of Economic Cybernetics, again directed by Nemchinov. And in November 1961, Nemchinov founded the Scientific Council on the Complex Problem of the Scientific Basis of Planning and Organizing Social Production. This council would provide an organizational armature that could encompass the numerically-interested planning economists, the new breed of mathematician-economists, and other assorted reformists. It initially coordinated or absorbed the work of four other scientific councils. In addition to 1) the council on the application of mathematical methods, it folded in the councils on 2) the effectiveness of capital investment, fixed assets, and new technology, 3) the problem of price-setting, 4) khozraschet and the material stimulation of production. Later it absorbed another four councils: 5) on the location of the productive forces, 6) on the economics, planning, and organization of industrial production, 7) on the perfecting of the methods and indicators of national economic planning, and 8) on the economic problems of the chemical industry. All of these would eventually be combined, in 1967, as the Scientific Council on the Complex Problem of Optimal Planning and Management.
of the National Economy. Of these, 2, 3, 4, and 7 were the key debates of 1950s reformism; 6 was Nemchinov’s jurisdiction at SOPS and reflected the work of LEMM; and 8 was the speciality of Nemchinov’s new ally, and pick to head the future institute, Nikolai P. Federenko. This council thus provides an organizational mirror of the merging of the localized problems of planning into a reformist economics, and of that reformist economics with mathematical economics.

In 1961 too Kantorovich and many of his students and colleagues moved to Novosibirsk, forming a division of mathematical economics in the new Institute of Mathematics of the Siberian Division of the Academy of Sciences, led by his old friend Sobolev. This institute as a whole was intensely involved in applied mathematical problems, and housed groups working on many areas of cybernetics, including computing and operations research. Kantorovich’s division there would do much of the most advanced theoretical work in mathematical economics. Back in Leningrad, the remaining mathematician-economists worked in the Computing Center of the Leningrad Division of the Institute of Mathematics, founded in 1959 on the basis of Kantorovich’s group working on bomb calculations. In 1966, it would become the Leningrad Division of CEMI.

Signals of political favor kept coming, too. In 1961, Keldysh claimed that there was “insufficient use of the achievements of mathematics and computing technology” in economics at the All-Union Conference of Scientific Workers at the Kremlin. Kosygin said similar things at other gatherings.

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Finally, in 1963, after much failed maneuvering, Nemchinov finally managed to found his institute. Several times Khrushchev’s interest had been aroused, and several times when he had turned away, the bureaucracy had not carried through. But then Nemchinov appealed to Glushkov for help. Glushkov, a far better politicker, managed to get the letter to Khrushchev about the widening gap in computer technology, the letter that led to the passage of the decree of 1963 mentioned in the last chapter, and finally CEMI was founded. CEMI gathered Nemchinov’s network of numerically-oriented and/or reform-mined economists into one place. It was based on LEMM (54 researchers), but also absorbed a group devoted to the study of the effectiveness of capital investment from the Institute of Economics (11 people), the Department of Transportation Cybernetics from the Institute of Complex Transportation Problems (16), Nemchinov’s former laboratory at SOPS, and the department of mathematical economics of the Computer Center of the Academy of Sciences. Rather than assume directorship himself, Nemchinov appointed Nikolai Fedorenko, a specialist in the chemical industry. Not a mathematical economist himself, he was an extremely adroit scientific political and institution builder. He would lead CEMI until 1985, during which time it grew rapidly. A decade later, it had nearly a thousand workers (including forty doctors and 170 kandidaty); by 1983 it would have 1100 employees (fifty doctors, 280 kandidaty), and be the largest social science institute in the Academy.

248 The story is told in detail in Sergei N. Khrushchev, Reformator. Trilogiia Ob Otse. Kniga 1 (Moscow: Vremia, 2010), on 949–953.
249 Fedorenko, Bspominaia Proshloe (ref. 90), 164.
INPUT-OUTPUT: THE CONSCIOUS SUPPORT OF PROPORTIONALITY

Input-output had an easy warrant in the political economy of socialism. Stalin’s had surprised the political economists by arguing that, contrary to the spirit of politekonomiia as it was then evolving, the laws of the socialist means of production are neither the actually existing policies of the Soviet state, nor laws that are always infallibly implemented. He warned “Do not mix up our yearly and five year plans with he objective economic law of planned, proportional development of the national economy,” which “give the possibility to our planning organs to correctly an social production. But possibility must not be confused with actuality.” Accordingly, the 1954 textbook codified this newly discovered “law of planned (proportional) development.” The crucial point is that, with this law, Stalin drove a wedge between his own actions or those of the state and reality. It was possible for planning to incorrect with respect to an objective law. And this law was one of mathematical relations holding within the structure of the social whole.

In the textbook definitions, the law seemed like two laws in one (and indeed there were debates as to whether the formula indicated two laws, or merely two aspects of one). The law of plannedness follows from social ownership of means of production. The proportionality of the plan, however, follows from the basic economic law of socialism, that society is organized towards the best fulfillment of the needs of the people. The textbook lists a series of proportions that must be correct: the proportions between producer goods and consumer goods industries, between industry and agriculture, and
among sectors themselves, such that bottlenecks, deficits, and gluts do not occur, and all
resources are used advantageously. In the literature in that stretches throughout the 1950s
and early 1960s, the two laws tend to be equated: planning is the knowing and
consciousness support of proportion. Its methods, the textbook states, are the existing
system of material balances, which draw up the input requirements for each commodity.
However, the material balances in fact could not assure proportionality, as was obvious to
any planner. No known method existed to establish proportionality. With the advent of
input-output modeling it was immediately understood that this method had been found;
reciprocally, proportionality would now have a new and much more precisely defined
content. But moreover, finally a mode of veridiction with respect to the productive forces
was installed that the politicians and planners ought to heed.

There are roughly two stages to Soviet work on IO. Starting in approximately
1957, five distinct groups of researchers began experimenting with their use. At the
Laboratory (and then Institute) of Electronic Control Machine (LUEM), Viktor Belkin
adapted the input-output model to the problem of price setting; at the new Laboratory of
Economic Mathematical Methods (LEMM), Vasily Nemchinov’s young researchers
experimented with interregional balances; and three interconnected groups at the
Scientific Research Economic Institute (NIEI) of Gosplan, the Main Computing Center
(GVTs) of Gosplan, and the Central Statistical Administration built models to construct
an integral vision of the economy and to plan it. Over the course of the 1960s, this
situation changed, stabilizing in the 1970s in two largely distinct research communities.

251 For a quick overview of Soviet input-output modeling, see Vladimir V. Kossov, “Vozrozhdenie
Mezhotraslevogo Balansa v SSSR,” Ekonomicheskaia Nauka Sovremennoi Rossii 2, no. 65 (2014):
103–10.
The first, largely deriving from NIEI Gosplan, though many of its members worked in their own division in CEMI, gave up on using IO for planning, but instead turned to forecasting. These were empirical economists, who had a pragmatic orientation to and understanding of planning, and a cold appraisal of the more utopian hopes pinned to mathematical technique. The second community embedded IO technology in the heart of complicated systems of optimizing models. They envisioned an ambitious new form of market socialism, in which market-like relations were parameterized in detail via an optimal planning.

An input-output model concretizes the long intuitive notion that the economy is a system of interdependence. But rather than viewing the economy as interdependent markets, as in a Walrasian general equilibrium model, however, it views the economy first of all as interdependent technological and productive processes. An input-output model is composed of production functions for goods, which can be thought of as recipes. To build a machine, for example, one needs so much of metal, so much of labor, and so much of power, in fixed quantities. Metal in turn has its own production function, and so on for every other good in the economy. The ratios of those fixed quantities to each other, i.e., the ratio by which inputs must be combined to get a unit of output, are the technological coefficients for each productive process. All of the production functions together can then be placed into a matrix, in which each row is the output of an industry, and each column is the inputs into an industry. The resulting matrix expresses the interdependence of production, the way that material or value flows through the economy.
from productive process to productive process, in ratios governed by the available technologies.

This idea is the heart of an input-output model, the interindustry matrix. A full model constructs a much larger table by supplementing the interindustry matrix (which becomes quadrant II of the full table) with three other matrices. To the right of the interindustry matrix is added the demands for final goods that are not inputs to any further productive processes (quadrant I). Summing up the row from the interindustry matrix and the final demand matrix together gives the total output or total demand for any good. Below the interindustry matrix is added a matrix for primary inputs (elements that enter into production as costs but are not themselves produced), like labor, taxes, and capital (quadrant III). And diagonally from the interindustry matrix, between final demand and primary inputs, is the transfers matrix, representing pure redistribution (quadrant IV). The full input-output model thus gives a synoptic overview of flows that makes sense to the eye: value flows from the bottom left, through the top left and bottom right, to the top right. While basic linear algebra combines or transforms the constituents of the matrix, the visual form itself offers displays possibilities of reasoning.

In the early years, input-output became integrated into the existing concerns of three groups of economists at the same time as it opened new horizons of research. The tool is flexible, and has been adapted to many uses. The qualities of the tool itself, in conjunction with those uses to which it has been put, shape the thinking of economists in accord with the particular way it frames the world.

1. LEUM: Prices of one level
In 1956 the cybernetician and pioneering computer engineer Isaak S. Bruk and the mathematician/programmer Aleksandr Kronrod were talking. Bruk said that he had tried to tell Gosplan chief Pervukhin that in the United States computers were being used in the economy, but had elicited no interest. He had also made a public lecture on the automation of planning. He wanted to hire economists into his Laboratory of Electronic Control Machines of the Energy Institute in order to help sell the planning establishment on the necessity of using computers for economic planning.

In 1957 he hired the young Vadim Belkin. Belkin recalls thinking that everyone in the theoretical section of the department, led by pioneering cybernetician and programmer Aleksandr L. Brudno, was a workaholic. They ran the computer in three shifts—its young workers joked that the laboratory’s acronym stood instead for the Laboratory of the Perfecting of Young Specialists. Though too young to have any first-hand knowledge of the planning efforts of the 1920s, Belkin had worked at the TsSU in the sector of the Balance of the National Economy under the statistician V.A. Sobol’, and he had learned of the 1923/4 balance that Stalin had called a “game with figures.” But LEUM was actively involved in assimilating foreign literature on the uses of computers. He came across the 1952 article by W. Duane Evans and Marvin Hoffenburg, which proposed using input-output models to describe the post-war conversion the U.S. economy to a civilian footing. The article contained a full input-output table compiled by the Bureau of Labor Statistics for the United States in 1947. Inspired by these two efforts, Belkin proposed planning not from the given resources, as was actual practice,

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but from final consumption on the basis of input-output tables. He took the coefficients from the 1947 table, no Soviet ones being available. Bruk sent Belkin’s proposal to Gosplan, where it met with merely polite interest. Belkin published his ideas in 1957, one of the first major proposals for using computers in planning.\footnote{Belkin, Viktor Danilovich. “O Primenenii Elektronnykh Vychislitelnykh Mash v Planirovaniy Statistike Narodnogo Khoziaistva.” \textit{Voprosy Ekonomiki} 12 (1957): 139–48.} He warned that the utility of these techniques were shown by U.S. wartime mobilization, and that the USSR thus assumed a geopolitical risk by ignoring them. By a slim margin, his was the first attempt to use input-output models in the Soviet Union.

Belkin tried to sell the method to develop mobilization plans for war. In 1959, through Aksel’ Berg and the deputy director of the institute, Golovchenko, a former colonel in Army’s Main Intelligence Directorate, a meeting was arranged with Marshall Zakharov at the General Staff. Belkin, chief constructor Mikhail A. Kartsev, and Brudno pitched the plan, but the marshall claimed to be uninterested because, as Belkin remembers it, the military had no need to economize, it got whatever it wanted from the planners.\footnote{They were disheartened, by the army had not been entirely deaf: Kartsev’s division was made secret, and in 1967 became the Institute for Computing Complexes, which developed supercomputers for realtime control.}

But in the course of his research on input-output, Belkin ran into the problem of prices, and to a less extent with the indicator system, problems that would plague all work on input-output modeling and give rise to minor literatures devoted to finding workable solutions. However, the pricing debates had started to generate some bureaucratic momentum, which provided Belkin with a forum. In 1959, the Presidium of the Academy of Sciences founded a Commission for the Calculation of Value in the
Socialist Economy. Nemchinov was appointed chairman, and the commission included veterans of all the major debates of the 1950s, including representatives from all three schools of reformist pricing, and all three of the rising leaders of mathematical economics. Many in the commission wanted to work out these prices as a purely parallel system just for economic measurement, but others like Malyshev and Sobol’ from TsU, the latter of whom had been a regular participant at the seminars at IEUM, wanted a radical revision of existing prices.

In 1960, IEUM was transferred from the Academy of Sciences to the newly formed Gosekonomsovet. Leonid Vaag, whom Belkin knew as the dean of the evening faculty at the Energetics Institute, had been appointed director of the Department of Economic Effectiveness of Gosekonomsovet in 1959. This institution for a brief period was nexus for collaboration of reformist economists. It was an intermediate result of a period of continual administrative reorganizations of the central planning apparatus that stretched from 1955 to 1966. By the end of these reorganizations Gosplan acquired the central role and great power that it would continue to exercise until perestroika.

In 1955 Gosplan was split in three in accord with many economists’ complaints that the exigencies of short-term planning had rendered inoperable the strategic five year plan—a recognition that planning had long since given way to management. This argument was strengthened by the new discussions about enterprise autonomy. Long-term planning, it was argued, should be strengthened and divorced from short-term operative planning, which should be become more streamlined as rights were devolved to

255 Its membership was: S.G. Strumilin, V.P. Dyachenko, L. V. Kantorovich, N.N. Nekrasov, V.N. Starovskii, M.A. Styrikovich, T.S. Khachaturov, Z.F. Chukhanov, I.S. Malyshev, V.V. Novozhilov, and V.D. Belkin.
the enterprises. The first function became that of Gosplan proper, and the second of Gosekonomkomissiia, while the planning of the supply chain in detail was devolved to a new agency, Gosnab. Two years later, as part of Khrushchev’s sovnarkhoz reform, they were all combined again. The re-organization of the management of the productive forces on a regional level caused coordination issues, and the powers of Gosplan were continually augmented to try to fix them. A year later the pendulum swung back, with the long-range planning invested in a newly formed Gosekonomsovet. (It was destined to be short-lived, dissolved in 1962.) Its director was the powerful engineer-bureaucrat Aleksandr F. Zasiad’ko, the deputy chairman of the Council of Ministers, who was then close to Khrushchev and an ally of his in the bureaucratic battles for economic reforms.

In July of 1960, the Central Committee instructed Gosekonomsovet to work out a methodology for wholesale prices, and at a conference October that covered the range of 1950s economics—price formation, effectiveness of investment, and profitability—a commission for developing that methodology was founded, in parallel to and overlapping the committee under the Academy of Sciences. Zasiad’ko chaired the committee, and it had three working groups for each theory of price setting. At the time, the Institute for Electronic Control Machines had the only computer under nominally civilian jurisdiction, the M-2. Belkin proposed using the M-2 to calculate the effects of the three alternative pricing formulas using input-output models, the first such use of computer modeling as

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an ally in economic argumentation. IEUM was finally instructed to make calculations for prices according to each conception, and the TsSU provided data. IEUM calculated a 25 sector input-output model and was able to report to Zasiad’ko in January of 1961 that it would be possible to unify the price levels of producer and consumer goods without a politically impossible and economically disastrous increase in consumer goods prices, as naysayers had warned would be inevitable. The commission ordered more detailed calculations. Bruno and Kronrod programmed the models, the TsSU provided the data tables, and IEUM and ITEF performed the calculations, generating indexes for transforming prices on the basis of 72 and 83 sector models. It is important to understand what had happened by this point. While the problem of price reform had arisen in pre-mathematical discussions, for Belkin, the question was not so much which pricing formula was to be used, as working out a rational structure—“prices of one level” he called it—that would enable the input-output technology to smoothly function and generate a coherent picture of the flow of value and product through the economy. It was as a corollary to this problem did Belkin support the pricing formula that included the costs of capital.

In the 1970s, Belkin would continue to work on this topic, developing what he called a dynamic “income-product” model, an attempt to link the physical and value representations of the Soviet economy. He constructed an exogenous matrix of coefficients expressing the value-added structure of production in order to sum up

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sectoral income. From this, he was able to construct constant “equilibrium” prices that preserved an average level of consumer prices.\(^{258}\)

2. LEMM: The region as laboratory

The first task that Nemchinov gave to LEMM in the early days was to master input-output modeling. They knew that trying to take on the USSR was too much, but Khrushchev’s 1957 reorganization of the planning apparatus from a sectoral to a territorial basis gave an approach. The new territorial management bodies, the Sovnarkhozes, were supposed to coordinate the different sorts of production in their region. For this, they lacked tools, which Nemchinov aimed to provide. The Laboratory tried to begin with a table for Novosibirsk Oblast. They had to disentangle from plant-level data which materials were produced in the oblast and which came from elsewhere, which led them to plunge into railway bills of lading. They were eventually frustrated. Then in 1958 they successfully constructed a model based on the anonymous republic of Mordovia. They bypassed the existing statistical data, the many difficulties of which are explored below. Enterprise accounts did not contain the necessary data, so they tried to use the tekhpromfinplans. “We had to go converse with the enterprises, sit in the bookkeeper’s office and copy down figures from the yearly accounts into the tables by hand. It was a wonderful school for rough work with figures and sources. Input-output was a wonderful finishing school,” Kossov said, recalling his work on Mordovia.

Moldavia was the first success, and it was quickly followed by Tatarstan and

Kaliningrad, before tacking the three Baltic republics in 1961, and finally for the republic of Belorus in 1962. In 1962, this experience led to the first two Soviet books on IO (one by Dadaian and Kossov, and another by Cherniak).

These problems with enterprise data led Cherniak and Modin to the idea of reorganizing the entire accounting and planning information system from the ground up to make it easily aggregable into input-out tables, starting from “matrix tekhpromfinplans,” a form of intra-enterprise input-output model. This became Modin’s personal hobbyhorse, and subsequently would be a direction of research of CEMI.

Slightly later, as cybernetically-inspired automated management systems became the rage, Modin would push his matrix enterprise planning as its basic data format.

Interregional input-output research became a major industry of its own, even though Nemchinov’s group more or less ceased to pursue it after the end of the territorial planning system and the reformation of the sectoral ministries in 1965. The ostensible goal of all this work was to plan the spatial distribution of industrial development. The various republican planning organs did much of the practical work; the major scientific work was at the Institute for the Economics and Organization of Industrial Production (IEOPP) in Novosibirsk, founded in 1957, and, in a new mathematical re-casting of its foundational function, at SOPS, which formed two competing schools. All of this work had to overcome significant methodological problems caused by the subordination of different enterprises to different levels of jurisdiction: all-Union, republican, or lower. The difficulties of actually implementing interregional input-output in practice were not just methodological, but, after the 1965 reforms, also based in a persistent conflict of
Soviet institutional politics: the familiar conflict resumed between weak territorially-organized state governance structures and powerful sectorally-organized industrial ministries.

As LEMM was transformed into CEMI, interest in input-output faded out. More and more efforts were directed to optimizing models at all levels, from enterprise to national economy. The flagship projects of CEMI became enormous multi-stage complexes of models, including input-output models, but operating according to a logic of optimization.

3. NIEI Gosplan: The Soviet economy becomes a sociotechnical object

At the same time, the TsSU and the newly organized Scientific Research Economic Institute of Gosplan (NIEI Gosplan, 1955) were both beginning to take interest in input-output. Industrialization in the 1930s and then wartime management had had limited numbers of high priority goals to achieve, and short-term management had essentially involved shuffling resources to those sectors or enterprises that had become bottlenecks to achieving those goals from those the production of which was relatively lower in priority. But in the post-war period, the situation changed. First, and closely related to the birth of the new Cold War military technologies, the technological chains were becoming ever more complex and difficult to strictly prioritize. Second, Khrushchev’s policies mitigated the Stalinist suppression or absolute de-prioritization of

the consumption goods industries. Khrushchev oversaw a rapid rise in living standards, both out of sincere conviction that the Soviet people deserved it, but also as a way to induce the increases in the productivity of labor required now that the massive inflow of ex-peasants to manufacturing was beginning to slow. Input-output answered to this problem of planning a massively more complex production problem, one that could not be cleanly segmented into priority and non-priority production.

From 1951 onward, Gosplan experimentally had tried to do forward-looking balances, but it had had no effective overall balance sheet of productive flows and forces. Its primary tool was the material balance, which tried to estimate the amount of inputs based on coefficients (*normativy*) required for the output of each of the most important products in physical units, showing beginning stocks, levels of production, main deliveries, imports and exports, and inventory. Making these balances cohere was a laboriously exercised art or knack, not a science. Worse, there were no means to be sure of even approximate internal consistency among all the balances. This problem was exacerbated by a tendential increase in the number of centrally-planned products, reaching approximately 18,000 by 1962. By the middle of the 1960s, Gosplan prepared balances for approximately 1,200 key products, each of which required tens of thousands of inputs. An additional 18,000–20,000 balances were prepared by the Sovnarkhoz of the USSR and other republican organizations. There were major discrepancies and non-overlaps in the description of products. All the planners could do was balance some of the major elements, and make rough second order adjustments to account for them. The best
they could manage was to build in reserves of about 5% to reduce the deleterious effects of the crudeness of their methods.260

The director of NIEI Gosplan, Anatolii N. Efimov became early enamored with input-output. He managed to make a quick pitch to the Council of Ministers in 1957, for which his institute and TsSU were rewarded with an instruction to work on an accounting balance.261 NEIE Gosplan constructed seven pilot tables (12, 15, 17, and 24 sectors in physical units, and 16 and 44 in value units), but serious work began in earnest only when Efimov hired Lev Ya. Berri, who had been languishing in Lviv has a result of the anti-Semitic “anti-cosmopolitan” campaign. They experimented with estimated Soviet coefficients as well as published Japanese and American data. Coefficients can be derived econometrically from a completed table, or they can be constructed from engineering data, and the latter approach was preferred in the USSR. Over the next decade, NIEI Gosplan would come to be the key agency gathering data to construct the technical coefficients for input-output work, working with (or working on) the many hundreds of applied industrial research and design institutes. Over the next decade, the IO method would become the primary instrument of research at NIEI Gosplan, employed in a variety of directions. In 1958, TsU published a translation of Leontiev’s work, and in a coordinated legitimating push it immediately received three positive reviews.262 In 1959,

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Gosplan received a (Main) Computer Center (GTs), which also immediately began work on input-output, preparing the primary planning tables in physical units, and performing calculations.\textsuperscript{263}

In 1960, Moisei R. Eidelman of TsSU made public the combined TsSU/NIEI Gosplan work on the first relatively disaggregated \textit{ex post} table for the USSR for 1959. The table was completed in 1961, though kept secret until 2008. The 1961 balance had 83 sectors in its value version (in purchaser’s prices), and 157 in the physical unit version. The existing data were not good enough, so they launched a major survey for the 73 industrial sectors and the construction sector, which sampled 20\% of all industrial and construction enterprises, or approximately 11,000 enterprises (This was part of the rebirth of Soviet work on the statistics of sampling that had been wiped out. Most Soviet statistics were based on complete censuses.) Data for agriculture and services, as well as national income data, came from census records and the income accounts. This was the first time since the first five year plan that the Soviet Union produced a synoptic knowledge about itself as a productive totality.

Input-output seems at first a relatively simple technology: insert the relevant statistical data into the table, and some simple linear algebra shows their relations. Accordingly, it appears to be an easy fit into the existing institutional structure. In fact, implementing input-output began to force into view as problems many aspects of that structure.

Some of these had already been recognized in early debates, but here they were recast. A first problem was that the gross output indicator of enterprise performance includes the value of intermediate products. This had already been recognized as a problem, for reasons already discussed, but it became acute with a method meant to track the flow of value stage by stage. Several of the proposed improved indicators, like commodified or realized output, would have had the same problem. Second, in the Soviet economy, goods had different prices at different steps in the chain of production, or depending on what sort of consumer they were destined for. This considerably complicated the building of an input-output table. This was not quite the same problem that other economist and engineers had encountered in the course of the debates across the 1950s. Here the problem of pricing appeared in achieving a consistent synoptic view of the economy, rather than in the problem of rendering different variants commensurable for the planner’s choice, or of creating good incentive structures for the enterprise’s choice.264

In the context of an input-output table, the problem appeared at first as to whether prices should be producer’s prices or final purchaser’s prices. An analytical or ex post table, meant to explore the past of the Soviet economy, was much easier to construct in purchaser’s prices, because that was how the data was available. Consumption was valued in purchaser’s prices, which argued for working out the whole table in purchaser’s prices. But they were sometimes highly differentiated by the category of purchaser, so the same product could have different prices in different places in the table. When working

264 A NIEI Gosplan group used the 1961 balance to calculate prices of a uniform level and then measure the divergence of existing prices from that level. The dispiriting results contributed (though without that much effect) to the ongoing revision of wholesale prices.
out the table in value, rather than physical terms, turnover taxes also highly distorted the final picture of where value is being created, by increasing the relative output of light industry with respect to that of heavy industry. Adding to these considerations, when making a planning table by which to extrapolate the future, the productive capacities of the intermediary industries were key, and therefore producer’s prices were more relevant. But getting producer’s prices was all but impossible. A table could be constructed in physical terms, but these had other problems. They did not provide a total picture of all production, they did not link up with the national income accounts, and worst of all they encountered the diversity of classification systems of goods maintained by the variety of different planning and distribution organs.

Despite these problems, a group at NIEI led by Feliks N. Klotsvog constructed the first planning tables in 1962, with 83 sectors in purchaser’s prices. At the same time, GVTs Gosplan, under Kovalev, constructed a 346 sector physical table. By 1964–5, this model had grown to 438 sectors. These models were not decisive. They did not immediately induce a wholesale change in Gosplan’s practice. In fact, their proponents have felt them to be mostly unused. But they were not completely ignored. First, they entered into the internal debates within Gosplan, the informal bargaining processes by which resources were actually allocated, as allies to be recruited into different coalitions. The planoviki of Gosplan had to learn to live in a world where young mathematicians would regularly confront their arguments for one or another allocation of resources with the results of a computation, would claim to speak an objective truth about the
possibilities of the productive forces of the Soviet Union despite their lack of experience in industry, of Party membership, of seniority or rank in the planning apparatus.

Second, their numbers could, when convenient, serve Gosplan in its bureaucratic battles with other state organs. Kossov remembers that,

“For instance, [Gosplan Chairman] Nikolai Konstantinovich [Baibakov] would come back from the Politburo—a standard situation—and he would ask me,
‘What do you think in this case would be the growth rate of the national economy?’ I wouldn’t know this number. I would give a guess based on my intuition but I didn’t know. And then at night I would go to the computer, to the mainframes, and run the computation on the input-output model. Yakov Urinson was working on the dynamic model. My wife would prepare two thermoses and some sandwiches. At three in the morning I’d take a smoke break and call Baibakov and confirm the figures. The model computed eighteen sectors over five years, but you could run it up to fifteen years no problem. We would determine the growth rates of each sector, what capital investments were required for each. Then we would take those computed volumes of production, and feed them back into the physical-term balance, to get the outputs according to the nomenclature, the ferrous metals, non-ferrous metals, fertilizer, etc.”

While mostly excluded from the planning process, the modelers increasingly turned to dynamic models that could generate variations on the future. In the hands of Anchishkin, Yaremenko, Ershov and their collaborators, input-output models changed from description and prescription to prediction. This was perhaps the greatest
effect of input-output modeling. It crowded the present with visions of the future, and the future was not shining.

4. Scientific and Technical Progress

After Prague Spring, the Party’s appetite for reformist thinking quickly disappeared, and the Gosplan input-output modelers found themselves under attack, or ignored at best. Many of the greatest theoreticians of NIEI Gosplan therefore gradually transferred to CEMI, where they were given their own department: Stanislav Shatalin and Nikolai Petrakov in 1965, and then the forecasters Aleksandr Anchishkin in 1971 and Emil Ershov and Yurii Yaremenko in 1973. At CEMI, they became involved in a crucially important but as yet unstudied project, the Complex Program on Scientific and Technical Progress (KP NTP).

In the 1960s, interest in forecasting was wide and growing, not only among economists. In 1960, Khrushchev had called for longterm forecasts, and in 1965, Kosygin had reinforced their importance. This was of a piece with the wave of interest in futurology both in the West and in the Eastern bloc countries. In 1967, the Academy, Gosplan, and the State Committee on Science and Technology (GKNT) adopted a joint plan for the coordination of work on forecasting the effects of scientific and technology progress (NKTP), which led to an explosion of organizational work, including the founding of a variety of scientific councils, institute sections, and symposia. In 1967 A.M. Rumiantsev, an economist closely associated with the CEMI reformists, pioneering sociologist, and ideological player who edited several important publications (including *Pravda* and *Kommunist*), became Vice President of the Academy and supported all this
work. The cyberneticians attached to GKNT and associated with Glushkov, the CEMI economists, the NIEI Gosplan input-output modelers, the economic sociologists all became involved.265

Already in 1967, Boris Mikhailevskii, a more or less self-taught economist who was among the early recruits to LEMM, had worked out a long-term forecast for the Soviet Union. His methods and models were idiosyncratic. He developed his own data sets based on close study of engineering and trade journals, and personal investigation, by foot and subway, of prices. As the legend related to my by Emil Ershov has it, his forecast predicted a long slow decline of industrial production, and Keldysh and Fedorenko burned all copies of it were burned on the steps of the Presidium of the Academy of Sciences. In 1970–71, Ershov and Anchishkin made a similar though less comprehensive forecast, foreseeing growth rates in the range of 4.2% and in the future falling to 2.7%, rather than the expected 6.2%, for which they were sharply rebuked, contributing to their exit from NIEI Gosplan.

A crackdown began in 1971 that killed the momentum, curbed the ambitions of futurologists to be involved in all aspects of planning and politics, and seriously set back the consolidation of Soviet sociology. But it far from ended forecasting work. In 1972, the Complex Program on Scientific and Technical Progress was founded to ameliorate the perceived widening of the gap in invention and implementation of technology with the capitalist West, and the resulting failure of the economy to realize productivity gains required to maintain a high rate of growth. This massive effort was the combined work of

the Academy and GKNT, to take in both applied and fundamental science. The Scientific Council of the KP NTP was chaired by Vladimir A. Kotel’nikov, a Vice President of the Academy and electronics and radio scientist who held a wide array of important positions in the institutions, both military and civilian, of that new sector. Fedorenko and Anchishkin both sat on the Council. Sections were established for every branch of science, each headed by a prominent scientist. Fedorenko, in his capacity of chairman of the Department of Economics of the Academy, arranged to have a young economist from CEMI present on most of those sections, often serving as secretary. Each branch of science and engineering was responsible for generating its own inventory and forecast, which amounted to many thousands of pages. It was the job of Anchishkin’s team to synthesize this enormous mountain of data into a model that could predict growth rates. Four such enormous twenty year forecasts were made, in 1973, 1978, 1983, and 1988.

If work on the “economic mechanism” was a theorization of the management, and more broadly institutional, preconditions for an increase in productivity, the focus of the Gosplaners were the technological conditions of growth. In the course of this work, Yaremenko, with assistance from Ershov, developed a new kind of input-output model, the “model of intersectoral interactions” (model mezhostraslevikh vzaimodestvii), that enabled him to depict the changing structure of the national economy. Like

266 Almost nothing has been written about KP NTP, but a useful source is the memoir, Vladimir K. Fal’tsman, Rossiiskie Nauchnye Shkoly v 60–80-E Gody (Moscow: Delo, 1995), 46-91.
267 Yurii V. Yaremenko, Strukturnye Izmeneniia v Sotsialisticheskoi Ekonomike (Moscow: Mysl’, 1981). This book was originally entitled The Multilevel Economy, but the editor required him to change the name, and cut it by two thirds. Yaremenko hated the resulting book. Parts of his original conception have been restored in the three volume selected works published in the 1990s. The only English
Mikhailevskii, Yaremenko has an endless appetite for institutional and statistical fact, and spent all his spare time in the Lenin Library reading technical journals. The detailed knowledge of Soviet institutions underlay the algebraic and statistical generality of his modeling work. In his model, the flows between each pair of sectors did not just depend on the technological coefficients that transform inputs into outputs. The flows also depended on three other quantities, the influence of each of which is econometrically estimated in reduced form: the level of production in the input sector, the level of consumption in the output sector, and sometimes side flows between either the input or output sector and some third sector. The side flows, the third factor, are a way to measure substitution effects. For instance, the flow from electricity to metallurgy enters into the equation expressing the flow from coal to metallurgy, because electricity and coal can substitute for each other as power sources. Or the flows from natural fibers to textiles depend in part on the flows from the chemical industry to textiles. But the first two factors are at the heart of his model, because they enabled Yaremenko to determine the relative administrative priority of sectors. The flow of electrical energy to light metallurgy, for example, is determined more by the demand from light metallurgy than the supply of electrical energy. Light metallurgy thus has a high priority for any available supplies of electrical energy.

By discovering these asymmetric priorities, Yaremenko discovered the structure of political priority that governed resource distribution. He discovered it as an absence: he can offer, within the confines of the input-output model, no theory of how these

politico-administrative priorities function or why they are as they are. All he can do is show that they exist. But underlying his work was a vision that he could not express in writing at that time, but spread orally. The priority structure of the productive forces of the Soviet Union, he was able to indicate without saying, had become increasingly distorted by the overwhelming weight of the military industrial complex. It sucked up what he called the “quality resources,” forcing their substitution in the civilian economy by larger quantities of “mass resources.” Precision instruments, electronics, advanced alloys and materials—these were all destined for non-productive uses. This diversion of quality resources slowed the rate of productivity growth in the civilian economy and thus dragged down the overall growth rate of the Soviet Union. Gradually it also led to a deepening heterogeneity of technological level of the economy.

In contrast, as he saw it, to Western economies, where competition and technological advance together eliminate antiquated forms of production, in the Soviet Union, multiple epochs of industrial ensembles were forced into anachronistic co-existence. The imbalances were compensated for by the exploitation of natural resources, of the natural environment, and by reducing consumer goods… the lack of which were compensated for by enormous quantities of alcohol. The low technological level of the large lagging sectors required only unskilled labor, could offer only low rewards to that labor, and thus necessitated coercion. Ultimately, he saw the Cold War as meaning for the USSR the same thing a hot war would have meant: when a country is losing a war, it begins to destructively and inefficiently consume its resources and its ability to reproduce those resources—including its human resources—in the hope of turning the tide. He saw
no hope for either socialism—and he was a committed socialist—nor marketizing reforms until the structure was demilitarized and the resources reinvested into consumer goods industries. And this reorientation, he believed, would require a recentralization of the economy. The runaway process of technological heterogenization was exacerbated by the disintegration of central control over the ministries in the wake of the 1965 reforms, each of which, competing for qualitative resources and unable to stop doing so, was subsequently launched onto an uncontrolled growth path. Only recentralization would allow a reorientation.

NOVOZHILOV: THE TRANSHISTORICAL MAXIMIZATION OF FREEDOM

The work of Viktor V. Novozhilov provides another kind of bridge between the reformism of the 1950s and Soviet mathematical economics. Though it contributed directly to the capital efficiency debate, it was far more sophisticated and had wide-ranging ramifications that took many years to be fully grasped. Novozhilov constructs a coherent marginalist Marxism. His vigorous objections to Western readings that took his Marxism for no more than an ideological safeguard must be taken seriously. His system is ultimately optimization-driven, and thus provided a bridge to Kantorovich’s work. Conversely, his more deeply worked out political-economic propositions provided the interpretive ground for much of Kantorovich’s work. Because of their shared optimization framework, they tend to be lumped together, but their students have distinctly different nuances and flavors to their work. Novozhilov saw the approached the problem of economics through the problem of how to measure economic effectiveness of
investment. This focus, and his unique and sincere version of Marxism, would animate a
generation of students.

Novozhilov almost uniquely was exposed to both the tradition of economic
statistics and that of engineering economics, and his work marries their respective
cconcerns with price formation and capital accounting. Educated in the juridical faculty of
Kiev University before the war, he moved to Petrograd in 1922 to take up a teaching
position in economics at the Leningrad Polytechnical Institute. He would continue to
teach there until at least 1951. Simultaneously, he worked in the statistical bureau of the
administration of the Nikolaevskii Railroad. In 1924 while continuing to teach, he held a
research position in the Leningrad division of the Institute of Economic Research of
Narkomfin. There he contributed to a wide range of important problems of the 1920s,
including external trade, price-setting, finance, and monetary economics and inflation. In
1926, his classic article "Goods famine" analyzed the disproportion between supply and
demand of industrial goods caused by state pricing policies. He was in conversation with
international research on business cycles (he commanded French, German and English),
and two of his essays on monetary theory won prizes in international competitions
organized in the United States. Novozhilov and the Institute of Economic Research
itself were subjected to sharp criticism, and in 1927 the Institute was dissolved. During
the next decade he published nothing but performed contract work for a variety of design

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bureaus, including especially for metallurgical complexes and hydroelectric projects.

From 1929 he began an intensive study in the economics of industry, and particularly the theory of investment, which was to form the heart of his mature work. From 1938 he led the kafedra of the economics of industry at the Polytechnical Institute, from 1944 leading the kafedra of statistics as well, and from 1951 to 1966 he would lead the kafedra of statistics at the Leningrad Engineering-Economic Institute, one of three engineering-economic institutes (the other two were in Moscow and Kharkov) formed in 1930 that trained the planners, industrial accountants, and financial specialists required for industrialization.269

Beginning in 1939, he published a series of papers that developed a new approach to the capital problem, culminating in his work of 1959.270 During 1943, while evacuated to Tashkent, he undertook a detailed study of the problems of the hydroelectrical industry on contract for the All-Union NII Hydrotechnology, including summaries of the 1927–1931 and 1937–1939 discussions on capital investment, producing an unpublished draft *Methodology for determining the economic effectiveness of hydrostation designs.*271 But while he began from the capital problem, he developed a vision of rational socialist allocation of all resources. His mathematical economics was founded on a marginalist

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269 A further connection to engineering was through his brother, Valentin, a physicist (more precisely a mechanic) who was to make important contributions to the theory of elasticity.


labor theory of value, and while unorthodox it was explicitly and sincerely Marxian.

Novozhilov’s rigorously worked out system began from the proposition that labor is the only real cost, and accordingly that which must be minimized. Every other scarce factor is a condition for the application of labor that increases its productivity—this includes capital, means of production, non-renewable resources, as well as anything like location that could yield an economic rent. For Novozhilov, the special status of labor divides Marxian from non-Marxian theory; treating it as merely another factor of production is a gross symptom of the way labor is viewed by the ruling classes of capitalist society.

Labor’s exceptionality is founded on both its subjective disutility, and that without labor the scarcity of other means of production is meaningless, but not vice versa. It is on the basis of this reasoning that Novozhilov vociferously rejected the suggestion common in Western assessments that he had not a labor theory of value, but merely a labor numéraire. Capital and means of production he treats in normal Marxian fashion as past embodied labor. Embodied labor must be used efficiency, but only because it enables economizing on live labor. That is, if we use our tools most efficiently, we can work less. Since at the start of a planning period past labor is already embodied in whatever quantity and cannot be changed, minimizing total labor in the economy means minimizing live labor. Novozhilov refers to Marx’s declaration that freedom from work is real freedom, and minimizing the working day its prerequisite. This, Novozhilov avers, is a general law of all economic systems, holding as much under socialism as under capitalism.

Hence Novozhilov reintroduces a notion of scarcity into Soviet economics. Everything is scarce unless it is useless, but that does not mean that scarce things produce
value, nor that scarcity is a cost. Only labor is a true cost. However, while using scarce
resources enables increasing the productivity of labor, lowering the per-unit expenditure
of labor and thus quantity of value transferred to the product, this resource becomes
unavailable elsewhere, lowering productivity there and hence increasing the amount of
value created. There is a trade off. Labor saved in one place is increased in another,
possibly by even more. What matters, then, is the ratio of this trade off. This is a
reconstruction of the concept of the opportunity cost of the choice of production
technology not in terms of output sacrificed, but labor costs incurred. His phrase for these
costs has been translated as “inversely related costs,” but a more literal translation of the
Russian is “feedback cost,” betraying that he was already thinking about the productive
power of the nation as a system. To globally minimize labor, not just minimize labor on
any one project, those feedback costs need to be taken into account. If these costs can be
included in the costs of products or used to allocate embodied label, then the local labor
cost minimization for any one project will coincide with a global labor minimization.

Novozhilov takes the final bill of goods as fixed, eliminating the problem of
maximizing output or utility, and therefore of imputing the process of intermediate goods
from the value of final goods. This he justifies by arguing, in good Soviet spirit, that the
alternative plans of final goods are not commensurable because they have different non-
economic effects. Choosing the objective of the economy is itself not an economic task.
The inputs however, expressed in terms of labor-time units, are commensurable, and
therefore minimizable. For the simplest case of allocating one scarce resource among
many goods, Novozhilov’s procedure begins by determining the coefficient of
effectiveness for each final product as the ratio between the labor saved by using that scarce resource in the production of a unit of that product and the number of units of the scarce resource used up. These coefficients of effectiveness are then ranked by descending magnitude. The available scarce resource is then allocated to creation of each product by that descending order of coefficients until the supply is exhausted. That largest coefficient of effectiveness for a product which does not receive any of the scarce good represents a dividing line, and is called the normative of imputed costs or the maximum effectiveness coefficient. Every use with a greater coefficient is more effective than even the most effective of all rejected uses. From one side the one, the normatives represent maximum savings of labor that could have been obtained by using the scarce resources in the rejected uses, and from the other the maximum amount of additional labor costs incurred by spending those resources on the accepted uses. The imputed cost of a resource is thus the quantity of that resource used in a production process to create a unit of output multiplied by the normative. The total differential cost of the output is the sum of the imputed cost and the live labor expended. At a stroke Novozhilov is able to reconstitute many of the most important concepts of marginal utility-based economics on a labor-value-theoretic foundation: this differential cost reflects scarcity of goods when supply and demand (albeit planner’s demand, not consumer’s demand) are at equilibrium, and minimizes the total labor expended in the economy, maximizing freedom.

Because the normative of imputed costs are conceived of as parameters that planners give to enterprises and design bureaus, Novozhilov has to devise methods to find them. In the theory of general competitive equilibrium, mathematical procedures for
approaching equilibrium have only an illustrative or mathematical value. Thus, in Walras’ version, he famously describes a process of *tâtonnement*: the economy acts as though an imaginary auctioneer called out prices until those prices were found at which bid-makers and bid-takers, i.e., supply and demand, balanced. The real process of convergence is in fact the ordinary business of economic life. Novozhilov’s first process for determination of the normative of imputed costs is actually a close cousin to *tâtonnement* (and Holubnychy avers that Novozhilov would certainly have been familiar with Walras’ idea, if not having read it in the original than through Pareto’s discussion). Take some hypothetical normative, and iteratively adjust it upward or downward until it brings the supply of a scarce resource into equilibrium with demand, raising the normative if demand exceeds supply, and lowering it in the opposite case. For the general case of multiple products and multiple scarce resources, in his 1946 article Novozhilov proposes using the Lagrange method. Equations can be written that express that labor costs must be minimized under the condition that all scarce resources are fully used. The solution of this system of equations yields the Lagrange multipliers, which correspond to the optimal vector of normatives. Novozhilov was thus the third person to use the Lagrange solution, after Harold Hotelling (1934) and Maurice Allais (1943), but before Paul Samuelson (1947). However, the Lagrange method could not be used in planning, so Novozhilov turned to Kantorovich’s linear programming. At the time, it was not yet clear that Lagrange multipliers are the same thing as the shadow prices of the dual function in linear programming. And Novozhilov had been collaborating with Kantorovich since
1939 and was fully appraised of his work in linear programming. His 1959 publication would show that Kantorovich’s method subsumed the Lagrangian method.

LINEAR PROGRAMMING AND OPTIMAL PLANNING

Kantorovich Solves the Plywood Problem: The Invention of Linear Programming

In the beginning of 1938, the young mathematician Leonid Kantorovich was consulting for a plywood trust. Despite the important results in pure mathematics that he had already achieved, he was accustomed to practical work, having initially worked in a construction institute, an institute of the transportation industry, and consulted for the Central Aerohydrodynamic Institute. The task of the laboratory of the plywood trust was to maximize the output of the plant’s machinery. There were eight peeling machines, which could be applied to five different sorts of wood, with respect to which they each had different levels of productivity. The output had to have certain proportions among the five different sorts of wood. The question then was how to optimally allocate woods across machines so as to maximize the output in the given assortment. Kantorovich was initially frustrated, but persevered because he quickly understood that it was a representative of a conceptually quite broad class of problems: extremal problems with multiple linear constraints. He toyed with several geometric means of solution, which he dismissed as insufficiently algorithmic. Already at this time Kantorovich was an expert in methods of numerical approximation and the use of the existing analog computing and tabulating machinery, and he thought in those terms. Then at the end of 1938, Kantorovich devised a method that would, he estimated, have raised the output of the
plywood trust by about 5%, which he called the method of solving multipliers (razreshaiushchie mnozhiteli). His method, which would come to be called linear programming, revolutionized economics. Over the next two decades, Kantorovich would repeatedly try to interest politicians and planners in his work and be rewarded with only disinterest or chilling hostility. But when it was finally made public and absorbed it gave rise to a new understanding of socialism, called optimal planning.

“We Will Give to the Front New Means for the Struggle with the Hated Enemy”: An Untimely Method

Kantorovich saw wide vistas of application for his method. In his very first triumphal oral presentation of it at Leningrad State University (LGU) in 1939, to which he invited industrial engineers in the hope that they would give him ideas for application, he discussed only what were called “techno-economic problems.” The early reactions to his work were contradictory, bearing witness to its originality, to the lack of prepared positions and competencies for judging it. Following this presentation, he wrote his famous article, which was printed as a brochure in 1000 copies, with examples sent to all of the leading newspapers, both economics and industrial journals and economics and

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272 This section title is taken from an article “Military Engineer of the Third Rank Kantorovich” wrote for the Higher Military Engineering-Technical School at which he worked in 1942, urging greater attention to the immediate applicability of research (though not discussing his own work).

273 He listed a variety of subtypes of problems of optimal employment of machinery (including that inspired by the original plywood problem), minimizing scrap materials, optimal distribution of basic inputs like fuel among activities, determining those variants of construction projects that would use the least construction materials, the distribution of types of crops across land with varying fertility, and the optimal use of methods of transportation (250-1). (The next two problems to which he would attempt application would be the optimal use of a transportation system (the so-called “transport task”) with M.K. Gavurin, and optimal cutting patterns with V.A. Zalgaller, from 1948.) Leonid V. Kantorovich, “O Nekotorykh Matematicheskikh Problemakh Ekonomiki Promyshlennosti, Sel’skogo Khoziaistva I Transporta (Reziume Doklada),” in Leonid Vitalevich Kantorovich: Chelovek I Uchenii (Vol. 1), ed. V.L. Kantorovich, S.S. Kutateladze, and Y.I. Fet (Novosibirsk: Izdatel’stvо CO RAN, 2002), 250–53
industrial research institutes, the industrial ministries, and the highest government bodies.\textsuperscript{274} He received positive reviews only from the Commissariat of Roads and Communication and the journal \textit{Forestry}. That same spring, at presentations at the Polytechnic Institute and House of Scientists he met for the first time ideologically-grounded negative reactions to his ideas, but apparently thought these surmountable. He published a mathematical presentation in 1940 as a contribution to functional analysis, but afraid of foreigners enjoying the advantages of his discovery, he purged it of all hints of practicability and it went unnoticed.\textsuperscript{275} A presentation of it to the Mathematics Institute helped buttress the case for the opening of the Leningrad Division of the Institute (LOMI) in 1940, where Kantorovich would gather students for the next decade and conduct his early experiments. That summer of 1940 Kantorovich had his fateful meeting with Novozhilov, who took immediate interest in his work. They taught a summer course together at the Polytechnic Institute, beginning what would be many years of fruitful collaboration.\textsuperscript{276} It is likely that this acquaintance with Novozhilov that stimulated Kantorovich to apply linear programming at the national scale, as optimal planning.

His work over the next few years were interrupted by the war, from which Kantorovich and his family suffered greatly, but in 1942 he gave a presentation taking aim at would would become his true target: the optimal planning of the entire national

\textsuperscript{274} Leonid V. Kantorovich, “Soprovoditel’noe Pis’mo I Spisok Rassylki,” in \textit{Leonid Vitalevich Kantorovich: Chelovek I Uchenii (Vol. 1)}, 269–70.


economy. In 1941, his institute, LOMI sent an official letter to the Institute of Economics, mentioning optimal transportation planning and optimal national planning. In 1942, Kantorovich wrote to Sobolev asking for his help in bringing his work to the attention of higher planning authorities. He wrote as well as to the pricing economist Sh. L. Turetskii in Gosplan, who in response lectured Kantorovich on the only auxiliary role that calculations can play in planning, on the ideologically worrisomeness of some of his formulations, and on the concrete means of management by which planners push and pull production toward the optimal—a term which Turetskii understood in not at all the exact and mathematical sense as did Kantorovich.

By the autumn of 1942, he had finished the draft of his book. The Naval Military Engineering Technical School at which he worked officially sent a copy of the manuscript for review to Gosplan. The reply from G. Sorokin, the scientific secretary of Gosplan, dated 28 March 1943, was harsh: “You did not succeed, and in my opinion, it is not possible, to lay down the variety of economic reality on the Procrustean bed of arithmetic formulae.” Worse, he denied the very principle, saying that “As soon as such

278 “Pismo Iz Leningradskogo Otdeleniia Matematicheskogo Instituta AN SSSR v Institut Ekonomiki AN SSSR.” In Leonid Vitalevich Kantorovich: Chelovek I Uchenii (Vol. 1), 290.
techniques turn up as means for solving economic problems, unforgivable methodological errors will be allowed in."\textsuperscript{281}

Kantorovich wrote letters to Stalin and Molotov trying to interest them and speed along review of his book, promising that even partial and local implementations of his method could increase output by 70%.\textsuperscript{282} He also noted that mathematical methods, despite their “at root incorrect” use by bourgeois economists, were already yielding benefits for the wartime economies of the United States and Great Britain. Extraordinarily, even in these early letters Kantorovich linked his method to the problems of price setting, capital investment, and profitability for enterprise assessment in three successive paragraphs, and cited Stalin’s speech of 1941 on the necessity of the use of the law of value. Through the logic of linear programming, he already grasped the connection between the positions to which the reformists in these three debates would arrive after nearly twenty more years of discussion.

In the fall of 1943, an article that Kantorovich had written summarizing his book was finally discussed in Gosplan, and the inevitable happened: he was accused of deviation from Marxism in favor of the “bourgeois schools” of economic thought.\textsuperscript{283} A manuscript was returned to him in the margin of which the reviewer (probably the statistician Boris S. Yastremsky) had written “in short, value without labor?! ‘Valuations’ like the Austrian school?” In the same year, Kantorovich’s work was discussed at the

\textsuperscript{281} G.M. Sorokin, “Pis’mo G.M. Sorokina,” in Leonid Vitalevich Kantorovich: Chelovek I Uchenii (Vol. 1), 315–16.

\textsuperscript{282} Leonid V. Kantorovich. “Pis’mo I.V. Stalinu” and “Pis’mo V.M. Molotovu” In Leonid Vitalevich Kantorovich: Chelovek I Uchenii (Vol. 1), 310–14, 314–5.

Institute of Economics, which was probably the first time most economists would have heard of him. He there seems to have had some positive feedback, including from Strumilin, Notkin, Konius, and Atlas. In response to both of these events, Kantorovich prepared an (unpublished) article for the first time critically (though shallowly) engaging with foundational Western literature in order to refute the charges against him. In March 1944, he wrote to the chairman of the TsSU (then still a division of Gosplan), Vladimir N. Starovskii, a short-tempered letter arguing that “sticking labels” of anti-Marxism on him was absurd and unworthy, and fairly demanding that his work be published and implemented as soon as possible. In this letter he directly mentioned the Cowles Commission and the journal *Econometrica*, as evidence of the role mathematicians could play in developing economics.\(^{284}\) Starovskii’s replied in July—in two sentences—that the work had no practical value, but that he had sent it to the Academy of Sciences, which might be better able to assess its theoretical originality. At this point, Kantorovich despaired of breaking through. Moreover, all of his acquaintances were strenuously warning him that his activities were becoming dangerous. Subsequently he was to learn that a closed session of Gosplan had indeed considered seeking his arrest.

By 1949, Kantorovich and his students (Gavurin, Rubenshtein, and Zalgaller) at LOMI had only managed some small experimental applications in factories belonging to the transportation industry. That year they organized a seminar for industrial engineers to try to teach them the techniques. Kantorovich envisaged the creation of cookbook style manuals for engineers in various industries, and the training of large numbers of

\(^{284}\) Leonid V. Kantorovich, “Pis’mo V.N. Starovskomu,” in *Leonid Vitalevich Kantorovich: Chelovek I Uchenii (Vol. 1)*, 371–74.
professional optimizers to dispatch to factories around the country. These experiments to which Kantorovich was devoting so much energy were by this time sharing LOMI’s time with theoretical research on numerical methods, engineering work on analog computers, and calculations for the bomb.285

As soon as Stalin died, Kantorovich tried again. With the help of the Prorector of LGU, Sergei V. Ballander, Kantorovich sent his work to the Council of Ministers in 1954, but it was sent for review to the very same people at TsU and Gosplan reviewed it negatively ten years before, Sorokin and Starovskii, to the same effect. Once again, they accepted its usefulness for “techno-economic calculations” but categorically refused its applicability to planning.

In the meantime, linear programming had been independently invented in the United States. The extreme cost of the Berlin airlift lent support to a U.S. Air Force initiated to mechanize the planning process—“programming” as they called it. In 1947, the Comptroller General E.W. Rawlings created a Project SCOOP (Scientific Computation of Optimal Programs) in the Planning Research Division of the Directorate of Management Analysis of the Pentagon to develop new computer-assisted decision-making methods. Dantzig was inspired by Leontiev’s input-output model, which he conceived as interrelating “activities” (production processes) run with different “intensities”. He tried consulting with the Dutch economist Tjalling Koopmans, then at the Cowles Commission of the University of Chicago and one of the few highly mathematical economists in the United States. Koopmans had worked on the problem of

minimizing the number of ships needed to carry matériel during the war. But Koopmans
and others at Cowles had devised no means to solve Dantzig’s problem. In June 1947, the
mathematician George Dantzig formulated the linear programming problem, and in
August 1947, he invented the simplex method to solve it. This method, to which I will
return, is so powerful that despite enormous effort to discover better algorithms for most
use cases the simplex method remains the most effective.\textsuperscript{286}

Kantorovich’s student A.M. Vershik recounts visiting military institutes in 1957
(the example he gives is of course NII-5) and discovering that the mathematicians there
were already working on linear programming and other operations research methods
using either English language sources or unofficial translations. In that same year Vershik
invited Kantorovich to lecture at the Naval Computing Center, where he was then
working. His coworkers, so conditioned to cynicism by the propaganda, relentless to the
point of absurdity, about Soviet priority in every field, were incredulous that linear
programming truly had been invented in the Soviet Union first.\textsuperscript{287}

After the 20\textsuperscript{th} Party Congress, Kantorovich went on the offensive. Up until this
year, there were only five Soviet publications on linear programming by Kantorovich and
his students and co-authors, all in small additions or obscure engineering journals. In
1956 he began to teach the method in his classes. He wrote editorials for newspapers,
which were rejected. He sent further letters to the Council of Ministers, in which he
referred to the extensive military and industrial applications in the United States. Bruk

\textsuperscript{286} Paul Erickson et al., \textit{How Reason Almost Lost Its Mind} (Chicago, IL: University of Chicago Press,
2013), pp. 53–64.

\textsuperscript{287} Anatolii M. Vershik. “O L.V. Kantorovicha I O Lineinom Programirovanii.” In \textit{Leonid Vitalevich
Kantorovich: Chelovek I Uchenii}, (Vol. 1), 130–52.
and Kolmogorov spoke about Kantorovich’s work at an October 1956 session of the Academy on automation, as did he himself. Finally, at the end of 1956, Kantorovich solicited letters to Academy President Nesmianov from Sobolev and the president of the Armenian Academy, V.A. Ambartsumian, that had the desired effect. Nesmianov instructed Nemchinov to call a session of the Division of Economic, Philosophical, and Legal Sciences of the Academy to hear Kantorovich’s lecture on optimal planning. This session, 20 June 1957, would be his first presentation of his work to economists in fourteen years. From the transcript, it seems likely that Nemchinov and Kantorovich had packed the hall with their supporters, who formed a chorus repeating Kantorovich’s points. Most disagreements were quibbles that appear more as searches for ideologically acceptable formulations, such as worries about Kantorovich’s preferred term for mathematical economics from this period, “econometrics,” which he soon ceased to use. The overall result was near-unanimous approbation, and a resolution was adopted to publish and popularize his work with all haste.288

Immediately thereafter, Kantorovich began furious activity, lecturing widely both to economists and mathematicians, publishing both scientific and popular articles, writing letters to both scientific and politics bonzes, and mobilizing his extensive network of contacts spanning physicists, mathematicians, cyberneticians, and economists. His centrality to each of these networks, and betweenness with respect to each of them, made both him and linear programming a focus of activity uniting variegated problems and communities.

“Efficiency is Presupposed Before the Price Concept”: Planning Becomes an Exact Science

Linear programming not only unified a series of economic problems that had been studied with the differential calculus but offered an approach to many others that had been unsolvable with it. It replaced the apparatus of differential calculus with that of a part of topology, convex analysis. It instigated a deep investigation of the property of convex sets, which are regions (in any number of dimensions) for which all points on a line segment between two points on the boundaries of the region are inside that region. In linear programming, the set of constraints form the boundaries of that region. In the plywood problem, the constraints are that the parts of the working day spent on making each kind of product for each machine must be equal to or less than the length of the working day and non-negative. The objective function, the quantity to be maximized or minimized (in the plywood case, the products produced in a definite ratio) is then examined within the convex set produced by the constraints, which is called the feasible region. Any point within the feasible region but not on its edge is non-optimal because by moving toward the edge the value of the objective could grow (or shrink). It follows that the intersections, the vertices of the lines representing the constraints, are local extrema, but only one of those is the global extremum, the highest value of the objective function, e.g., the most veneer in the given assortment that can be produced in a day.

But linear programming does more than find the optimal solution. It also assigns values—mathematically, the Langrange multipliers—to each of the constraints that represent the sensitivity of the optimal value of the objective to changes in the
constraints. In Kantorovich’s example, these would be the amount by which production changes as a machine becomes more or less productive, or as the proportions of different types of plywood in the desired final output change. This value can be interpreted as how much it would be worthwhile to spend to improve a machine to that level of productivity. It is important to note that these values have no essential connection to the idea of the market, or indeed to any other institutional arrangement, as I will discuss below. They are indicators of efficiency and rationality at a higher level of abstraction. Tjalling Koopmans, with whom Kantorovich would share the Nobel Prize in Economics in 1975 for the independent invention of linear programming, wrote to Paul Samuelson in 1950 that,

“I have been thinking further about the best terminology for what has been variously called shadow prices, accounting prices, efficiency prices. Of these, I now like efficiency prices best, because it indicates that efficiency is presupposed before the price concept can be constructed. However, the word price still has too much of a market connotation to satisfy me completely. How about the good old word “value”? This, of course, has been abused in various metaphysical sense, and has therefore been avoided for some time by the more careful economists. However, I wonder if it could not by now be re-introduced in what is by now a very proper sense.”

In the Western literature, these values would be called “shadow prices”; Kantorovich, in full cognizance that it was dangerous to call anything not based on labor

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values either a value or a price, first called them “solving multipliers” (reshaishee mnozhiteli) in 1939, then “greatest efficiency valuations” (naibolee tselosoobraznie otsenki) in 1942, before devising the unwieldy but canny circumlocution “objectively determined valuations” (ob’ektivnye obuslovlennye otsenki).

Within the context of a single factory, there are of course no prices, so the valuations did not have a clearly economic meaning. But Kantorovich followed the grooves of the single factory metaphor: not only could a workshop be optimized, but a factory, not only a factory but a whole sector of production, and not only a sector, but the entirety of the national economy. In the Soviet context, linear programming immediately appeared metaphorically transferrable to all scales of the polity. This was perfectly obvious to Kantorovich. If the entirety of the productive processes of the country could be grasped as a linear programming problem, then the computation of the desired optimum would at the same time give every single commodity in the economy a price that reflected its contribution to achieving that optimum. At a stroke, linear programming thus gave new meaning, perhaps the first real meaning, to the idea of scientific planning. Input-output analysis had introduced a means to achieve consistency in plans, but linear programming for the first time gave content to optimality. The Party had always claimed that its plan was scientific, that is was corresponded perfectly with the demands of the economic laws of socialism and the laws of historical necessity. But linear programming showed for the first time how there could truly be a single, unique, and provably best plan. And as a corollary, it threatened to challenge the power of the Party to know it.
The two key ideas of optimal planning that derive from linear programming are the optimality of the plan and the transition to parametric guidance. Once the Party sets the goal of the plan, e.g., chooses the national output mix, computation of the linear programming problem would yield not only the quantities of goods that would be produced, but also the set of prices that would correspond to each goods’ contribution to achieving that goal, including natural resources, capital, transportation, services, and other things that are difficult to price with the labor theory of value. For an optimal planner, the purpose of the nationwide computer network proposed by the cyberneticians is to handle the extremely large flows of information required for setting up the problem, and the computational demands associated with running the algorithm to get the numerical solutions to it. But once achieved, these prices could then be set into law or regulation as normatives. Enterprises could then be freed from the “petty tutelage” of the ministries and the direct planning of inter-enterprise logistical chains abolished. Enterprises would be told simply to maximize profit while taking the normatives as parameters for their action. Their self-interested behavior would then bring about the equilibrium corresponding to the computed optimum of the objective function. At a stroke, linear programming offered a unified solution to all of the planning debates of the postwar decade: it promised to give a rational set of prices, including interest rates for capital goods, that could serve as a framework to reconcile local initiative with global goals via the lever of profit.

There were many areas of research at CEMI, but they were all united by the optimal planning vision. At CEMI, the “brand” of the institute and its director,
Fedorenko, became SOFE: the System of Optimally Functioning Economy. The word “brand” is chosen purposefully, for there was not in fact a unified system or theory, nor was what CEMI did in essential ways so different from approaches found in other institutes, such as at Kantorovich’s home for much of the 1960s and 1970s, Sobolev’s Institute of Mathematics of the Siberian Division of the Academy of Sciences, or the IEoPP. In some nominal sense, everything at CEMI was part of SOFE, though in fact many economists and mathematicians there thought themselves unconnected to it. In particular, the pure mathematicians, the economists working on market models and Walrasian general equilibrium theory, the forecasters all often saw their work as separate from it. In many cases they actively disliked SOFE. Yet when Fedorenko listed the parts of SOFE, he would include that work.

The idea of an optimal plan gave new content to the ideal of socialism; or, conversely, we could say that once the ideal of the optimal plan was conceived, it became hard to understand what else socialism could be besides it. Optimal planning thought was immediately political-economic, or governmental. It provided a certain diagram of power, which I will expand on in more detail below. Before exploring optimal planning and certain of its conceptual focal points in detail, however, linear programming must be set into the context of a longer history. This forgotten history repositions thinking about socialism at the very heart of neoclassical economic thought, the idea of perfect allocative

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290 Publications under the name “Fedorenko” were, according to multiple CEMI economists with which I spoke, almost always the product of the work of groups or individuals at CEMI. Fedorenko was a politician and rhetorician, but not a mathematical economist. In Soviet and now Russian academia, it is an open secret which institute directors actually write their own books and which do not. The practice was not considered entirely illegitimate; now there are notable incidents of scandal surrounding it, which index the introduction of Western academic norms.
efficiency expressed in the concept of general competitive equilibrium. It thereby establishes the conceptual ground of the remarkable intercourse between the nascent mathematical economics communities across the Iron Curtain. Against this background, it will become intelligible though no less remarkable that linear programming could catalyze both general equilibrium analysis in the West and optimal planning thinking in the socialist bloc. Finally, through the exploration of two conceptual problems at the heart of optimal planning, the determination of the objective function, and decompositions algorithms, I will show how technical facets of mathematical modeling thus took on significance as arguments for the institutional reform of socialism, and vice versa.

PERFECT EFFICIENCY: GENERAL EQUILIBRIUM AND SOCIALISM

The impact of linear programming has to be understood against the background of more than half a century of economic thought that refracted the problem of allocative efficiency and the theory of general equilibrium through the lens of socialism. In the post-1991 world, a series of oppositions have solidified as a sort of political common sense, according to which socialism is planning, capitalism is the market, and the fall of Soviet Union is history’s judgment on the socialist ideal. Neoclassical mathematical economics is understood by many of its critics—both Soviet and current—to be the theory or beguiling ideology of the goodness of capitalism and the impossibility of socialism. This common sense is point for point contrary to history—and a very recent
history at that—the rapidity of the forgetting of which can only be understood as a political symptom.

First, socialism has not always been equated with central planning and markets with capitalism. Market-based conceptions of socialism have been inseparable from neoclassical economics from its conception, motivated reform projects in the socialist bloc from the 1950s onwards, and were the true inspiration for Gorbachev’s *perestroika*. It is only in the post-1991 epoch that planning and socialism could be conflated without further comment. Second, neoclassical economics has not always been an apology for capital. Models of socialism—models in which socialism is not only conceivable but conceived to be functional, stable, efficient, and sometimes even better than capitalism—have been at the heart of neoclassical economics. The competitive capitalist market, market-based socialisms, and central planning are identical at a high enough level of conceptual and mathematical abstraction, and thus have functioned not as opposites but complementarily as models for exploring each other. Third, the intensifying mathematicization of American economics in the immediate post-World War II period was neither a straightforward cause nor effect of any sort of pro-market swing in the discipline. In fact, this mathematicization was accomplished largely by people with socialist sympathies themselves, many of them Eastern and Central European émigrees. They saw mathematical economics as not just a model of capitalist markets, but also models for socialist government. Circles within the existing American profession that were more explicitly anti-socialist were thus also acutely uncomfortable with the
mathematizers. A brief history of neoclassical general equilibrium thinking will serve to illustrate these points and thereby defamiliarize post-socialist common sense.  

In the 1870s, the work of William Stanley Jevons, Carl Menger, and Léon Walras began what the so-called “marginalist” revolution. It was an alternative foundation of economic theory to that of Smith, Ricardo, and Marx, which Marx had dubbed “classical.” While the latter based value on the costs of production (especially labor), the new economists based value on the relation of the individual to the object, on the object’s utility for the economic agent. This way of posing the problem made the mathematics of the differential calculus immediately applicable. The consumer buys up until the utility derived from one more additional unit—the “marginal” unit—of the product is zero. The firm sells up until the profit derived from one the sale of one more (again “marginal”) product is zero. When consumer and the producer enter the market, demand pushes the price of a good up, while supply lets it down, until the price settles at a level in which marginal utility and marginal profit are both zero, and the transaction happens—the market “clears.” Thus far, all three theorists were in agreement, but Walras, in his *Elements of Pure Economics or the Theory of Social Wealth* (1874), extended one side of the problem further. Could it be proven that not only could one market clear, but that the markets in all goods could simultaneously clear?  

Walras considered increasingly complicated versions of the the pure exchange problem (i.e., consumers are bartering, there is no production, in the image of the Paris

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Bourse), representing equilibrium as a system of equations expressing the balance of supply and demand. There are two ways of looking at Walrasian equilibrium, which can be reflected in the mathematical representation. In each case, Walras’ attempts to demonstrate that equilibrium can or must hold fail. In the first, the equations that express the balance of supply and demand in each market are understood as expressing the equilibrium state. Walras claimed that the fact of equal numbers of equations and variables shows that a solution must exist. However, this falls because it does not guarantee that the prices of solution are non-negative. Adding non-negativity constraints made the problem insoluble with the mathematics that existed at the time of Walras’ writing. In the second, the equilibrium is viewed as the outcome of a dynamic process. The imaginary process that Walras uses is one of tâtonnement. Walras imagines an auctioneer who calls out prices until the market for a product clears. The auctioneer then moves on to the next market. When the next market clears, it will move the first market out of equilibrium, but Walras assumes that it is less out of equilibrium than it was initially. If that were true, then as the auctioneer progresses from market to market and back again all markets should converge toward equilibrium. This is an argument about dynamic stability. Mathematically, it fails, as would be shown only much later, in the 1950s and 1960s.

Though no socialist country had ever existed, in the latter half of the nineteenth century thinking through socialism was a normal and accepted part of economics. Because they based value in universal qualities of rational conduct, marginalists argued that the categories of market economics and the laws they ascribed to markets were
universally valid to all times and places. The socialists, and Marxists among them, who thought that such categories and laws would not hold under socialism were mistaken. Walras considered himself a socialist from at least 1861. But Walras’ vision of socialism was one that employed the market. The state would own all land and natural resources and lease them. Income from this would eliminate all taxation and allow subsidies for the poor. The state would provide the necessary institutions to ensure both competition and justice. As Bockman puts it, “To Walras, perfect competition, socialism, neoclassical economics, and mathematics did not just complement each other, but in fact made each other possible.”

Walras’ vision of market equilibrium even held a metaphorical placeholder for central planning: an “auctioneer” called out prices, in a process called *tâtonnement*, searching for those that matched supply and demand. His successor at the University of Lausanne Vilfredo Pareto, replaced the auctioneer with the “Ministry of Production,” which solves the system of equations of equilibrium so as to maximize profit.

The idea of market equilibrium was an ideal of perfect allocative efficiency. Or better: in neoclassical thought, the concept of perfect efficiency is logically prior to any set of institutions, including those institutions that assign property rights and distribute the social product. *Any* perfectly efficient system, including an ideal socialism, would instantiate the same virtual or logical structure. In 1908, Enrico Barone, also of Lausanne, famously declared that, “The system of equations of collectivist equilibrium is no other

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292 Johanna Bockman, Markets in the Name of Socialism, 22.
than that of free competition.” The ideal and perfected forms of markets and of centrally-planned socialism were, in the Walrasian conceptualization, identical. This inaugurated the tendency of economists thinking in the neoclassical tradition, as it has come to be called, to use the one as a tool for thinking about the other. Tacking back and forth between the two ideals, and from each ideal to the opposing form in reality, became a procedure for generating universalistic economic concepts.

The Bolshevik revolution of course posed this problem of universality acutely. As discussed, despite dissenters, the orthodox Marxian point of view was that Marx’s economics did not apply to socialism, but were an analytic of capitalism. At this time, one prominent marginalist agreed with them: the arch-liberal Ludwig von Mises. He controversially claimed that “socialism is the abolition of rational economy,” and marginalism thus only applied to capitalism. This was a break with neoclassicism, one of the several theoretical points of divergence by which the Austrian school ceased to be merely a regional flavor of marginalism and took on an oppositional character.

However many socialists were convinced that neoclassical economics was the way forward. Otto Neurath in 1919 proposed a neoclassical completely centralized, planned, and moneyless model for the German war economy. Writing in 1922, Karl Polanyi acknowledged that “The only theory of a marketless economy, which we have at our disposal, stems from the marginal school and admittedly as a theory of a closed

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economy. A communist managed economy could, so paradoxical it must sound in many ears, only turn to this school, to lay the foundation on its particular theoretical economic doctrine.’”295 In Great Britain in the 1930s neoclassical socialism was flourishing among the students at the London School of Economics, founded by the socialist Fabian Society in 1995. These students were taught by John Hicks, Lionel Robbins, Arnold Plant, and others with strongly anti-socialist points of view. But they took what they learned as applicable to market socialisms. Subsequently becoming prominent members of the increasingly consolidated neoclassical form of economics, they firmly installed market socialism as a realization of efficient allocation. The crucial moment in the modern history of neoclassical planning was the three years Oskar Lange spent teaching in London on a Rockerfeller fellowship, 1934–7, before taking up his position at the University of Chicago. In Lange’s hugely influential model of market socialism, the Central Planning Board would set prices, and then watch for deficits and gluts, and adjust prices accordingly until supply and demand balanced. Socialism, he argued, was at least as efficient as capitalism in theory and might be better in practice than existing monopolistic capitalism.296 Abba Lerner, a socialist student at LSE, extended Lange’s model.297 He had proven the two fundamental welfare theorems that defined the


implicational relationship between Pareto optimality and equilibrium: any equilibrium is Pareto optimal; any Pareto optimal distribution can be achieved as an equilibrium. He showed that any desired Pareto efficient equilibrium state could be achieved by lump sum transfers of wealth between citizens prior to allowing them to exchange and the market thus to equilibrate. The Lange-Lerner model would be important not just in the United States, but also in Soviet mathematical economics of the 1960s.

THE OPTIMAL AND THE EXTREMAL

Modern general equilibrium theory was focused on the search for a proof of a solution to Walras’ problem, a proof that there exists a set of prices that will harmonize supply and demand, and that the economy tends towards it. Consumers seek to maximize their utility, generating demand for goods, and firms seek to maximize their profits, generating supply of goods, but somehow coordination emerges across all markets. The mathematical elegance and power of the theory of general equilibrium would combine with the way it elicited and attracted all the affective attachments to the idea of capitalism as a providential world of freedom to help stabilize the disciplinary transformation of American economics into what it is today. Linear programming played two important roles in the this transformation. First, early attempts to formalize general equilibrium could come up with no satisfactory way to mathematically describe the production side of the market, the firm. Linear programming provided this. Second, it also raised the mathematical level, such that, by 1954, Lionel MacKenzie, Gérard Debreu, and Kenneth

Arrow would employ fixed point theorems to prove the existence of the a general competitive equilibrium.\textsuperscript{299}

E. Roy Weintraub and Till Duppe have recently argued that the 1949 activity analysis conference at the Cowles Commission was the breakthrough moment in the mathematicization of economics in the United States. This conference assembled a variety of new mathematical techniques, linear programming foremost among them, and new formulation of economic problems. Over the last twenty years, historians of economics have largely demolished the received story of the replacement or evolution of institutionalist economics into mathematical economics. According to the picture now emerging, in the United States the war brought together an interdisciplinary constellation of new actors hitherto marginal to economics who then took over or displaced the pre-existing discipline, giving rise to structure dominated by highly unified mathematical core and an array of fragmented “heterodoxies.” The 1949 conference brought together the ingredients of the economics to come, both the initial mathematical techniques and problems and also the community of actors: Central and Eastern European émigré economist-mathematicians located on the margins of academia and mathematicians who had become involved in applied work during the War.\textsuperscript{300} With respect to its function for assembling a community, I would argue that the Moscow conference of 1960 represents a


similar milestone. But with respect to technique, the 1949 conference was epochal because it assembled all the conceptual and technical ingredients that would allow general equilibrium theory to achieve its modern mathematized form, for which linear programming was the linchpin.

Linear programming allowed the pure exchange equilibrium to be turned into an equilibrium between producers and consumers. Previously, there was no mathematical way to treat the two symmetrically. The system of prices that represent equilibrium is supposed to be there result of individual’s and firms’ self-interested behavior. The consumer problem, the maximization of utility, was a model of choice among different bundles of goods. But the producer problem, the maximization of profit or minimization of cost, required a model of choice among different production technologies. Even if the equilibrium system were solved for the prices and quantities of all goods, this would not determine the choice of production technology, because any good can be made more than one way.

The classical production function assumes smooth and diminishing marginal rates of technical substitution between factors of production: you can use less of one thing and more of another, but with decreasing effectiveness. Leontiev’s input-output model introduced the linear production function, i.e., one in which output expands linearly in proportion to inputs (and is thus said to exhibit constant returns to scale), which represented an intermediate step. In a linear production function, inputs must be combined in fixed ratios: you can add more labor, but without more machines for those workers to use, they will remain idle, and conversely you can add more machines, but
need the hands to work them. Adding additional units of some but not all inputs would not expand production. But Leontiev’s model did not introduce any element of choice among possible technologies. It thus fails to capture the key intuition about the behavior of producers in a market: that they alter their production techniques as the prices of the inputs to production changed. So-called “activity analysis” reformulated the producer’s choice problem to be the choice among possible linear production functions, i.e, possible ratios holding between the inputs, which are called the production possibility set. In a two input case, this would be represented as rays extending from the origin, their length being equal to output. If lines then connect the points on each production function where output is equal, a frontier emerges, the “isoquant,” that is piecewise linear. (The flat parts of the isoquant between each vertex represents running a mixture of the two adjacent production processes.) Linear programming treats the input ratios of the production technologies and the available quantities of inputs as constraints. Given the equilibrium demand for the output of a firm and the price of that output, the firm acts as though it solves a linear programming problem to minimize its costs. Therefore, the use of linear programing to solve for the firm’s maximal profits would at the same time pick the most efficient production technology. This opened up the road to providing a proof of the existence of general equilibrium.

Aside from existence, general equilibrium theory had three other major goals: proofs of the uniqueness, stability, and optimality of equilibrium. The First and Second Welfare Theorems state that any equilibrium is Pareto optimal, and any Pareto optimal distribution can be achieved by redistributing goods and then letting competition
generate that equilibrium. The proof of the existence of general equilibrium was thus
indissoluble from a certain conception of the goodness of markets. Pareto optimality is a
weak and not completely intuitive version of “optimality” that is not equivalent to
optimizing a linear programming model. It states merely that no one can be made better
off without making someone else worse off, and no more. Stability and uniqueness have
been proven not to hold, at least not in the desired way. The Sonnenschein-Mantel-
Debreu (1972–4) results show that without extremely restrictive assumptions an economy
will have multiple equilibria. Scarf (1960) showed that with the standard Walrasian
process for arriving at equilibrium, tâtonnement, instability is the rule, not the
exception. Yet such is the hold of the basic intuition of general equilibrium that most
economists, while knowing these results, continue to research as though they were not
true.

In the United States, the key problem was understanding the possibility of
general equilibrium, the possibility that capitalism could produce order. Accordingly,
linear programming after giving its initial impetus became only a technique that was
ancillary to this problem, not a continually fertile resource for the economic imagination.
As Weintraub and Düppe note, the 1949 conference therefore turns out to be a turning
point in another way: it represents a clear origin point for the cleavage, mostly

*Econometrica* 40, no. 3 (1972): 549–63 and “Do Walras’ Identity and Continuity Characterize the
Class of Community Excess Demand Functions?,” *Journal of Economic Theory* 6, no. 4 (1973): 345–
54.

unremarked, between operations research and economics. While for economists, linear programming assumed this subsidiary role, a different community of operations researchers, systems analysts, and management specialists would continue to do optimization methods as its own field of study. In 1951, Dantzig would organize the first conference on mathematical programming at the National Bureau for Standards, and none of the economists from the 1949 conference would be present. The members of the Mathematical Programming Society would come to call the 1949 conference the “0th conference.” In academia, they found an institutional niche in business schools or schools of engineering. They became, in effect, the planners in the non-marketized inner bellies of the vast leviathans that populate capitalism, and which, ironically, were icons of the fight against communism: the government of the United States, especially the military, and very large corporations. Importantly for the Soviet comparison, the optimizers included the study of algorithms and computational considerations in their field. These were irrelevant to the economists; economists do not even learn how to deploy Dantzig’s simplex algorithm. It is symptomatic of this split that when Kantorovich’s article of 1939 was finally translated in 1960, it appeared not in an economics journal but in Management Science. To the economists, optimization was a non-realist representation of something that was supposed to take place via the “truck and barter” of the market or in the heads of agents. The economic models of the following period were mathematical structures about which theorems were proved, not means for computing numerical solutions to practical problems. Insofar as economists did hook their models up to
numbers, it was via statistics, as the developing subfield of econometrics, in order to test
the conformity of or calibrate the model with respect to (statistical) reality.

Things played out very differently in the Soviet Union. Soviet economics never
made any distinction between operations research and mathematical economics. There,
linear programming led directly to optimal planning, which conceives of the entire
economy as an optimization problem. Walrasian general equilibrium models are not
equivalent to optimization models, because they do not have a global objective function.
The consumers optimize, and this produces their demand, the producers optimize, and
this produces their supply, but the economy itself does not optimize. The equilibrium set
of prices is not anyone’s goal. If agents have heterogenous preferences, it is
mathematically impossible merely to aggregate their preferences, aggregate their demand
functions, and derive a unique aggregate demand function. And the assumption of
heterogenous preferences was not accidental to the exercise, as was explicitly realized by
key general equilibrium theorists like Kenneth Arrow and Paul Samuelson. The very
intellectual purpose to which Walrasian models are put, establishing the harmony of the
market, requires that the agents are heterogenous, have different preferences. Linear
programming therefore could not solve the problem of proving the existence of
equilibrium. This would require the use of fixed point theorems. However in the Soviet
context, linear programming had much broader implications.

Under certain conditions, the problem of general equilibrium reduces to the
problem of finding an extremum. These conditions were contrary to the intuitions about
the market that determined the development of general equilibrium research in the West,
but fully in accord with the intuitions about planning that determined it in the Soviet Union. First, if demand can be treated as fixed, rather than deriving from the equilibrium system, so that the production side is the only moving part, then equilibrium will be equivalent to a cost-minimization problem (as in Novozhilov). Equivalently, if the assortment demanded is fixed, then equilibrium will be equivalent to an output-maximization problem (as in Kantorovich). And indeed, this is fully in accord with Soviet idealizations of the planning process: the Party decides upon what ought to be produced, the planners figure out how, and the firms produce it. The Party’s demand does not respond to the possible supply of goods, but determines the actual supply. Second, under highly restrictive assumptions on the utility functions of the consumers (homogeneity), which make them in certain mathematical respects identical, the agents can be aggregated as though into one mega-agent, known as the “representative agent.” This done, the maximization of the representative agent’s utility would yield equilibrium. Again, this has intuitive interpretations in the Soviet Union. One the one hand, the representative agent could be again taken to be equivalent to the Party; or the identical agents that compose the representative agent could be understood as the postulates of scientific norms of consumption. If the economy had only one decision-maker—whether a dictator or a representative agent—the problem of coordination to which general equilibrium theory is an answer could not arise.

DECOMPOSITION: RUNNING A PROGRAM ON THE COMPUTER CALLED THE USSR
Linear programming could theoretically support a vision of hypertrophied, even dystopian centralization. High speed computation and a perfect plan could undergird a rationalization of the existing management system. But in fact it was understood in an essentially decentralizing fashion. Here, technological fact, mathematical theory, economic management, and socialist ideology all became entangled one with another. Computing a single optimal plan for the entire economy was technologically impossible. However, an optimal planning problem could be mathematically decomposed into a series of subproblems, and then recomposed up toward the global optimum. This mathematical procedure was understood economically in Nemchinovian fashion, as a possible decentralized institutional setup for organizing the productive forces of the Soviet Union. And this institutional setup could be understood as the perfect realization of one of the key ideological principles of the Soviet state, democratic centralism. The mathematical decomposition of an optimal plan became a way of thinking about the implementation of quasi-markets. Historically, it took over the problem space prepared by the previous two decades of thinking about indicators of enterprise effectiveness and material stimulus. It thus became a way for mathematical economists to intervene with tools special to themselves in the emerging epistemological space of the economic mechanism. Decomposition also could be interpreted within cybernetic thinking about the coupling of systems. And lastly, it was in implicit dialogue with Eastern European market socialisms, and constituted a unique Soviet reply to them.

perhaps the first attempt to offer a systematic vision based on the first years of work at CEMI. They laid out three basic principles: 1) that a unified criterion of optimality is the mathematical expression of Stalin’s “basic law of socialism”; 2) that the national economy must be seen as a hierarchical system; and 3) that the functioning of the economic mechanism can be described algorithmically. Fedorenko’s book of 1968, *On the Development of a System of Optimal Functioning of the Economy*, expanded on these guidelines and codified them as the axioms of SOFE, henceforth the official stance of the institute. The language is obviously cybernetic. The economy is understood as a very complex system, consisting of several subsystems, and functioning with incomplete (or, better, dispersed) information. Complexity implies the impossibility of total centralism. Agents have their own resources, knowledges, and objectives. The economic mechanism must unify them. The economy has a single objective function and faces scarcity, and therefore is like an optimization problem. The economy is hierarchic, and the plan is formed iteratively, and implemented by agreements among agents.

Three mutually-supporting lines of research fleshed out this conception. First, there was a mathematical investigation into the decomposability of an optimization problem. This research posed the very general mathematical question as to the conditions under which an optimization problem could be broken down into subproblems such that the separate optimization of the subproblems would lead to an optimal solution to the global problem. Secondly, there was a computation problem. The procedure for decomposition would have to be proven to stably converge toward the optimal global solution.

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solution, to do so within a reasonable amount of computational time, and to produce subproblems that would fit into existing computer memory. Third, these conceptual and computational investigations undergirded work on large complexes of planning models. These complexes did not perfectly satisfy either the conceptual or computational constraints. But the basic reasoning was the same, and it was hoped that further work would lead to more satisfactory realizations.

The basic inspiration was therefore optimal planning; the basic means would be large complexes of models that would be hooked into the national information system. The models that were being developed by different research groups at CEMI.\textsuperscript{304} Such complexes would be the flagship projects of CEMI from the late 1960s until the 1980s; some similar work would also be carried out to a lesser extent at the IEOPP in Novosibirsk, and, for a period, at NIEI Gosplan. These complexes of mathematical models that conceptually mapped the institutional arrangements of the USSR onto the decomposed optimization problem. The first rough proposal for a complex of models was that of Boris N. Mikhailevskii in the early 1960s. During the middle of the 1960s, Gavrilets, Volkonskii, and Pugachev worked on the mathematical and algorithmic theory of decomposition. By the end of the 1960s, the complexes based in the theory of decomposition had grown from the work of small numbers of young mathematical economists into very large teams of economists, mathematicians, statisticians, programmers, and computer engineers. In CEMI in the late 1960s and early 1970s, there

\textsuperscript{304} Matrix \textit{tekhpromfinplans} at the enterprise level, optimization models at the branch level, input-output models to check global consistency and for medium-range planning, and forecasting models for the long-range; models of consumer behavior and demographics to forecast demand, of technological advance to feed into long-range forecasts; all employing as needed the mathematics of complex systems, of stochastic processes, of linear, discrete, convex, and dynamic programming, of algorithms.
were two competing groups working on these models, that of Pugachev and that of Eduard F. Baranov with Viktor I. Danilov-Danilian and Mikhail G. Zavel’skii. The second group was the most ambitious, and also the most doggedly persistent. But they failed. Eduard Baranov recounted to me somewhat sadly that,

“From the point of view of today it appears like a total utopia. Nevertheless we did it, in part. The task was simply too much, even though our kollektiv had about a hundred people. We had to build the information base under the calculations, input-output tables for all the Union Republics and Russia divided into ten regions. The goal was to attempt to experimentally compute such a plan, to work out the method, gather the information, and develop the algorithm for reaching agreement. We worked on this practically all of the 1970s. We issued publications, managed to do parts, but in the end we couldn’t complete the work.”

Pugachev’s earlier effort was relatively less complicated, but did much to set the pattern. In a 1972 presentation, he delimits four important dimensions of choice relevant for the goodness of a plan: the choice and level of output, the technologies used, the location of production, and the time sequence of development. He then quickly consigns the location problem to a secondary role, and explains ways to reduce the mathematically challenging problem of dynamics into more tractable static or (insofar as they crudely take into account intertemporal investment needs) quasi-static representations. His system has four levels: the national economy, ten intersectoral complexes, one hundred sectors, and the enterprise. At the bottom-most level, the enterprise maximizes profit given the normatives established above. The theory of decomposition thus lent mathematical
support and recontextualization to the non-mathematical arguments for a single, consolidated criterion of enterprise effectiveness, and for profit as that criterion. The three upper levels of the management scheme are envisaged as conducting a multi-stage optimization. In this presentation, I simplify the top three levels into two, leaving out the intermediary stage of multi-sectoral complexes. In his scheme, the planner assigns several alternative output targets, input allocations, and values of the coefficient of relative effectiveness of capital investment to each sector. Each sector then gathers information on all existing enterprises and possible new construction or expansion. This information is represented as a vector of inputs and outputs at the sectoral level of aggregated classification of products. It should be constructed in at least two variants, optimistic, pessimistic, and then some intermediate variants. An optimization model is then computed on the sectoral-level data to maximize output in a given assortment, producing a set of feasible plans. This set also establishes the coefficients of substitution between outputs in the branch, which are aggregated “prices,” from which the planner can determine what tradeoffs would be involved in pushing output higher for any particular product category. The extreme values form the “fork” within which the search algorithm will converge on the optimum.

The result of running the sectoral optimization model enables aggregating the entire sector into a single simple form, as producing a single generalized output. The planner then takes uses these highly aggregated sectoral sectoral models in building the national economy-scale model. The national objective function is then maximized, constrained by the total resources in the economy, and by the stipulation that the
The coefficient should be equal across all sectors. The process can thus begin again, in which the results of the global calculation are passed as parameters to the branches, which develop new variants of the plan within a narrower “fork,” recompute their plans, and pass them back up, etc. This model achieves an approximate optimum in one iteration, but better ones can be achieved by iterative narrowing of the “fork” and recalculation.305

As these models would evolve, the plan has become no longer equivalent to the list of tasks to be accomplished, the outputs produced. It is no longer an image of the future to be realized. The plan has become an iterative and interactive multi-stage process of formation, calculation, and implementation. Plan formation is the process of the elicitation of information, and the generation of new information, by negotiating over the objective function. Implementation is the elicitation and generation of new information in the process of disaggregating the global optimal. The plan is an algorithm, a program, but it extends out past the computer that runs the mathematical models. The stages of computation require institutionalized decision-making processes be created and set in motion in the real world. The plan-program runs on the “hardware” of the institutional structures that manage the productive ensembles of the USSR itself.

“BIG CEMI”

By way of summary before conclusion, let us examine the structure of CEMI in 1969, at which point it had nearly achieved its full size. It would steadily grow before

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being dismembered in the late 1980s; its members refer to the form before the schism as “Big CEMI.” Represented within it traces remain visible of all of the forces and networks that congealed into it, and all the projects in which it was engaged.

**Moscow Branch**

I. Department of economic planning and forecasting, S. S. Shatalin

Sector I: Methodology of economic forecasting, A. D. Smirnov
1) Methodology of social-economic forecasting, V. S. Dadaian
2) Forecasting the economic growth of the USSR, G. G. Pirogov
3) Forecasting the economic growth of socialist countries, (Not in operation.)
4) Forecasting the economist growth of the developing countries, Kuz’min
5) Forecasting the economic growth of capitalist countries, (not in operation)

Sector II: Models of economic planning, B. N. Mikhalevskii
1) Systems of models for describing the national economic plan, B. N. Mikhalevskii
2) Models of financial planning, B. L. Isaev
3) Models of foreign trade, Shagalov
4) Mathematical problems of national economic planning, V. A. Volkonskii
5) Programming, (not in operation)

Sector III: Experimental description of multistage systems of optimal planning of the national economy
1) Optimizing models of the economy, E. F. Baranov
2) Methodology for describing multistage systems of optimal planning of the national economy, V. I. Danilov-Danil’ian
3) Modelling optimal national economic proportions, V. F. Pugachev
4) Optimal location of production, V. A. Masch
5) Modelling optimal territorial proportions, M. G. Zavel’skii
6) Macroeconomic information, (not in operation)

Sector IV: Optimal branch planning, A. S. Nekrasov
1) Methodology of optimal branch planning, A. S. Nekrasov

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2) Problems of optimal planning of the chemicalization of the national economy, Shukin
3) Problems of optimal functioning in the fuel-energy sector (not in operation)

Sector V: Problems of the standard of living of the population, Rimashevskaia
1) Problems of the standard of living of the population, Rimashevskaia
2) Problems of commodity distribution, I. Lakhman
3) Sociological models, I. N. Gavrilets

II. Department of theoretical problems of the optimal functioning of the socialist economy, Petrakov

Sector I: Optimal functioning of complex systems, A. I. Katsenelinboigen
1) Theory of optimization of complex systems, A. I. Katsenelinboigen
2) Mathematical analysis of complex systems, B. Mitiagin
3) Probability problems of control theory, (not in operation)

Sector II: Economic problems of the optimal functioning of the national economy, Petrakov
1) Models of prices formation, Petrakov
2) Models of economic accounting
3) The economic valuation of the optimal use of natural and labor resources, (not in operation)

III. Department of systems of control
Sector I: Automatic systems of control of production
1) Methodological elaboration of automatic control systems
2) Automatic control systems for branches with discrete production characteristics
3) Automatic control systems for branches with continuous production characteristics
4) Automatic control systems for enterprises
5) Automatic control systems for motor transport

Sector II: Systems of planning-economic information
1) Automatic systems of perspective plan calculation
2) Information-programming support for plan calculation
3) Decision making systems
4) Systems for processing information
5) Systems for control of scientific research

IV. Department of mathematics and computer technology
Sector I: Mathematics
1) Mathematical programming
2) Discrete programming
3) Probability theory and mathematical statistics
4) Systems of algorithms and programs
5) Functional analysis

Sector II: Mathematical support of computer and simulation systems
1) Algorithmic languages
2) Simulation
3) Operational systems
4) Standard algorithms and programs

Sector III: Computer technology
1) Engineering-technical problems
2) Methods for mechanizing economic-mathematical calculation

**Leningrad Branch**
1) Systems of economics valuation (optimal price systems) V. V. Novozhilov, F. F. Diderizh, S. S. Gdolevich
2) The construction of models of economic systems (optimal planning models of the individual firm) R. P. Sheinman
3) Game theory N. N. Vorob’ev
4) Cybernetics V. I. Varshavskii
5) Mathematical model of public services (queuing theory) B. G. Pittel’
6) Mathematical programming of economic problems O. G. Faiane
7) Maintenance of computers
8) Programming language
9) Small scale computers
10) Other laboratories on computational methods for problems in specialized fields of science.

Let us take up some of them in turn.

Boris Mikhaevskii’s Sector II, models of economic planning, was working on analytical, empirical models of the economy. Mikhaevskii, who in the 1960s, well before anyone was willing to listen, made grim forecasts of declining growth, drowned while swimming. His sector was later given to Anchishkin when he moved to CEMI from NIEI Gosplan. This sector would become the home in exile of the NIEI Gosplan forecasters, and would later become the Institute of National Economic Forecasting in 1986, and from which would come most of the Gaidar government in 1992
Department I, Sector III and Department II, Sector I represented at least three
distinct groups working on multistage optimizing planning models, led by Baranov,
Pugachev, and Katsenelinboigen. Department I, sector V, one the other hand, represented
one of the early manifestations of Soviet economic sociology, and would become the
Institute of Problems of the Population.

Departments I and II were both headed by refugees from NIEI Gosplan, the future
academics Shatalin and Petrakov. They would become two of CEMI’s most outspoken
stars and spokesmen in the 1970s, translating its technical achievements into reformist
visions. Shatalin was a spokesperson for SOFE, and one of the most vociferous
opponents of the political economists. Petrakov was not mathematically oriented, but
spent much of his career pushing the limits of what was ideologically possible with
respect to introducing markets. He was especially important for casting the theory of the
economic mechanism in a cybernetic language. In 1976 Shatalin was forced to leave,
when the institute came under fire for having too many Jewish emigres to Israel, and
would join the new Institute for Systems Analysis to head its economics division. In 1986
he too would move to the Institute of National Economic Forecasting, bringing much of
his division with him, including several of the future young reformers. Toward the end of
perestroika, both Shatalin and Petrakov would be appointed official advisors to
Gorbachev.

Department III was what was left of the goal of the the nationwide computer
network. It contained programmers, computer engineers, statisticians, theorists of
information flow, and management theorists—in short, cyberneticians in the strong sense.
With the nationwide network a dead letter, they developed specialized computer systems for various echelons of management, and developed optimization models, in an operations research-like mode, for enterprise management. Department IV were the applied mathematicians, some of them with a cybernetics identity, but some just mathematicians. They either worked on their own research, or provided support to various applied projects in other departments.

A NEW SETTLEMENT

By the 1970s, a new settlement to the fight for the field of economic expertise seemed to have been reached. It was the third organization of the field since the middle of the 1930s. To review, entering the 1950s, the political economists had occupied the commanding heights of the economic field. Political economy was the exemplary, highest-status form of economic knowledge. It was able to offer very little to the practice of planning. But the language of political economy was the official language of political discourse, that in which policy was expressed and was debated, insofar as there was room for debate. A basic part of the higher education curriculum, it was also a medium for communication required for participation in various official forms of group interaction, including especially party cell meetings at every level. Professional political economists were the metadiscursive experts that regimented the language of political economy, set rules for its functioning, and guided its reproduction throughout the body politic. Both in the propositions expressed in the language of political economy, and in the circulation of its forms themselves, political economy was a basic mode of producing cohesion in Soviet socialism. This may smack of functionalism, but the social function of cohesion is
exactly the way in which political economists understood their own task. The formulation
of scientific propositions of political economy and their subsequent reproduction
throughout the polity were essential to producing the right consciousness throughout that
polity that would bring socialism into being.

Arrayed around political economy were a variety of practically-oriented
knowledges concerned either with the management of different sectors of the economy,
or with “functional” concerns, like price setting or finance, that cut across the sectors.
These latter were supposed to take their direction from political economy, but in fact
operated largely autonomously from it. During the complicated postwar period a
complicated rapprochement began: the political economists attempted to re-engage with
planning practice, at the same time as the practical economists and engineers close to
planning practice re-entered the field of debate, increasingly theorizing the problems of
management that they encountered. In the process, reformist economists and engineers
elaborated a set of problems which focused their attention. But more deeply, they came to
a basic understanding of and within the practical logics of Soviet production, an
understanding that has the right to be called economic. By rendering visible the way that
the institutional mechanisms of Soviet socialism articulated local interests, they
constructed this “economic mechanism,” as it would come to be called by the end of the
1960s, as a site for veridiction.

At the end of the 1950s, “mathematical methods” constituted an intervention into
this field. They were welcomed and wielded by a segment of the reformists, against the
more conservative of the political economists. The latter reacted with various arguments
against mathematics, which had not been relevant since the first Five Year Plan, the beginning of the industrialization drive. But the new industrial sectors, new personnel bearing new expertise, and new metadiscourse of cybernetics—all brought into being as part of the creation of new sociotechnical weapons systems—had changed the terrain. Young mathematicians and physicists, often with cybernetic inclinations, were recruited into the economics profession. They deployed the new tools of input-output analysis and linear programming within the problematization defined by the reformist economists. In the processes, that problematization mutated. Mathematical technique gave new forms of inference and new justifications for pre-existing proposals. But conversely, mathematical technique became its own level of historical effectivity. In the encounter of technique with the reality opened up by the problems, the problems and mathematics grew, and grew together. The ensembles were experimental systems that generated novelty that continually modified the system and its capacity for producing further novelty.

The increasingly mathematical reformist economists went through three stages with respect to the conservative political economists: a defensive fight for existence (roughly 1957–63), open challenge for the center of the economic field (~1960 to the about 1970), and accommodation. In the first, they employed a mixture of political economy arguments for their right to existence, self-abnegating claims to being “mere” methods, the faddish language of cybernetics and computers, and appeals to the threat posed by the West’s developments of mathematical economics. In the second, the opposed their own “constructive” economics to the merely “descriptive” political
economy, or claimed that they were raising economics to the mature level of an “exact” science. But by the 1970s, the field stabilized, and a ceasefire prevailed.

Figure 1. The structure of the economic field

The result had a complicated structure. The order of economic knowledge was divided into three layers. At the “top” was the political economy of socialism, which debated propositions as to the nature of socialism and its “economic laws.” Institutionally, different schools of political economy were located at the sector of general problems of the political economy of socialism of the Institute of Economics, led by Yakov A. Kronrod, the kafedra of political economy in the department of economics of Moscow State University, led by Nikolai Tsagalov, and the kafedra of economics science at the Academy of Social Sciences of the Central Committee, led by Ivan I. Kuz’minov. At the “bottom” were the “techniques of planning,” and included industry-
specific forms of economic and engineering knowledge. But between was the “economic mechanism.” The economic mechanism was the site of reformism, the level at which the institutional arrangements that were to count as instantiating the ideals of socialism could be investigated and debated. The economic mechanism is where socialism became plural: not only the various envisaged new mechanisms for the USSR, such as envisaged in the 1965 reform, but also the different mechanisms of Hungary, Yugoslavia, China. These were all socialism, but all had different mechanisms.

Cross-cutting this order of knowledge were two overlapping jurisdictions each founded on different forms of expertise. The jurisdiction of the mathematical economists embraced the bottom two levels. It was certainly possible to be a mathematical economist and never touch the problem of the economic mechanism, confining ones career to applied mathematics, highly detailed problems of particular industries, or the programming of management computer systems. But when mathematical economists derived lessons for institutional change from their models, they were discussing the mechanism. Conversely, political economists could confine their disputes to the questions such as the proper order of derivation of the laws of the political economy of socialism, but when they drew implications for, for instance, price reform, they too discussed the mechanism. Accordingly, the economic mechanism was the most contested region of the epistemic order; only extremely rarely did either group attempt to extend their jurisdiction beyond it into the other’s special purview. The language of work on the economic mechanism clearly betrays this hybrid status, partaking equally of the vocabularies of Marxism-Leninism and cybernetics.
The two jurisdictions do not map onto the distinction between those for and those against decentralizing or market-like reforms. The distinction between centralizers and decentralizers cuts across all three levels of the order of knowledge and across the two epistemic jurisdictions. Among political economists, there were thus tovarniki, marketizers, and those against. Among mathematical economists, there were those that saw computerization and modeling as ways to centralize state control, and those against. Sometimes, those on the same side of the reformism debate would team up across jurisdictional lines, but sometimes the epistemological/methodological differences would trump common cause. And even when these divisions were not relevant, disagreements about the form that de/centralization ought to take could trump agreement on the needed direction of reform.

Two Modes of Veridiction

As this chapter has explored, mathematical economics had two centers of gravity, two communities, one based around input-output modeling, and the other around optimization techniques, constituted the heart of Soviet mathematical economics. While they both came to be housed first of all at the CEMI, their overlapping networks extended in different directions. The optimizers were more closely connected to the Academy of Sciences, to the applied mathematics profession and to military cybernetics and computing institutes. The input-output modelers were more closely connected to the planning apparatus—Gosplan and its institutes, and the Central Statistical Administration—and to the institutes of applied industrial science.
As they developed, they exerted repelling forces on each other. The input-output modelers thought the optimizers utopian and disconnected from practice. Their research into the mathematical structure of optimization seemed like a game for its own sake. And their schemes were denigrated as unrealizable—probably in principle and certainly in the near term. For the optimizers, on the other hand, the input-output planners were only a weak support for a flawed system. They had no sufficiently comprehensive vision of socialist reform. They were too focused on production and growth, and not enough on efficiency—too much on technology, and not enough on management. Their techniques were less sophisticated, mathematically and conceptually. They did not aspire to comprehensively program the entire economic mechanism.

The input-output modelers would rally to answer the demands of perestroika and the first years of transition. In 1986, the former Gosplaners, now having spent decades at CEMI, managed to break away and form their own Institute of National Economic Forecasting (Institut narodnokhoziaistvennogo prognozirovaniia, INEF). Many of them were acquainted with the young reformers, either from academic circles at CEMI, or with Gaidar from his tenure as economics editor of Kommunist. They provided forecasts and current analysis of the dynamics of the careening economy, gathered data for international agencies, oversaw the overhaul of the statistical system, and generally kept doing their jobs. Some of them achieved positions of responsibility in the new Ministry of Economics, the inheritor of Gosplan, that never would have been possible during the Soviet period. The economic reformers in charge needed economists to talk to in the ministries, not the former planoviki, who primarily had experience in management and
engineering. Initially the served as deputy ministers, and then, as the reformers gradually lost influence, they increasingly assumed the position of minister of economics.

The former VTs Gosplan became the Center of the Economic Conjuncture in 1992, and in 1993 was removed from the ministry and became directly attached to Gaidar’s government. It was combined with the rump of the reformers’ Working Center for Economic Reforms as the Analytic Center of the Government in 2005. NIEI Gosplan was renamed the Institute of Macroeconomic Research; SOPS persists with the same name. The Gosplaners at INEF formed an independent think tank, the Center for Macroeconomic Analysis and Short Term Forecasting (SMAKP) in 1997, which consults primarily for the Ministry of Economics. Another group from INEF, led by former Vice Minister of Finance Sergei Aleskashenko, formed the Development Center in 1999, which subsequently became a semi-autonomous division of the Higher School of Economics. This network of institutions is today the intellectual support to the economic policy making that centers on the Ministry of Economics.

The optimal planners, on the other hand, were left to the side. Perestroika turned out to have been their heyday, when many of their ideas were implemented—though ironically not in the optimal planning variant, but in something closer to Eastern European market socialisms. When the Gaidar team came to power under Yeltsin, they did not employ their elders. Without any participation in politics or think tanks, they did find a role teaching imported Western mathematical economics. The more enterprising and younger members often took up positions at the new Higher School of Economics. Perhaps most important was CEMI’s role as incubator to the New Economic School. But
even there, most CEMI economists ceased to teach anything but mathematics after the first few years. Embittered, many of the CEMI gradually became more and more communist and statist in their old age—much more so even than they were as young men in the 1960s.

Fundamentally, the two differed in their approach to economic reality, that is, with respect to their mode of veridiction. The input-output modelers were empiricists, they grounded their veridiction in numbers that represented productive reality. Working very close to the data, they were discovering the technological and macroeconomic structure of the productive forces of the Soviet Union. Input-output analysis understands production as technologies and flows between them. The volume of these flows and the proportions between them reveal the structure of production. This structure is not a transcendent ideal that exists independent of existing production, but is an inductive, statistical inference from the empirical state of current technologies and past investment. This structure does constrain the course of development because only some futures are possible on the basis of the present, at least without incurring waste on the one side and shortage on the other. The structure expresses a determinate space of variation in which different futures are possible, enables quantifying the size of the tradeoffs between them. In planning, the input-output model expresses these constraints by working backward from a desired end state. It reverses the temporality of Soviet planning: rather than an open-ended future of “planning from the achieved level,” of adding more, it asks what the planners and politicians define a determinate goal state.
This future is limited by the current production, and in the last analysis by the technologies that underlie it, and their potential for change. This is why, as input-output analysis turned away from models for planning, it became models for longterm forecasting. As the term of planning stretches out into more and more distant futures, it becomes less like planning and more like forecasting. And the longer the term, the less important current decisions become. Slowly moving and hard to affect variables exert stronger and stronger influence: on the one hand, the primary factors of production, i.e., the investment share and population growth, and on the other hand, the technologies that combine them. The Soviet input-output modelers, as they extended their forecasts twenty years or more into the future, became ever more concerned with describing and predicting that seemingly most unpredictable series of all: invention. They generated the only coherent and empirical picture of the longterm structural change of the Soviet Union, which stood quietly alongside the ideological narratives about the imminent arrival of communism. This picture elicited ever greater attention from their peers, and anxiety among Party leadership.

The optimal planners based their veridiction on an ideal structure, the structure of perfect allocative efficiency. The structure of allocative efficiency was not the same as the structure of proportionality of the input-output modelers. First, it was not an empirical discovery, but an ideal with normative power with respect to which reality was measured. It failed to correspond to or describe the reality of the Soviet Union, and precisely the measure of this failure was the space of in which the critique functioned. Second, it existed only as a mathematical object; it could not be realized in a intuitable spatial form,
like the iconistic input-output table. The “result” of this object would be a vector of prices, which express and summarize its structure but do not depict it.

Optimal planning was not just non-empirical, but it also stood in a different relationship to economic reality than did Western general equilibrium analysis. First, it was not an “invisible hand,” not a natural outcome of exchange. It was something that had to be brought about through conscious planning. This was true too of some redactions of Western neoclassical economics, like the Ordoliberals. But, second, this perfectly allocationally efficient structure was non-natural, non-automatic in a further sense, because it was anchored by a explicitly chosen outcome, was optimally efficient only with respect to realizing that outcome. Third, optimal planning would be not only the right direction of things, but moreover the right programming of the institutional structure of the Soviet Union, of its ensembles that brought things and people into interrelationship, such that decisions were taken in a way that realized planning. Fourth, general equilibrium has a descriptive but non-realist relationship to economic reality. It assumes that the actual truck and barter of real life will bring about the equilibrium it describes, but does not attempt to describe that activity. Economic activity proceeds only as though it were a tâtonnement process. But optimal planning is constructive as well as normative. It must create real algorithms, computational and institutional, that that will provably bring about and maintain the optimum.

*The Place of the Sovereign*

No matter how their modes of veridiction that limited political power in the name of economic reason differed, both of these two communities, centered on these two
techniques, operated with a shared ideal of governmental technology. It can be pinpointed by comparison to the political economic thought that Foucault argued was inaugurated by Adam Smith, and the distance of Smith’s thought from that of physiocracy. Smith is famous or infamous for the phrase “the invisible hand,” but for all its seductive metaphorical power and seeming simplicity, it has not ceased to generate oceans of interpretive work. Foucault’s interpretation sets up an opposition. One the one hand, the invisible hand of the market is like the providential action of God that arranges things just so. From the unseen vantage of the hand, the entirety of the economic world is intelligible, is linked by chains of reason, down to its least instance. The totality of the world is transparent to the gaze of God. This is the gaze that physiocracy offers to the sovereign via the Tableau economique. Physiocracy does interdict the disciplinary techniques of Raison d’État, but the sovereign is not to intervene not because it is impossible, but because he has perfect knowledge of the necessity of all the events that take place in the economic life of the nation. Economic knowledge and political sovereignty combine into an economic despotism. Economic knowledge, in the Physiocratic system, is a science of government.³⁰⁷

But Foucault argues that Smith’s thought is critical in the properly Kantian sense: though the Reason of man cannot help but postulate such a vantage, it is strictly speaking senseless, the thought of that vantage is contradictory. The non-transparency of the economic is not a matter of limited knowledge. The rationality of the economic process, the fact that things come about as thought guided by divine reason, is possible only

because there is no knowledge of the totality. Each economic agent acts interestedly, and can only act, from their own limited and situated perspective within the economic process. And only if each agent so acts will the process as an uncognizable totality achieve something like a global rationality. There can be no point of view by which the sovereign—or any other agent—can cognize the totality. This is why Foucault claims that political economy and liberalism are born together. Economic reason is, he says, “lateral” or “orthogonal” to government. It gives a limit to governmental action that is internal to government (versus the externality of the limits of the law), but it is itself not a knowledge of government.  

In the history of governmentality, the death of economic god, of the economic sovereign, of the possibility of a science of government, marked a crucial watershed:

“All the returns and revivals of nineteenth and twentieth century liberal and neo-liberal thought are still a way of posing the problem of the impossibility of the existence of an economic sovereign. And with the appearance of planning, the state-controlled economy, socialism, and state socialism the problem will be whether we may not overcome in some way this curse against the economic sovereign which was formulated by political economy at its foundation and which is also the very condition of existence of political economy: In spite of everything, may there not be a point through which we can define an economic sovereignty?”

I argue that what we see in the mathematical economics of the Soviet Union of the 1960s was just such an attempt to create an economic reason that preserves a position for the

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308 Michel Foucault. *The Birth of Biopolitics*, 281–3
sovereign and can thus serve as a science of government. This last phrase, after all, which Foucault uses to characterize to physiocracy, has its most recent resonances in the history of socialist thought, from Owen, Saint-Simon, and Fourier to Marx. Soviet pre-mathematical economics said to the sovereign—that is, the Party, or to Stalin—that rule by dictum was impossible, or at least could never be as effective as desired, and at worst could lead to Terror, to the escalating and irrational use of violence to close the gap between the wills of sovereign and citizen. The polity must be composed through the creation of an economic mechanism that would enroll the irreducible plurality interests in the global project. The sovereign must govern through and by means of interest. Input-output modeling and optimal planning stepped into this structure and offered a means to do just this.

As governmental diagrams, both techniques preserved a position for the sovereign. The input-output model, as inheritor of the Tableau, lay before the sovereign gaze the proportions of the economy, and offered a spectrum of consistent plans to choose among. It was no restraint on the sovereign’s choice save consistency, and even then the sovereign is free to choose an inconsistent plan, in which case the model will dutifully tally the costs of inconsistency. But the optimal planning model goes further. While the input-output model was perfectly agnostic to the model of government, disciplinary or otherwise—and was therefore most easily assimilable, not only because of ideological proximity to existing practice, but because of its governmental compatibility with it—the optimal planning model is essentially a structure for governing interest. The computation of the model yields “prices” and other “normatives.” These are parameters
for action. Optimal planning requires the creation of freedom, of a realm of choice for economic agents, in order for these parameters to function as channels guiding interest. But to where are they guided? To the fulfillment of the objective function. The objective function is “exogenous,” meaning it enters into the optimization problem and determines it, but is itself not determined by it. It is determined by the party. The objective function is nothing other than a name for the economic sovereign.

Optimal planning was a tense synthesis. It tried to hold together two freedoms, the freedom of the economic agent and that of the Party that bore the knowledge of the course of history. The agency of the economic agent would coincide with and enact the will of the Party. A complex, hierarchical, system of systems, each with their degree of free play, but so preconfigured as to realize a single harmony in pursuit of a common objective.

As such, optimal planning was an expression of the social, ethical, and political situation of the Thaw itself. The Thaw was a period of optimism during which the vast majority of Soviet citizens and the intelligentsia yet believed in the possibility of a “socialism with a human face,” in a true Leninism rescued from the distortion of the cult of personality. In the 1960s, the dissidents were a tiny minority, a bare handful of individuals. The intelligentsia still believed or wanted to believe that Soviet socialism could be, in Marx’s famous words, the true “reign of freedom.” It wanted a degree of freedom, and it wanted that freedom to coincide with a sincere and earnest state, the goal of which was to realize the true conditions of freedom for all.
Andrei Nechaev: [The Soviet citizen] had a feeling that he was a man needed by his country. … This perception of eliteness, of chosenness, many have lost of course. But today they have a car. It breaks down, they buy another. They have a dacha, but the feeling of being needed to the country, of being a respected person, they don’t have that.

Alfred Kokh: And being needed in one’s family, this is, unfortunately, marginal.

Andrei Nechaev: And there are millions of such people.

Alfred Kohkh: The logic of which you speak is generally clear. And why people have such a feeling is also more or less understandable. But why do thy have to think up what never happened? Today has appeared such craziness as that millions of Russian people died as a result of the reforms. They ‘died of famine,’ and they blame us for it. Read the internet, the newspapers. Luzkha with Popov.

Andrei Nechaev: Partly, this, you understand, comes from the very top. There they would like to support a certain level of hostility towards the 1990s, and to those people associated with them, but the old arguments no longer work, so they have to think up new, more dramatic ones.
Alfred Kokh: And why the 90s? Why not the mid 1980s, the 1970s? And who thinks up such things? Surkov?

Andrei Nechaev: Probably. Or those that give him orders, or those who advise them.

Peter Aven: It is certainly an ideological apparatus. But the main thing, is why is the past uninteresting? I think that in Russia at the beginning of the 20th century there was a feeling of passionarity. There was a discussion after the revolution, everyone had the feeling that something had happened, but that still greater changes were needed, to struggle for the best, the right, one can go this one, one can go that way. Let’s fight for our future. Today the very idea of fighting for the future has disappeared. And for this reason no one is interested in the past.

Alfred Kokh: They fight for the present.

Petr Aven: The air has escaped.

Andrei Nechaev: You, Petya, have put your finger on the main thing: Egor had that passionarity 200%.  

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AT GAIDAR’S GRAVE

On the fourth and final day of a conference named in Gaidar’s honor, March 19th, I emerged out of the metro at Yugo-Zapadnaya into light snowfall and dim early morning light. It is the last metro stop, and the edge of the city. Very tall new apartment towers stand out against the white sky. My formal shoes slid on the sidewalk as I hurried as best I could toward the Academy of National Economy.

The Academy was a response to economic stagnation. It was created in 1977 in order to train top managers, as a Soviet answer to the American business school. Better managerial training, so went the hope, would restart productivity without requiring any real changes to the structure of the economic mechanism. In 1989, the mathematical economist Abel Aganbegian was appointed its new rector. Aganbegian was one of that first wave of mathematical economists. In 1960 he moved to Novosibirsk, and by 1964 he was appointed director of the Institute for Economics and Organization of Industrial Production, at the age of 32. By 1984, he was one of the most prominent spokespersons for mathematical economics, and moved to Moscow to advise Gorbachev on perestroika. As rector, in 1991 he assisted a young Yegor Gaidar in setting up his own institute, the Institute of Economic Policy, which became the staging ground for the future government. Gaidar’s protégé, Vladimir Mau in turn would take over the rectorship of the Academy.

The Zenit Business Center rose before me—the Crystal, the Icicle, the Blue Tooth, as Muscovites call it. It is as though a monument to the folly of economists, a
tombstone to the optimistic years of reform and transition. The enormous blue glass
building looms over the Academy, on the grounds of which it was built, casting a jagged
shadow. Its facade is pocked with black holes where windows have shattered. If you get
close enough to peer into them you can see the graffiti coating the empty interior. The
project was Aganbegian’s idea, realized just when foreign investment in the Soviet Union
was legalized. At the time, it was meant to be the largest commercial complex in
Moscow. It was funded by a consortium of foreign banks and the Italian government in
1990. By 1994, in a multi-stage scheme, the building was privatized. In 1995, it ran into
funding problems, and construction was frozen. But by 1998, it attracted the attention of
state auditors, and in 1999 the procurator opened a criminal case against Aganbegian.
Caught in legal and financial limbo, the building has since decayed.

The two charter buses parked out front the Academy gates were far from full of
people. The conference had been a major event, with thousands of participants, from
aging academics to prominent businessmen and officials giving quotations to swarms of
reporters. But now the handful of passengers sat in little clusters and made quiet small
talk in a variety of languages. Marek Dabrowski, the former Polish Minister of Finance,
sitting behind me tried to sustain a conversation with a young and overly jovial American
political scientist.

When we disembarked at the gates of Novodeviche cemetery I found some
acquaintances, American and British economists who had been involved in the early
reforms. I fished out cigarettes from the deep pockets of my borrowed black coat for
someone who had forgotten his. The ancient monastery’s cemetery, the last resting place
of saints both of the church and of the state, had been a controversial site to bury one of
the most hated men in Russia.

By the time we walked to the grave many of Gaidar’s friends and associates,
having arrived in private cars, were already assembled. Many of them had come directly
from the first board meeting of the new Gaidar Fund, founded to rehabilitate his memory
as a blow in the culture war for liberal policy and values. They lay wreaths on the grave
one by one, then stepped back to stand in a crescent facing the monument. This
monument, standing amid the traditional busts and Orthodox crosses, was abstract:
vertical sheets of blasted bronzed metal, curling at the edges, meant to symbolize the
scholar’s sheaf of dogeared papers. Beneath it the grave was already heaped high with
flowers, their bright hues fairly glowing in the colorless winter day. Yegor Timurovich
would have been fifty-five years old on this day.

There were no speeches, and almost no conversation. It was not a place that lent
itself to talk. The gathered mourners, approximately forty people, arrayed themselves and
merely stood in silence facing the grave. Some were young, like Gaidar’s son Peter and
the younger members of the former Institute for the Economy in Transition (newly
renamed in Gaidar’s honor), and some were very old, like former Minister of Economics
Yevgeny Yasin, his chin jutting forward over his scarves. But most were in their fifties:
his comrades in government of those early years and some Polish counterparts. That is,
still vigorous and active, still deeply involved in weighty affairs of business and state
(among them Minister of Finance and First Deputy Prime Minister Alexei Kudrin), but
no longer young, and you could see it on their faces and from the slope of their shoulders.
They felt the weight of the historical events they had lived through and shaped, and they felt the weight of the judgment, even hatred, of the Russian people for what they had done and for many things they had not. But their shared determination, shared sense of responsibility, of rightness, and of mission, one not yet carried to completion, was also still visible. If hundreds of economists had come to the conference meetings, it was several dozen comrades who had come to the grave. After maybe an hour Anatoly Chubais, standing tall next to Kudrin in the middle of the crescent with his famous red hair uncovered, seemed to move or nod his head and wordlessly the tight knot of people began to break up into twos and threes to walk back out to the road.

**PREHISTORIES**

Soviet economists’ networks, intersecting and overlapping across the dozen major research centers of Moscow, Leningrad and Novosibirsk, were in continual motion across the 1980s, forging links and alliances with bureaucratic patronage networks, becoming visible to the public in the “battle of the programs” in 1990, and intertwined with the emerging democratic wave. But in the autumn of 1991, having come to power after the failed putsch, Yeltsin chose a 36-year-old economist named Yegor Gaidar to spearhead radical market reform and gave him carte blanche to bring into government his entire circle of similarly young and even more unknown economists. The team has been called many names—the young reformers, the Snake Hill group, the Gaidar team, the government of deputy laboratory heads, and others much less kind. To most eyes they appeared out of nowhere, and their success against far more famous (and perhaps more
moderate) groups of economists appeared inexplicable, and has largely escaped attempted explanation to the present day.

This chapter will explain and interpret the emergence of this group. To do so, I will begin by arguing against a common way of framing the transition: the grand narrative of neoliberalism. This narrative has important implications because it slots Russia into a world historical narrative. The ground cleared, I then situate the transition team in their theoretical and institutional milieux and in the wider mutations of late socialist society that recent scholarship has revealed beyond the received story of “Stagnation.” The Gaidar circle took shape within the interstices of late Soviet life that allowed a limited autonomy. By the onset of perestroika, their early years spent searching for likeminded others had culminated in a seminar at a sanatorium called Snake Hill. In their memory, this was a historical watershed. Dozens of members of the original Snake Hill group later entered government at cabinet-level positions.

But their theory, not just their organization, gave them an advantage. Most accounts assume that because we call them “economists” and because they oversaw the beginnings of the institutionalization of a capitalist economic system their economic theory was the orthodox ‘neoclassical’ theory with which Western observers are familiar. But this is not the case. “Western knowledge [of mathematical economics] is useful for the second stage of reforms,” Vitaly Naishul said to me. He punctuated each word of the next sentence with a his fist in the air,

“But first you must feel know what can be done here, what exists here, with your skin, not with your brain. Then you have to understand economics, markets, so
deeply that it is as obvious as daylight that, even without knowing some aspect, you know how to apply it to that aspect. These two things make a reformer. Then after you people will come who must have more complex knowledge. The reason that this group is still in power is because we have this clear sort of understanding.”

The young economists grew to intellectual maturity within a Soviet academic context, learning from local sources. Importantly, they actually rejected harshly the most neoclassical of Soviet economic trends, optimal planning, despite their significant mathematical training and being mentored by among the most famous of the optimal planners. Insofar as they were in contact with Western scholarship, it was much more unorthodox and institutionalist work, like that of Herbert Simon and Oliver Williamson, not the mainstream of mathematical economics. Two key mentors were Yury Yaremenko (in Moscow) and Sergei Syroezhin (in Leningrad); they also describe the encounter with the Hungarian János Kornai’s *Economics of Shortage* as life changing. Based on comparative research of the attempted market socialist reforms of the Eastern European economies, field research in the local agrarian economy of the Altai region of Siberia, and experience at Gosplan, three subgroups independently developed what they came to call the theory of the administrative market by 1986. This is a deeply institutional (and non-mathematical) theory which involves a history of the evolution of the Soviet planned economy, a critique of the Soviet state, and a certain understanding of the limits and possibilities of reform.
But their reform plans too changed over time. Initially they took the Hungarian market socialist model as their goal. This market socialist orientation was universal within reform economics. Indeed, perestroika should be understood, as it was then, as the long-deferred—and in the end, disastrous—realization of market socialist dreams by the reform economists of the 1960s. Only with perestroika well underway did a full transition to capitalism become the aim of the younger generation. They understand their own evolution with respect to market socialism versus capitalism as the result of the changing political possibilities over time.

This narrative cuts off in approximately 1986/7. This is before the young reformers began in earnest to network in larger dissident and emergent “informal” political circles, in which they played important and under appreciated roles. They took advantage of the quickly changing possibilities for forms of association opened up by perestroika, including the advent of political clubs. Through these clubs they helped to create, especially the eponymous Club Perestrioka, they opened fora for the emerging democratic political scene, contacts with which were crucial for the political battles of the 1990s to come. Their success in coming to power despite their relatively low stature compared to the other groups that developed reform plans on the eve of transition is rendered plausible by the way they seized these new possibilities.

The end of my story here is also before their first contacts with Western economists. Future work, based on archival work, will examine this other side of my domestic story. The first contacts between Russian and Western economists took place from roughly 1988 at two venues, the Centre for Research in Communist Economies
(CRCE) in London and the International Institute for Applied Systems Analysis (IIASA) in Laxenburg. In 1989, they took a group trip to Chile. These early contacts have been overlooked. Based on archival research at each of these transnational centers and interviews with those they came in contact with, I will reconstruct the representations and interests on both sides.

Many critiques of transition have pointed to the IMF and Yeltsin’s foreign advisors (especially Jeffrey Sachs, Anders Aslund, and Richard Layard) to explain the purportedly extreme and dogmatic pro-market stance of the reforms. Using the archives of both the IMF and the World Bank, and interviews with team members from these two places and Jeffrey Sachs’ team, I will show the understandings and misunderstandings each side had of the other, and demonstrate that though they were very important for the political success and self-image of the reformers, they too did not fundamentally alter the aim of reforming socialism out of existence. They came too late to make any difference in the overall direction of policy.

AGAINST “NEOLIBERALISM”

Both in the West and in Russia narratives of the transition to capitalism often indict the young reformers as either textbook neoliberal economists or as the dupes of the same (naming especially Jeffrey Sachs and the IMF). Neither of these variants are tenable, and both obscure the true deep roots of the reformers in domestic Soviet social, cultural, and theoretical milieux. As against the former, one need not dig too deeply to see that their training was Soviet through and through, their exposure to Western theory
late and partial, to contemporary (post-sixties) theory non-existent. There is no evidence, first-person, anecdotal, or archival, that the goals or thinking of the economists of the Gaidar government had been shaped by the Western economics most deserving of the title ‘neoliberal’. As against the latter, a careful study of the evolution of their positions through the 1980s reveals that their policy goals, if not always the means by which to achieve them or a detailed understanding of their interconnections, were already set by the time they first encountered Western economists—and among these Sachs and the IMF, the conventional devils, were neither the first met nor the most influential. This is reinforced, as we shall see, by archival evidence. (Thus too are unsupportable the anti-liberal Russian narratives that take the young reformers as usurpers, nearly a coup, possessed by foreign ideas and perhaps foreign money, hijacking the politics of transition either for their own gain and that of their supporters or zealously in the name of an imported ideology, and finally ousted by a properly patriotic Putin.)

Therefore, if the continuity of the grand narrative of neoliberalism as it sweeps from Bolivia through Reagan and Thatcher to Yeltsin requires that of the entangled skeins of economic theory and economists in institutionalized positions of influence, it is thrown into doubt by a deeper knowledge of the Russian case. And the Russian case is crucial to the historiographical power of that narrative: it supports a conception of neoliberalism as not just one story among others of the second half of the 20th century, but as a periodizing or epochalizing construction.

Epochal history supposes a path along which the collective subject of mankind is passing, a path that is broken into stages. As Ronald Meek demonstrated, such theoretical
history attained its familiar materialist form in the middle of the eighteenth century, between Glasgow (Smith) and Paris (Turgot).\textsuperscript{310} Out of the Pufendorf’s history of property, the North American encounter with the Native American, and French providential history issued four stages defined by their respective ‘modes of subsistence:’ “1st, the Age of Hunters; 2dly, the Age of Shepherds; 3dly, the Age of Agriculture; and 4thly, the Age of Commerce.”\textsuperscript{311} Meek hypothesizes that the catalyst of this synthesis was the complex and rapid socioeconomic dynamics of mid-century Glasgow, where multiple modes of subsistence were indeed visible to the naked eye. And positing socioeconomic stages, he argues, is the pivotal intellectual operation that enabled capitalism to be thought in its synchrony. The sectioning of history is the condition for establishing stages of it as homogenous within themselves. As a conceptual consequence, that which differentiates the stages from each other, the mode of subsistence, is thus both common to each and is determinative of the non-essential or derivative that differs in each.\textsuperscript{312} Taken up by Hegel, this fruit of the Scottish Enlightenment bloomed into the progress of Spirit objectifying itself in all the other phenomena of the age, and thence, “stood on [its] head”—again—into Marx’s “mode of production”. In Marx, another stage is added: communism becomes the end of history.

However out of fashion Marx may have been, 1991 immediately called for epochal theorizing. Famously, Francis Fukuyama declared liberal capitalist democracy to


\textsuperscript{311} Adam Smith, \textit{The Wealth of Nations}, 5th ed. (London: Methuen & Co., Ltd., 1776), (A) i.27.

be the end of history, the socialist parenthesis finally closed.  

(China and the European welfare states were waved away as vestigial.) From the left (or at least those who had not yet written off the Soviet Union as already non-socialist at one or another watershed), this unambiguously signaled that the previous twenty years, plus or minus, represented a deviation from the path of history. Thus the theory of neoliberalism, an epicyclic explanation of the retrograde motion of History since 1970, just as the Soviet period was explained away by liberal narratives.

In anthropology, neoliberalism achieved the status of epochal appellation of choice in the second half of the 1990s, having replaced a long series of quasi-epochal, quasi-typological designations with derivations from a variety of theoretical traditions, including complex society, post-Fordism, post industrial society, postmodernity, and finally globalization amongst others. This is undoubtedly a theoretical solution to the practical problem of how an anthropology that had abandoned its comparative-typological project and lost its colonial scene of encounter could make analytical contributions to the study of the globalizing post-colonial world that could command wider attention. And thus anthropology comes full circle, from having finally shaken loose of evolutionary historicism in the first half of the century for what now seems to be only an ethnographic interregnum before the return of the reign of the epoch.

The theorization of neoliberalism has suffered from a plethora of definitions, including as a distinct set of policies that aim to remove the state from economic management, as a political ideology sometimes called ‘market fundamentalism,’ as an

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elite project aimed at the restoration of class power after the golden era of Fordist compromise. But increasingly commentators have linked any and all social phenomena to neoliberalism, an inflation or “acceleration” of analysis that relies upon classic epochal logic, according to which all major events of the epoch are taken as emanations of its central tendency, its Subject of History. But the dangers of epochal thinking are to some extent recognized: historical processes must now be given their mechanisms and agents. In the post-1970s world of neoliberal periodization this subject is thus some form of “neoliberal project”, and the red thread by which its continuity is recognized is the presence of a certain sort of economics. Economics, in particular an amalgamation of neoclassical mathematical economics and Austrianism, is in all theorizations considered the arena *par excellence* for the elaboration of neoliberalism, and economists the ideological beating heart of broader coalitions within the power elite. It is they who, from positions of institutionalized power like the international organs of finance and development, provide the authoritative technocratic oomph to turn imagined liberal utopia into actually existing neoliberal dystopia. Ironically, given the left’s opposition to idea-centric explanation of historical change, this demiurgic aura of economists is only reinforced by the left-inflected theories of neoliberalism that aim to enable opposition to them. But it is crucial to realize that the world-historical import of this neoliberal project, its ability to serve as the essence of an age, follows precisely from the neoliberal narrative’s comprehension of the end of the similarly world-historical project called the


Soviet Union. And the incorporation of the Soviet Union has relied on the assimilation of some of the agents of transition to those economists that embody the neoliberal Spirit, namely the economists of the Gaidar government.

The stakes here include not only dispelling the demiurge of the Economists, enabling the study of actually existing economists as social actors in variegated locales, even as social philosophers of the most varied sorts, and employing techniques with their own cognitive affordances and recombinant genealogies—in short, decomposing the monolithic unity of the discipline imagined by laymen and disciplinary others. The stakes are much larger: removing the Gaidar group from this master narrative—and thereby the Soviet Union—removes the telos towards which disparate political-economic processes around the world are retrospectively seen to lead, dissolves the plausibility of the epochal formulation, thus arresting the analytical acceleration and restoring the possibility of researching the manifold of the global contemporary.

**UNAVOWABLE POSITIONS**

In contrast, my narrative is grounded in the social structures, intellectual projects, and cultural shifts of late socialist worlds. From this perspective, the reformer/conservative binary dissolves into constellations of interconnected reflexive actors. Their histories are at once very local and transnational, and remain very much alive across the narratological abyss of 1991.

The Gaidar circle is of heterogenous origins, they came from diverse locales in Soviet academia, with different sorts of training and prestige. As young academics in the
1980s they slowly found each other, not knowing precisely what they sought but sure each time they found it. Despite their diversity, there was something crucial they shared: an intellectual environment that was created inside the institutes that preserved something of the ideals of the Khrushchev Thaw, the ottepel.

As young researchers, the generation of the 1960s (born in the 1930s), the shestidesiatniki, had created and then inhabited the institutions and social networks of Soviet mathematical economics—foremost among them the Central Economic Mathematical Institute—and imbued them with their idealism, their belief in both the reformability of socialism and the necessity of reform, their interest in the market as a coordinating mechanism, and their resentment of censorship and dogmatism. Their idealism coincided with the first fruits of the mass education campaigns of the early Bolshevik years, the massive buildout of the apparatus of the Soviet sciences, and the rising demands for expertise need to govern the increasingly consolidated and complex Soviet society. Between January 1959 and December 1967 the intelligentsia (defined as “…persons with a tertiary education, tertiary students, and persons lacking formal tertiary qualification but who are professionally employed in jobs which normally require a tertiary qualification”) increased by over seventy per cent.\footnote{L.G. Churchward, *The Soviet Intelligentsia* (London: Routledge, 1973), on 6.} Accordingly, their careers progressed very rapidly. For example, Stanislav Shatalin had already in his mid-thirties become a corresponding member of the Academy of Sciences and a deputy director of CEMI—fantastically young. By the time the young reformers were coming of academic
age, these shestidesiatniki controlled these institutes and had already raised several generations of students.

From its foundation CEMI had offered a certain refuge. The director, Nikolai Federenko, and his deputy directors gave a home to many young mathematicians, engineers, and economists who had besmirched political records, wanted to escape the highly regimented worlds of the closed military institutes, or came from various ethnic minorities. For the latter reason, it had a disproportionate number of young and brilliant Jewish mathematicians who found their way to the heights of their own profession—Moscow State Universities Faculty of Mechanics and Mathematics and the Institute of Mathematics—to be blocked, and accordingly were forced to switch into applied specialties. The young stars of the early era of mathematical economics who later rose to prominence, figures such as Stanislav Shatalin, Yurii Yaremenko, and Nikolai Petrakov, maintained this atmosphere. They led or participated in the constant campaign of a faction of the mathematical economists to legitimize the idea of the market as a tool for socialist governance. The young Moscovites who eventually gathered around Gaidar looked to them for inspiration, mentorship, and protection.

The idealism of the Thaw, however, itself cooled. The period from Khrushchev’s ouster to Gorbachev’s initiation of perestroika is also represented as zastoi, Stagnation. (Though commonly the terms of office of the general secretaries are taken as the watersheds, for my purposes more important is the invasion of Czechoslovakia in 1968, prior to which the Brezhnev government had continued to support the Kosygin/Liberman reforms.) But recent scholarship, to which this work is a contribution, has refused to view
Thaw and Stagnation as opposite movements along the axis of freedom-constraint. Rather both periods are revealed in their polyvalent social transformations.

Alexei Yurchak has argued that in the late Soviet period the univocal authoritative discourse issuing forth from Stalin had been transformed into a mechanical and routinized practice of self-citation, increasingly lacking in cathexis or identification.²¹⁷ Behind this patchwork screen of ideologemes a crucial third position evolved between or alongside the positions of identification and dissidence. Yurchak calls this position being *vnye*, outside of, or beyond. Those *vnye* were not in opposition to the regime, like the celebrated dissidents of the 1960s and 1970s, on whom so much attention has been lavished. Though he (rightly or wrongly) shies away from offering this as an explanation for the collapse of the Soviet Union, this argument is meant to explain the paradox that the Soviet Union’s end was unthinkable right up until the minute it happened.

Kevin Platt and Benjamin Nathans extend Yurchak’s argument, both backwards in time, to transformations of consciousness at the time of the Thaw in order to reincorporate dissidence into Yurchak’s schema, and outward into a broader context of transformation.²¹⁸ They argue that the Thaw was the beginning of a process by which personal and intellectual life achieved a degree of autonomy, by which the state’s claims over daily life to a degree withdrew. Official discourse under Khrushchev took seriously the claims of Marxist ideology that socialism ought to provide a sort of obviously modern life that was manifestly superior to that which capitalism provided, and in the post-War

context, this meant emerging consumer society. Social control had to shift from coercion, terror, and mobilization, to more subtle modalities of everyday discipline and what James Millar has called the “little deal” of widely available consumption and a degree of personal autonomy.  

They thus claim that the other side of the hollowing out of Soviet official discourse was the creation of an analogue to the private life of liberal societies. Careful not to assimilate the two too closely, they do note that this was “imaginary” in some sense. I would argue that it was precisely not imaginary. Rather, it was real, but could not be imagined. Soviet authoritative discourse continued to claim unbounded application as the same time as it ignored and had to ignore the unrepresented private worlds, so long as they did not cross the line into dissidence and individuals maintained a facsimile of conformity. The relationship between public and private was emphatically not that theorized for early bourgeois society, in which the public sphere serves as the rationally agonistic forum for plural private voices—it was a “private public sphere.”  

From this perspective Platt and Nathans argue that “the discursive transformations of perestroika in significant part constituted a state-initiated release of these political potentials into social and political life at large.”  

In this mutating semiotic framework, the institutes of the Academy of Sciences were important spaces. As Mark Sandle describes the worlds of these institutes: “The

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321 Kevin M. F. Platt and Benjamin Nathans, “Socialist in Form, Indeterminate in Content,” on 322.
problem that confronted these individuals and institutes was the fact that they were attempting to occupy a politico-ideological ‘space’ between the dissidents on the one hand, and the official ideological establishment on the other that did not publicly exist.”

Platt and Nathans are concerned to pluralize Yurchak’s trinary in order to make room for a variety of dissident practices; the economists evidence yet other positionalities available with respect to authoritative discourse. Inhabiting these positionalities also meant orienting toward specific theoretical schools and mathematical techniques. One option that many took was to withdraw completely into pure mathematical research without any ideological implications. Another closer to identification was to hope for reform from within that would finally put their talents to use. But any position that involved the hope for political engagement, a desire to be effective, could neither take the stance of dissidence nor of the purposeful disengagement of vnye. The economists, both of the sixties and of the eighties, were within the spectrum of what Churchward termed “loyal oppositionists,” people willing to work within the system for its reform.

Oleg Ananyin, a member of the reformers’ circle from the beginning, has reflected and offered a categorization of dissidents, loyal reformers “seeking a way of legitimizing her/his reformism, i.e. making it compatible with, at least, official discourse” and “latent dissidents,” adopting “a mixed strategy of double existence, breaking with establishment in one's thought, but not in observable behavior. The ‘latent dissident’ was ready to play conventional language games about “system improvements,” yet for him – unlike ‘loyal reformer’ – ‘reform’ was no more, than an euphemism for a transition to

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capitalism as a full-fledged market economy.” Ananyin, perhaps contrary to expectations, places himself and his fellows firmly in the loyal reformer type, with a very strong sense of professional identity.  

Refusing the association with the Russian revolutionary imaginary, Aven said, “If you think that we felt ourselves to be inheritors of the Decembrists, People’s Willers—nothing of the sort. We were entirely not dissidents. We lived in the Academy of Sciences, where there were various seminars, Shatalin’s at CEMI, and later at ISA, various scientific schools, and thus we regarded ourselves as part of the academic environment, just our theme was a little different, more connected with changes in life than the more theoretical seminars of our colleagues. We perceived ourselves until the end of the ‘80s fully as an organic part of the economics establishment.”  

Their orientation was emphatically technocratic, with the emphasis on their professionalism. In interview, Anatoly Chubais offered “Sure, I could go out and paste up fliers ‘Down with the KGB!’ . Perhaps it is honest and beautiful, but I was not about that, I wasn’t about ‘Down with the KGB,’ but about how to reform the economy. Anyone should understand this. This was our profession, and we wanted to work these things out to the end in this profession and to build something.”  

Sergei Vasiliev similarly said, “We thought of ourselves primarily as a scientific movement and as expertise: support for reform,”

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research on theoretical problems.”

Glancing ahead, this orientation can be seen throughout their subsequent 1990s careers; though they continued to hold the highest bureaucratic posts, they usually eschewed political duties, and few of the core members ever stood for election.

In contradistinction to the already famous scientists and their older disciples (the academic generation of the seventies), the young reformers were more pessimistic as to the reformability of socialism. Aven said to me “In our generation? We were much more cynical. We didn't believe in all this stupid stuff about socialism with a human face and all that, I just hated all that, I hated, I hated the KGB, I mean it was, I hated. They were much more idealistic, that's right, that generation was basically much more idealistic, that's right.” Aven may be an outlier; certainly there was considerably more idealism among some other members of the group, such as Ananyin and Vasiliev, as to the possibility of some sort of market “socialism with a human face” within the constraints of the system, at least through the middle of the 1980s. This change in attitude can be attributed to their environment: while the shestidesiatniki emerged into the glories of the Great War, the societal opening of the Thaw, the massive buildout of academia, a growing economy that increasingly was fulfilling its populist promises, and Sputnik—in short, into an environment of hope, optimism, broadening horizons— the young reformers grew up in what has been retrospectively cast as stagnation, zastoi, after the disillusioning invasion of Czechoslovakia, characterized by pervasive and growing shortages, the arrest and rollback of the Kosygin/Liberman reforms, a rusting industrial base overwhelmingly

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devoted to the military, growing awareness of the technological advances of Western economies and the rising living standards of consumer society, and a calcified state topped with a gerontocratic Politburo (celebrated in official rhetoric as “stability of cadres” and popularly mocked, bitterly, as the “parade of coffins”).

The older generation did not suffer Stagnation easily. “They were much more conformist. They were in Russian we say *slomanie*, they were broken people. Psychologically they were seriously broken. Because their life was unhappy,” Aven said to me, grimacing as he remembered without pleasure:

“I guess they somehow are a lost generation, lost generation. Because again they were part of the system much more, they were much more constrained, but still they were able, and some were very talented, but with no result, with no effect, they couldn't influence the system. They had heart attacks, they were drinking a lot, and as a result Anchishkin died very early, Yaremenko died early enough, Shatalin had cancer and was a hard drinker, Petrakov is just an alcoholic. And so on and so forth. … They were hard drinkers and this feeling of lost generation was very strong in them. And because they were feeling they were so much constrained they were prepared for many more compromises than ourselves.

Aven continued, likening taking leadership in the transformation of the country to an act of self-salvation,

“We could have become the same, but we received this chance to change the country, to change our lives. I emigrated *de facto*. But anyway it was a chance for a different life. We were younger.”
“CADRES DECIDE EVERYTHING!”

“We did a lot of talking this past winter,” Viacheslav Shironin told me. We were sitting again in the same Italian/sushi restaurant in Kitai Gorod where we usually met. Grigorii Glazkov lived across the street. In the back room the waiters would let us turn off the pop music for the sake of my recorder. “We fell out of touch for many years but in the last several years we’ve been trying to take stock, understand our own history. What we realized is that we’re a strange community of very different people, with very different experiences. It’s not that everyone can talk with everyone else.”

The economists had been each other’s best interlocutors, and what is more, best friends for nearly a decade before they came into government. From that moment, they churned, some growing closer, some falling by the wayside. Some remain in government to this day. They have provided the continuity in economic policy of the first twenty years of Russia’s independent existence. Each can be located in a particular strand of Soviet economics—and usually in reaction against it. They represent almost the full spectrum of approaches within Soviet economics.

The political and methodological fractures of the Soviet economic field were exacerbated by the way the hierarchical structures of Soviet academia fostered differentiation within ‘disciplines’: each institute, and within each institute each section and each laboratory, trained up its own junior researchers under the direction and control of the senior researchers. Even within the current of mathematical economics, united as it was by its theoretical and political opposition to the political economists of socialism,
initial differences in vision and technique had quickly led to the differentiation of multiple problematics and fields of research, the names of most of which would be unfamiliar to a Western economist: intersectoral balances, the perfection of the economic mechanism, economic cybernetics, the system of optimally functioning socialist economy, etc.

As the young reformers met each other and began to work together, they were consciously trying to figure out a way to describe the system in which they lived in a way that incorporated their various experiences and bridged their differences. Chubais said, in an interview:

“One of our main tasks we called working out a language: in which language to describe it all. It was clear that those languages which already existed were unusable. … A language is several things. First, it is the choice of depth. You can study Kondratiev long waves, which is interesting in principle, and there have been many arguments about them. But if you discover in 1989 that the Soviet economy under the influence of a long wave would enter modernization in twenty years, then in reality you’ve learned very little. The actions that you needed to take in 1991, when you don’t have a banking system and the consumer goods market is in collapse, don’t depend on that. From the other side, the Soviet sectoral economic sciences were too narrow. … And the other requirement of a language was its ability to describe on a homogenous field thirty-some-odd sectoral transformations: just as much the convertibility of the ruble as (excuse the expression) privatization, as much as banking reform, as much as price
liberalization, etc. The must be described integrally, described in one language.”327

But despite the diversity of their origins, in a remarkably short time they developed their own way of thinking that marked them so indelibly that they have remained cohesive to the present day. It was marked by an interest in the actual functioning of the institutions of the Soviet state and economy, a complete disinterest in normative models and idealizations, whether verbal or mathematical, a deep curiosity about alternative socioeconomic arrangements, and a dissatisfaction with Soviet reality—both as a means for achieving growth and as an environment for the growth of the individual personality.

From the second half of the 1990s their interaction had lessened. The great push of the Yeltsin years had lost steam. They were villains in the popular imagination. But in 2011 it was twenty-five years since the conference at Snake Hill that brought them all together for the first time and they were reflective. They had held a conference to talk to each other, supplementing their informal gatherings. From 2006 onward, they had done a series of interviews with the liberal website polit.ru, and then another series in 2010 in Forbes, some of which would later be published as Gaidar’s Revolution. Petr Filippov had launched a fund called Lessons of the Nineties to generate pro-liberal narratives of what had happened, including textbooks and popular nonfiction. Yevgenii Yasin had launched the Liberal Mission fund, which held public discussions and sponsored academic research, much of it from political scientists and jurists, and published

translations of the Western liberal canon. And the Gaidar Fund had recently been launched and was searching for a mission. Soon they would hold a series of public lectures, reminisces and apologies before an audience, at the hub of Moscow intelligentsia life, the Polytechnic Museum. This is not just the guilty conscience or self-righteousness of aging ex-politicians. They understand themselves to be fighting a culture war.

When I spoke with them, they were very reflective on the nature of their group. Its cohesiveness over decades of intense and intensely differing life experiences puzzled them. “Chubais and I will never understand each other,” Shironin said, perusing the phonebook-sized menu again without interest. “I can talk to Glazkov or Naishul and they can talk to Chubais. It is a connected graph. But we have various attitudes to our life and profession. Because of this, the group presents different sides in different circumstances. I am a researcher, Naishul is a preacher or a prophet, Oleg is a scientist but also a teacher. Ignatiev is an uberconservative, a born central bank chairman. Glazkov is a social actor, the key to assembling this community. It makes sense that he quit economics to become a psychanalyst. In chemistry there is valence—we have very different valences. So all the relations between any two people are different, but we’re somehow complementary.”

The young economists met each other gradually, with two centers in Moscow and Leningrad, merging from 1984 onward and later adding some contacts from Novosibirsk. From 1986, the process of formation of the group and their networking with other emerging movements accelerated dramatically. But entering the eighties the scene seemed sleepy. As Grigory Glazkov put it,
“… there was in the pre-perestroika period a paradox. On the one hand there were people who understood that the system was doomed, that something needed to be done with it, but they basically discussed this in their kitchens or some small laboratories. Many intuitively felt it but they weren’t economists. They were, as they say, dissidents, but they didn’t have any concrete knowledge or economic qualifications. On the other side there was this completely gigantic academic machine, which at least knew, or at minimum ought to have known, how a real market economy is built. … But they felt themselves within the system, and generally didn’t even think of how to change it. People understand, of course, that all this in general didn’t work, but what to make of it? People who understood the one and the other were in fact few. And those who understood but moreover could unite into a group and move somewhere—they simply didn’t exist.”

The situation differed in Moscow and in Leningrad, and it is possible to read off some of the differences in the attitudes and inclinations of the members from the two capitals from differences in in their positions in the intellectual and institutional field. Firstly and most importantly, the Moscow members were at the center of Soviet science. From the metro stop at the corner of Nakhimovsky Prospekt and Profsoyuznaya all of the buildings containing several thousands of the best economists and mathematicians in the Soviet Union were no more than a hundred yards from each other. Looking along Nakhimovsky, IMEMO is to your right, and the enormous Institute of Economics faces the monolith of CEMI across the street, behind which is the Institute for the Study of the

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World Socialist System, (IIMSS) while a mile to your left is the Institute of Systems Analysis (ISA). And this is only the research economists, completely leaving out the many many more involved in different parts of the planning apparatus, ministerial academies, and great universities scattered around the city. The young economists were being groomed to make their careers at the pinnacles of this world. They graduated from the legendary mathematics faculty of Moscow State University or the economic cybernetics track in the economics faculty established as a feeder for CEMI and chaired by Shatalin. After graduation they went directly into the laboratories of CEMI, the Institute for Systems Analysis and the Institute of Economics, bypassing by means of their contacts the ‘distribution’ (raspredilenie) system, which placed Soviet graduates in places all around the country for their first two years after graduation. Moscow was a highly competitive world of clans and networks inside and spanning these institutions, each headed by its respective great academic, maneuvering for resources, positions, tokens of prestige, and the ear of government patrons, and the young graduates were raised up into it. Just as their mentors had, they could expect to make great careers and one day replace them. These very possibilities can by hypothesized to be a reason that the Moscovites were on the whole less radical at the beginning. They had a lot to look forward to. And so had their teachers, for whom status and prestige were some sort of compensation for dashed hopes and endless compromise.

In contrast, Leningrad was dull. The Leningrad group came from the Engineering Economic Institute (Inzhekon) and the Financial Economic Institute (Finek), decidedly not first-rate institutions. Those from Finek found a mentor in Ivan Mikhailovich
Siroyezhin, about whom more below, but aside from him they are at pains to emphasize that there were no great clans, no great masters, no competition. They had to search for and find each other, and when they did they felt themselves in a void: “[in Moscow] there were feuds between clans. [There] there are so many people who thought about the economy, but between themselves they simply squabbled, and could not agree and begin to act. They simply divided the pie. Despite the smartest, most honorable people, the system was thus. In Peter it was the opposite situation. There were very few such people, but precisely because of this there appeared a little group with a ton of energy which sought to break toward something. And with a man [Chubais, –A. L.] who as an organizer could gather them all.”

They sent Glazkov to do his graduate study in Moscow precisely to seek out likeminded people, people who might have more knowledge and might be closer to power. Their marginal position with respect to Soviet academia might also be a reason that they were more inclined toward political radicalism.

*The Executive Center*

The core of the Leningrad group assembled first. Prosaically, the moment of origin, as they tell it, was when two young students from the research institute of Inzhekon, Grigorii Glazkov and Anatolii Chubais, went on a potato picking in 1979 at the village of Bor in the Boksitogorsk raion. There they met Yury Yarmagaev, a mathematical economist from Leningrad State University (LGU) and vehement anti-communist, and the three fell into an argument over the import of Resolution 695, on

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329 Grigorii Iu. Glazkov, “‘U Eltsina…’”.
“normative methods of management of the national economy.” Though it has been quickly forgotten, this decree they viewed at that time as the peak of Soviet reform economics, an attempt to sweep away the old tinkering with normatives and introduce something like a market: “for us—provincial economists, especially working in the Engineering Economics Institute—it was such a serious document. I think that people in Moscow academics laughed at this and regarded it absolutely cynically.”

The three kept in touch and continued their discussions, and eventually coauthored an article. Their article began from the problem of indicators of enterprise performance, and concluded that there was no perfect indicator or system thereof, that the indicators had to be produced by the agents themselves. “As a result of scientific seeking we came to the conclusion in it that, no matter how you turn it, you won’t get anywhere without a market. Now it sounds silly. But then, in 1980, it was really a very important result for us. We thought that we had proved it for ourselves.”

Chubais remembers the same event with a mixture of pride and slight shame at his youthful self.

“Because [profit] was a value, rather than a physical measure, it was the only way to compare costs and benefits. … Glazkov discovered this, which was for the Muscovites of course a weak paraphrase of Novozhilov, and the subject of homeric laughter, but for us it was a real discovery that completely enchanted me. A real break. Good, but if it is value relations, that means prices. But where should the prices come from? Prices of equilibrium, of supply and demand. And thus the second discovery: if we have prices of supply and demand, then the

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330 Grigorii Iu. Glazkov, “‘U Eltsina…’”.
331 Grigorii Iu. Glazkov, “‘U Eltsina…’”. Glazkov may be misremembering—according to Chubais’ memory, it was 1982.
quantity of money changed prices, and we need macroeconomics. You need a financial grip that will allow you to give the conditions for these prices. Yurii Yarmagaev discovered this, absolutely brilliant. He discovered macroeconomic and financial stabilization. … I want to say once again, the Muscovites had read all of this at a young age, and we had to discover it ourselves. … Well, to read something and to come up with yourself affects a person very differently.”

In the spring of 1982, Chubais met Sergei Vasiliev, who by the fall of that year had become the fourth member of the Leningrad group and its chief theoretician. He had been an exchange student in Yugoslavia in 1977, had been impressed with its reforms, and made them his object of study. Vasiliev was a protégé of the head of the economics faculty at Finek, Sergei Syroezhin, and headed a very large laboratory on regional economics at the Finek research institute, into which he had gathered smart and likeminded young researchers. Syroezhin has become almost entirely forgotten, but he had an important influence on the Leningraders.

Born in 1933, Syroezhin met Kantorovich in 1958 and after attending the “sixth course” threw away his nearly completed dissertation in economics and began again with mathematical methods. In 1963, he was sent on a trip to the United States to study systems for the control of production. Returning in 1964, he headed the new laboratory of econometrico-mathematical methods at LGU where he worked on automated management

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333 Vasiliev was also uncommonly fluent in English, and could function as a translator of many foreign ideas to his colleagues. He was taught English by a New Yorker, Moisei Shteyngart, who had come to the Soviet Union in 1933.
systems. During these years he published two books on network planning methods, called in the United States the Program Evaluation and Review Technique (PERT) or the Critical Path Method (CPM), and led a committee on this topic under the State Committee of Science and Technology. He even conducted experimental televised lectures on the methods for several thousand Leningrad management personnel. Following the rising interest in them in the United States, Syroezhin became very interested in simulation games, called in the Soviet Union “imitation methods.” He designed several himself, which were presented in his undergraduate textbooks and widely taught. The last period of Syroezhin’s creativity, from 1970 onward, was spent developing a general “theory of economic [khoziaistvennikh] systems.” During this period, he led Finek’s department of economic cybernetics.

His work is a brilliant synthesis of the political economy of socialism, American management science in its technicized Cold War version, and Soviet economic cybernetics. Though his system synthesized its sources, working all the way from the most abstract categories of Marxism-Leninism to practical management techniques, what distinguished it was its focus on decision-making. His key concept was that of the “administrative” or “executive center,” which was any location from which a decision had to be made, at any scale from shop floor to the national economy. He examined the interaction of executive centers in the triadic formulation of supplier-planner-consumer, which he thought was the central relationship of Soviet communism, rather than the dyadic producer-consumer relationship of capitalism. He tried to model the interaction

over time of the executive center with its environment. In his model this interaction was mediated by the representation that each center was able to create on basis of available information, and this was subject to a learning process.

Figure 2. Homeostatic change of an executive center and its environment (“AC” in the diagram above).


Vasiliev explained to me that that Syroezhin’s approach inoculated them against optimal planning. “We saw immediately that the economic interests of different players
were not as prescribed by the Soviet system, and that you cannot get proper information from below.” The center would not hold. Instead, centers proliferated.

“The executive center was a universal unit for the description of the Soviet economy. Each has its own interest, and they are all different, qualitatively different, because they have different information. It was technically impossible to reveal those interests because the languages and information systems of each center, their perception of the economy, of their role in it, of their environment was different. This is a very natural way to think from the viewpoint of the theory of systems, from the cybernetics viewpoint, but very different from what optimal planning was. In optimal planning, the enterprise maximizes profits, but for us it was an open question whether it maximized anything at all.”

It has often by speculated that neo-liberals like Hayek had an influence on the reformers, but Vasiliev demurred, telling me that “We got Hayek very late, maybe 1986–7. It changed me in the political sense I think, it made us more resolute in the sense of our perception of society, but it really only showed us a broader viewpoint. Syroezhin’s approach to economic information was basically Hayekian: you cannot compute the market, it is much more complex. You cannot reproduce it by any type of model.” Shironin recalls that he was given a book of Hayek’s for the first time at a conference in Hungary in 1988, and “understood it not as some conservative line, but as institutional analysis.”

Accordingly, the Leningraders got a highly atypical education. “Syroezhin was very skeptical of mathematical methods. We never got anything of macroeconomics. Nothing at all. I think it was a mistake, but we didn’t have it. I had to read a lot myself. Because he thought that the mathematics of mainstream economics breaks the brain, brings it too far in one direction. He used to say that mathematics is a game of one player, whereas from him the important thing was to have multiple players. He taught game theory, for example, probability theory, information theory, operations research, imitation modeling, graph theory.”

Vasiliev brought with him Mikhail Dmitriev, an even younger economist who worked in his laboratory. In 1982 Dmitriev had first read János Kornai’s work in the English language publication of Hungarian economics *Acta Oeconomica* and shared it with the group. Kornai’s *Economics of Shortage* was to have a lasting effect. Sergei Vasiliev, lecturing at the Polytechnic Museum, said of Kornai, “The main thought was that while there exists state property and socialism, there would always be deficits. To avoid deficits, it was necessary to avoid state property and transfer to private property. This was proven and obvious. It was very convenient for us to have this book, because everyone that read it and understand it *de facto* became a member of our expanded circle. That is, when a young person asked his colleagues "Have you read Kornai?,” if he had read it he right away was part of the mass of people with whom you could discuss things.” Kornai’s point of view meshed with Syroezhin’s. They both saw the economy

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336 In their reckoning, Dmitriev is not counted as an initial core member, though he was integrated through Vasiliev earlier than many other members. He was younger and even more radical in his political inclinations than Chubais, Glazkov, and Vasiliev, and thus did not always find their discussions interesting.
from the point of view of self-interested economic actors. Kornai’s point of departure was the most salient perennial problem of the Soviet economy: shortage. But what he showed was that shortage was a necessary consequence of the incentives under which Soviet actors operated. It was not the result of some imperfection of the planning system that could be reformed away or solved with new technical, mathematical means. Shortage was systemic. Only completely severing the enterprise as a fiscal unit from the state budget could sufficiently change the enterprise manager’s calculus so as to make shortage never appear.

Finally, the core of the group was completed with the addition of Sergei Ignatiev, who had returned to Leningrad to work at the regional affiliate of Goskomtsen (the state price-setting body). Ignatiev had just finished his education at MSU and seemed to the rest marvelously well-educated. His dissertation, importantly, had been on inflation in Yugoslavia.

This first group was extremely cohesive, and does not seem to have had the wider penumbra of weak ties that surrounded the Moscow core. But later on it would gradually produce a second cohort of younger economists, again almost all students of Syroezhin’s at Finek and adopted by Vasiliev. They included Boris Lvin, Alfred Kokh, Aleksei Miller, Il’ia Iuzhanov, Dmitrii Vasil’ev, Mikhail Dmitriev, Mikhail Manevich, Andrei Illarionov. They were to organize themselves from the political club called Synthesis, founded in the summer of 1987 and meeting at the Leningrad Palace of Youth. As economists they were on the whole weaker, with far less research experience, but they were politically even more radical than their elders, many of them espousing American
libertarianism by the mid-1990s. The strength of their connections to the early core varied from person to person; with few exceptions they began to be incorporated into the core group from 1990 or later; they were a reserve that was drawn on when the handful of core members was already in government and found themselves desperately in need of more bodies. Although almost all of them would go on to have political careers at high levels, they had only fairly modest roles, if any, in the first Gaidar government.

But this wave was to come later; meanwhile the Leningraders went looking for contacts in the capital. Glazkov recalled to me that “We had our small circle of economists thinking about changing Russia. But there was no academic science in St. Petersburg, only in Moscow. University is one thing, but Academy of Sciences was another. In Leningrad virtually all economists were engaged in applied economic science. And we were interested in fundamental economics, and that was non-existent there. So for us there was a whole world which was not accessible, the world of the academic science of economics.” In 1982, one of his acquaintances at Inzhekon had been invited to a seminar at the Institute of Economics, but could not go, and Glazkov took his place. It was not a market-oriented seminar; some of the people in attendance that day are currently leading communist intellectuals. Glazkov wondered to himself why he had bothered to come. But then he saw one person across the room who appealed to him, not for anything that he had said, just his manner, and introduced himself. That person turned out to be Oleg Ananyin.

In early 1983 Ananyin came to Leningrad to present at Inzhekon, and afterwards he and Chubais and Glazkov walked along the Neva talking until late. Ananyin
remembers that this first meeting did uncover some differences of opinion: “I was older than them, had studied the Czech and Polish discussions, in which the clash of market romantics, market pragmatists, anti market technocrats was clear, so for me there was nothing new here. But my interlocutors, it was clear, had comparatively recently come to these things.”

Ananyin gave them Yegor Gaidar’s number, but when Glazkov called Gaidar he was uninterested. Why would he go give a paper to some unknown people in a third rate university? However, soon afterward Chubais was on a routine work trip to Moscow and dropped in on the laboratory unannounced. He immediately impressed Gaidar, who returned the visit. From that point the two groups worked in close communication.

*Goulash and Grain Elevators*

Moscow was an altogether different story. In the 1980s, the Moscow core of the group formed at a peculiar new institution, the Institute for Systems Analysis (ISA). The ISA was founded under Jermaine Gvishiani, the son-in-law of the fading but still powerful Politburo member Alexei Kosygin, and a deputy chairman to the the State Committee on Science and Technology (GKNT) since 1960. The ISA was subordinated dually to GKNT and the Academy of Sciences; it was therefore under the jurisdiction not of the department of science of the Central Committee of the Party, but under the Council of Ministers, which gave it considerably more ideological leeway.

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337 Oleg I. Ananyin, “‘Rech’ Shla…”
338 This ideological space was not just abstract: they had an almost military level of access to foreign literature and, a true rarity, unrestricted access to a photocopier.
It was initially formed from three research groups. Scientists and engineers from the department of Stanislav M. Emilianov at the Institute of Problems of Control (IPU) formed the core. Emilianov was a world famous control theorist, interested in dynamic, nonlinear, and indeterminate systems, whose theoretical work found application everywhere from high speed missile guidance to industrial management to urban traffic modeling. This group included Gvishiani’s laboratory of systems analysis. Gvishiani was a cybernetic philosopher and enthusiast for Western management theory and methods, which he strived to import into the Soviet Union. His dissertations were entitled *The sociology of American management* and *The American theory of organizational control*. With his family connections and positions at GKNT, he worked to construct bridges for intellectual discourse with the West, serving as the Russian representative to the Club of Rome and helping to found the International Institute for Applied Systems Analysis (IIASA) in Laxenberg, a town outside of Vienna built around a Hapsburg hunting palace. The second group came from the Institute of the USA and Canada, and was led by Boris Z. Mil’ner. Their focus was on American management science. Finally, Stanislav Shatalin led the last group. He had already been a deputy director of CEMI for twelve years, but when CEMI came under assault for the wave of Jewish emigration, Shatalin (who was not Jewish himself) was fired as a gesture of appeasement. He was immediately hired by Gvishiani to lead an economics division of the new institution.

The kernel of the group from Moscow formed in this institute. In 1983, Shatalin formed a new laboratory for the study of the economic mechanism. The laboratory was to

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undertake a comparative study of socialist economic mechanisms to derive ideas for reform. This study presupposed thus presupposed that socialism was plural, that its institutional foundations could be constructed in different ways. V.N. Gerasimovich, who played no deep role in the group, headed the laboratory. The two other initial hires, who de facto led the laboratory, were Yegor Gaidar and Oleg Ananyin.

Gaidar had studied at MGU as a political economist, but his focus was on the study of the economic mechanism, that is, economic reform, with a focus on enterprise management. He had also studied in Yugoslavia and spoke Serbo-Croatian. Viacheslav Shironin recalls that “Yegor’s theoretical representation of the structure of economic life in the USSR was at the beginning relatively simple and did not much differ from that of many Soviet economist, as ways his thinking on the root to reform. I remember him saying that we needed to work out our shared thinking while it was still possible, while ‘it hadn’t yet begin.’ And that ‘when it begins we will all sit and calculate normatives.’” What made him stand out was his attitude.

“Yegor, as it seemed to me, from the very beginning was not only oriented towards reforms (reform-minded [English in the original —A.L.] by his own expression), but also oriented towards action to the extent to which it was possible in that place and that time. I will try to speak in more detail about this, but already here I note that in my opinion exactly such—clear and pragmatic—an understanding of his mission by Gaidar was his main and conspicuous contribution to the formation of the new professional society and new professional ideology. Precisely this different the ‘Gaidar team’ from other groups
of economists. … Yegor was not interested in scientific ideas for their own sake. He was to a certain degree familiar with the construction worked out by world economic science, but he completely did not strive to make his own contribution to their development and perfection. He wanted to work with reality, and first of all with political reality, and the construction of thought were to him necessary and interest only to the degree to which they might become instruments for politics. In other words, who knows what we might really by forced to do, calculate normatives, organize financial markets, or carry out requisitions? Life would show, but we should be ready for any of them.”

Ananyin was also an MGU-trained political economist, working prior to his transfer at the Institute of Economics, but more interested in the philosophy and methodology of the social sciences. He had studied the Polish and Czech reform discussions in depth, the latter in extreme detail, and knew the English-language Hungarian literature well. He had even studied in Czechoslovakia in 1979 and while there had made acquaintance with economists and others with firsthand knowledge of the lead to the Prague Spring. Both he and Gaidar read deeply in Western sovietology.

Into this laboratory transferred Petr Aven and Shironin. They were both mathematicians by training, graduates of Mekhmat. Shironin had by chance ended up in a hospital bed next to the cybernetician Ilya Muchnik, Aven’s advisor, and having impressed Muchnik with an idea for how to model endocrine pathways, Muchnik introduced the two. The laboratory was rounded out by Marina Odintsova, a specialist on

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the East Germany economy. Vitalii Pokhodun had studied in Budapest and could guide
them through the Hungarian literature (though *Acta Oeconomica* granted access to the
non-Hungarian speakers). Rounding out their knowledge of mixed economies, the last
informal member, Yurii Goland, a physicist who was a self-trained expert on the
economy of NEP.

“This was,” Glazkov says, “the period of searching for some kind of model. It
was understood that the Western market economy wasn’t for us, but look, the Yugoslav
model… maybe that one? Or the Hungarian model?” I asked Glazkov what vocabulary
would be used to express these ideas about market socialism in approximately 1983. He
replied, “You know, strangely, maybe not strangely, we didn't think in terms of market
socialism and we didn't use this combination of words. It was in the past, it was in the
1960s, and in the 1980s, I don't know. Firstly, cybernetic language, feedback.”

In the summer of 1983, Aven and Shironin went to Novosibirsk. Ilya Muchnik
was a longtime coauthor of pioneering economic sociologist Tatyanna Zaslavskaya, and
he made the connection. Zaslavskaya was beginning a series of historic fieldwork
expeditions empirically study the functioning of agriculture. Aven and Shironin and the
rest of the young economic sociologists were sent to the Altai republic, where they
conducted interviews with farm managers, specialists and workers “from the regional
statistical administration to dairy farms, from grain elevators to the regional party.” This
was an extremely fruitful journey for them. Shironin recalls an episode, a meeting of the

341 Grigorii Iu. Glazkov, “‘U Eltsina…’”. 
bureau of the krai party committee (kraikom), that Tatyanna Zaslavskaya observed and told to the group which proved good to think with:

“It was in the hall of the House of Culture, on the stage and the parterre, the bureau on the stage and the the first secretaries of the regional committees in the parterre. They were discussing the plan for the harvest. The question the first secretary asked each region’s secretary ‘How many centners can you harvest?’ And then they began to bargain. The bracket: from sixteen to eighteen per hectare. The regions wanted to harvest less, which would be easier to fulfill, but more was required from them, and they bargained very seriously: everyone redfaced, smoking in the corridors, stressed out. Generally, if you wrung out sixteen you were a hero, if you ceded eighteen it was shameful. And then we went to the region, and I had in my hand a notebook in which I had written all the statistics from Altai for fifty years, and saw that the average was twelve centners per hectare. In all of fifty years the biggest harvest, which was around eighteen, happened only once. I began to wonder then what the difference was between sixteen and eighteen. It seemed that there was. There is the plan, which if you overfulfill it you get a medal or something. There is the plan task, which is already not sixteen, but fourteen, and from this depends your salary. And then there is the task from the regional committee, which is, let’s say, already twelve and a half. And from this depends whether you’ll be called onto the rug and punished. And the secretary of the regional committee has a little book, in which it is written, hidden from his bosses, how much is required to feed the animals
through the winter. That is, in fact, the complexity of the information flows was fantastic. And everyone understood all this. But it was different games, and I understood then that the plan is something like a share on which is written $100, but in reality its price depends on various processes: someone sneezes and it rises.”

Chubais remembers the attraction of this kind of work for the group:

“We were sort of bookish boys, not from the depths of the people [narod] but from the anti-people intelligentsia, which was a birthmark which followed us all our lives. This weakened us: we didn’t have anyone from the people in the true sense of the word. It was the Moscow and Petersburg scene. It’s not even Russia, it’s the capitals. This gap, whether we understood it or not I don’t know, but it was there de facto. Maybe this was why we were so drawn to any non-book information from life. Wherever we could glean even a little bit, we did.”

Aside from information, Aven and Shironin also picked up two new members, the young economic sociologist Sergei Pavlenko, and the maverick philosopher of biology cum self-taught ethnographic sociologist Simon Kordonskii. They were deeply engaged in thinking through the informal patterns of power and authority inhabiting the structures of the Soviet state.

The Scientific Section

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343 Anatolii Chubais, “‘My Byli Edinstvennoi Gruppoi v Strane…’”. 
When Aven and Shironin came back from the field, the laboratory was about to start an important new chapter. In November 1982 Brezhnev had died, and Yurii Andropov had became General Secretary. He almost immediately began tentatively soliciting economic reform plans, putting Nikolai Ryzhkov, former deputy chairman of Gosplan, in charge as the head of a new Economic Department of the Central Committee. According to Tatiana Koriagina—Viktor Volkonskii’s wife— in late November, about two weeks after Brezhnev’s death, Ryzhkov initiated a working group led by members of Gosplan and including researchers from state economic research organs (she does not mention the Academy institutes), housed in the Interdepartmental Council for the Study of the Experience of the Member Countries. In May of 1983, the Council of Ministers discussed Gosplan’s recommendations, which were too radical to be approved: the recommendations involved the creation of a private sector, a market, and, by some accounts, large state corporations that would seek financing on the international market. By the fall of 1983, with Andropov ill and unable to save it, the working group was dissolved.

But Andropov initiated a second commission. In January of 1984, the Presidium of the Soviet of Ministers instructed Gosplan to prepare a “Complex Program of the Perfection of the Mechanism of Management,” which was instructed to finish its work by the end of 1985. In February, the chairman of Gosplan Nikolai Baibakov sent to the Council of Ministers a report, in which he recommended creating a permeant Politburo commission. That same month, Andropov died and was replaced by the conservative—

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and already terminally ill—Konstantin Chernenko. But this did not stop the bureaucratic machine. On February 23rd, the Council of Ministers appointed a temporary Politburo commission on economic reform. By May it had become a permanent commission, formally headed by Tikhonov, chairman of the Council of Ministers, but factually run by Ryzhkov, and included Gorbachev.

The commission had a scientific section, and it was led by Gvishiani. But the work was actually done, Gaidar attests, by the departments led by Mil’ner and Shatalin, and especially Laboratory No. 12. The Muscovites included their new acquaintances from Leningrad in the work immediately. To underscore the point: far from appearing out of nowhere in 1992 and requiring tutoring in basic economics by Western experts, the young Soviet economists had been intensively involved in thinking about the process of reform for over a decade; from 1984 onward, furthermore, they were directly in contact with high level political discussions. This work culminated in a 120-page document, the final draft written by Ananyin, in the summer and fall of 1984, “Conception of the Perfection of the Economic Mechanism”

Aven described the plan as being for a gradual transition to what was essentially the Hungarian model, and also more or less summarized the past twenty years of Soviet reform thinking. It would have dismantled the administrative planning system, introduced a profit-based stimulus system, while continuing to control wages. Prices would gradually be decontrolled, and barriers to external trade reduced. But more importantly, it foresaw the development of private and cooperative business alongside state corporations. In his memoir, Gaidar wrote that “We were aware that the proposed model
could in no way can not be regarded as an ideal, but thought it was important to carry out at least these cautious steps in the direction of the market, the creation of models of a non-state economy as a prerequisite for the subsequent evolution of the system, of a soft exit from socialism.” It was in this year, too, that public discussion of non-state ownership of property first became licit, touched on in an article by reformist political economist and future advisor to Gorbachev Leonid Abalkin in an article in the newspaper *Moskovskii Komsomolets*.

Their proposal, Gaidar recounted, was well-received by the rest of the scientific section, excepting only the director of the Institute of Economics, Nikolai Kapustin. But the politicians were less enthused, and Gvishiani gave Gaidar the dispiriting news that it would not be moving forward. Despite the death of their reform plans, the young economists would note over the ensuing months how their phrases and ideas began seeping into the speeches of the politicians who had taken part in the council. In short, they had expanded the realm of the sayable.

Shatalin’s interest was not dampened, and he set his young economist to create a reform plan of their own in 1984–1985. This never quite congealed, but did result in a series of published working papers. The completely earnest discussion of reform sometimes elicited smiles from colleagues; Shironin recalls the barb of a colleague upon coming into the laboratory and seeing them in heated discussion again, “What, again with this onanism?”

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The laboratory did not last long. In 1985 Gaidar and Gerasimovich quarreled for personal reasons and Gaidar left to the economic department of the Party theoretical journal *Kommunist* and then to *Pravda*. There he had much greater public recognition, the ability to shape the public discussion, and the right to talk to almost anyone, but was much further from the actual preparation of reform. Ananyin and Odintsova returned to the Institute of Economics, and later Shironin joined them when Mil’ner’s group transferred there from the ISA. Petr Aven went abroad to IIASA in Austria. But the network persisted and grew.

*Snake Hill*

In August of 1986, in participants’ memory of these years, it all came together. In that month the group held the first of a series of seminars. There were at least three major seminars between 1986 and 1989 (at Zmeinaia Gorka, Losevo, and Zimenki), and a hard to determine number of smaller ones, who were often camping trips to Petr Filippov’s dacha on Lake Ladoga. These meetings involved lots of exercise, copious drinking, and recitations of bardic songs—Vasiliev had a great voice, and Chubais played the guitar, favoring the songs of Bulat Okhudzhava, with whom he would became friends. They were nevertheless also presentations of research. Chubais, famously, usually went to bed before the carousing began so as to rouse everyone in the morning to ready themselves for a day of presentations.

They seminars were venues to work out their ideas, but also to vet new members. Each meeting included more and more people economists. In addition to the younger
wave of Leningraders, there was a growing complement of Muscovites. In 1984, Glazkov had begun graduate school at CEMI under Nikolai Petrakov, whose 1974 book, *Cybernetic Problems of Controlling the Economy*, had been inspirational reading to the young economists. From CEMI or, after the split, from Yaremenko’s Institute of National Economic Forecasting, would come another fifteen or more future members of the reformist government.

Chubais organized the first big seminar. He had become the head of one of those semi-defunct “voluntary” institutions that littered late Soviet society, the Young Scholars Association of Inzhekon. He had previous used it as to invite the Muscovites to Leningrad to give talks and visit. Now under its cover he arranged a conference at a sanatorium called Zmeinaia Gorka—Snake Hill. The model was the series of conferences that the management theorist and rector of the economics department of MGU Gavril Popov had been holding outside of Moscow, in which Chubais and Vasiliev had taken part.346

This was the first time that all of the circle was gathered into one place, rather than individuals taking the train back and forth between the capitals. Not only were they able to experience the social frisson of long acquaintanceship flowering into relaxed friendship, but away from institutional obligations they were able to speak openly and boldly. They each remember it as a turning point in their lives.

In 1987 the second much larger seminar took place at Losevo, a facility owned by Finek. This was actually a large Finek-organized conference, but the entire team

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conspired to come and held a semi-secret conference within the conference. It was at this secret conference that Vitaly Naishul’ first met the group and presented to them the idea of voucher privatization.

A Supermarket

In 1985, Naishul’ had published as *samizdat* under a pseudonym a book called *Another Life*, which compared living standards in the United States and Soviet Union. His longtime laboratory-mate, Yurii Rodny, told me this this book “made him famous to about one hundred and fifty people.” But the germ of his plan for voucher privatization was present already in an plan for the privatization of agriculture that he and the director of his laboratory, Viktor Konstantinov, had managed to present to the director of the Central Committee department of agriculture in 1982.\footnote{V. M. Konstantinov and Vitalii A. Naishul’, “Planirovanie Sel’skokhoziaistvennogo Proizvodstva Na Osnove Kolkhozno-Brigadnogo Podriad” 1982, http://www.igrunov.ru/vin/vchk-vin-discipl/econom/others/inme/agricult-reform.html.} When he presented his ideas to the group, Irina Evseeva remembers, everyone criticized him, Chubais, who would in 1993 be responsible for enacting it, most strenuously of all.\footnote{Irina Evseeva, “Reformatory Stali Politakami v Pravitel’stve,’ Interviu S Irinoi Evseevy,” *Polit.ru*, 2006, http://www.polit.ru/article/2006/11/03/evseeva/.}

Naishul’ had graduated from Mekhmat and then worked at NIEI Gosplan from 1971–1981, before transferring to CEMI and working under Yaremenko. “At the end of the 1970s not only our group [Rodny, Konstantinov and himself] but also several other sensible people in Gosplan knew that the country was in a grave economic crisis. It was clear to us long before the dissidents or other ‘voices’ began to speak out. How did we
know this? The point where you feel the state of affairs in a market economy is the stock exchange. The point where you feel all the problems of the planned economy, this is Gosplan. Gosplan was feverish, feverish not as an organization but as a mode of work, all the time recalculating its own plans. So, in the late 1970s in Gosplan it was felt that the system was in a crisis from which, so it seemed, there was no escape."

When I met with Naishul’, I asked him about this experience, what it was like, he told me that “We had working contact with people running the economy. When I first started hearing their stories, that is 80% of my economic thinking. It was stories, anecdotes, close to an art, lasting as long as a cigarette.” What his experience taught him was that the economy had long ago ceased to be planned. That Gosplan did not know what was going on, and knew that it did not know. In fact, this was simply the condition of work. Calculations were not carried out in order to represent reality, but to be allies in bureaucratic battles over resources. “At the institute, one of the basic jobs was medium term forecasts, rarely longer than the rest of the year. For the first two or three years I was shocked, because whatever I would come up with, people would tell me it was a lie, that everyone knows that this figure is wrong, et cetera. In five years I began to understand that there were some laws in our house, that it wasn’t pure chaos.”

The theory that Naishul’ and his laboratory-mates came up with drew on this experience to fill out Yaremenko’s macroeconomic studies with this models of interindustry interaction. Yaremenko’s econometric input-output model provided the macroeconomic theory within which the young reformers would think. He believed that

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in the post-Stalin period the structure of the Soviet polity had changed. First, consumer goods and agriculture had ceased to be a completely deprioritized source of resources for heavy industry. Consumer goods were needed to induce labor productivity once the gulag was closed down and disguised rural unemployment absorbed into the industrial workforce. Second, because of the advent of the new sectors, the results of the scientific-technological revolution, that constituted military industry the priority sectors had become immeasurably more complicated, and their productive goals had become not intermediate inputs but complex final products. It is one thing to throw resources into the creation of as much pig iron as possible, but it is another altogether to construct laser gyroscopes, over the horizon radar networks, and microelectronics. Without a clear division of priority and non-priority, the task of management was becoming immeasurably more complex. Yet structures of priority still remained. They were the result of the balance of power within a bureaucracy that increasingly had no center. His econometric regressions revealed these priorities as they showed up in the pattern of intersectoral resource flows over time, but not the mechanisms by which they operated.
Figure 3. The interaction of fuel-energy flows.


Naishul’s theory was one of these mechanisms. He was thinking about how non-monetized bargaining processes guided resource distribution within the polity, but also rendered it increasingly uncontrollable.

“The administrative market—it is a hierarchical system, which is based on trade relations: a horizontal trade, trade between each other is not subordinate entities, and vertical trade, trade between between non-subordinated subjects, and vertical trade between subordinates and superiors. A very interesting phenomenon, in which even the relationship between superior and subordinate was also one of trade. This economy that emerged after Stalin was our great achievement, the positive result of which was that the country is prepared for exchange relations
long before Gaidar came with his reforms. We can say that the Brezhnev era is the era of trade. Incidentally, not only the era of trade, but also the era of rights: the villagers got passports, the city got apartments as property, etc. This is positive. A negative—that the system completely destroyed statehood.350

The different subgroups of the future reformers were all cottoning on to the same thing. They came to it by different routes. Naishul recognized this, saying “Paradoxically, studying in Novosibirsk a completely different object—not the State Planning Commission but the rural area of the Altai Territory—Kordonskii, Shironin, Aven came to the same conclusions. When I met them in the 1987 year, this became clear351.” Shironin, Aven, Pavlenko, and Kordonskii found it in Altai farms.352 Naishul’ from working at the Gosplan research institute.353 Sergei Vasiliev and Yegor Gaidar came to it by studying the Eastern European reforms, the failure of the Kosygin reforms of 1965, and the American literature on management and corporate governance.354 Vasiliev said to me, “Yes yes, and I can tell you that it was really fantastic that at the beginning there were no barriers between different people who came from different... we immediately began to speak the same language. Yes it is remarkable. It is one of the most remarkable

350 Vitalii A. Naishul’, “Otkuda Poshli Reformatory.”
351 Vitalii A. Naishul’, “Otkuda Poshli Reformatory.”
things.’ The group dubbed their co-discovered institutional picture the theory of the administrative market.

The conclusions that they began to draw from it were deep and drastic. First, the Soviet state, as a unitary actor, was already hollowed out inside and was no disintegrating. This was both constraining and enabling. On the one hand, it meant that they might dream of even more radical reforms than they had thought possible. They had always been strict about keeping their reform plans within the realm of political possibility. But if the political center was disintegrating, perhaps they could be pushed further. Furthermore, they were heartened by the notion that Soviet citizens and managers were already accustomed to trading. Worries about their need to acclimatize to self-regarding economic behaviors could be put aside.

But on the other, reform plans had to be kept simple and easy to execute. Naishul’ in fact argued against his own idea of voucher privatization, believing that the state was already too weak, that the controllers of state property were already becoming de facto owners. If the reform scheme were complex and multi-stage, the administrative market would simply bargain it away into nothingness. Their prior plans had foreseen a lengthy two stage process. During the first, the economy would be slowly restructured until it was near equilibrium, financially stable, and technologically restructured so as to have some areas of competitiveness on the world market. Military spending would be cut dramatically. It would have to be demonopolized and inefficient enterprises, especially in heavy industry, closed down. A financial system would have to be created, with a corporatized structure, to move investment into new branches of production. Only when
this restructuring was complete would it be possible to pass to deeper marketizing reform, which was envisaged to take many years. This plan was beginning to seem impossible.

Naishul’ drew a more radical still conclusion from this theory. The role of the Soviet state to come would have to be even more minimal than the theory (let alone the practice) of American capitalism imagined that of its state to be. The state was destroyed by unrestricted trade. It could not take on the normal tasks of a capitalist state. The ethics and abilities of the managerial staff were destroyed by unrestricted trading. They could not be trusted with the execution of those tasks. And this rot went as deep into society as had the Soviet state. In strange inversion, the gutted Soviet state became increasingly indistinguishable from an anti-capitalist’s neoliberal nightmare. Naishul’ here revealed the visionary streak for which his colleagues admired him, even though they were often unwilling to following him so far. His conclusions are worth quoting at length.

“Thus the bureaucratic market embodies a society where everything can be sold and bought, even things which cannot be bought in a conventional market system. However, we must note that exchanges take place not among ‘strangers’, and not of all kinds of goods, but only through definite exchange chains, which either appear ad hoc or function permanently.

“The bureaucratic market has created a special kind of manager- not the ‘party soldier’, but the ‘party merchant’, for whom nothing is sacred ill his public function. The fate of a Siberian river can be swapped for a thesis, agreement to supply a consignment of pipe for a Moscow residence permit.

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“Absolutely nothing is sacrosanct in this system, be it moral imperatives or the laws of the country. One new Soviet custom is not to fulfill the most fundamental decisions of the CPSU Central Committee and the USSR Council of Ministers. The regional party secretary can 'curb' the procurator in order to let the collective farm director hire freelance workers (who will help to upgrade the farm's performance and to catch up with plan targets). 'For the sake of business' one can ignore instructions and, for instance, send to sea a vessel that is not seaworthy with passengers on board or sell prohibited foodstuffs.

“…A true bureaucracy, faithful to its professional duty and capable of honestly fulfilling all its instructions and the decisions of higher bodies is practically non-existent in the USSR. That is why, when we discuss ways of economic restructuring, we must bear in mind that it is next to impossible to reproduce in the Soviet Union even the relatively narrow range of administrative regulation that exists in Western economies. The Soviet market economy, which must replace the administrative market, will have to do without even the degree of state regulation that exists in capitalist countries.

“In the last resort 'bureaucratic trade' in the USSR has perverted itself by destroying the status system that underlay it. As a result, status has been deprived of the meaning it has in the non-socialist world. An academician in our country is not necessarily a scholar, while a physician with a degree may not know how to treat his patients.
“Status will have to be reconstituted with the help of the market as well. The market will regard as an engineer anyone who, whether he has graduated or not, is doing the work of an engineer. What awaits us is not a traditional market of the Western type operating in a stable social context but a super-market, which will mould the social structures themselves.”

THE PYRAMIDS OF EGYPT

The Moscow-Leningrad school had a complicated relationship to the economics of the generation before. It executed a reflexive critique, which instituted a new form of veridiction that opened up a new space for thought and action. But it drew deeply on the schools of thought that it critiqued. Its thinking was not a Western import, and differed in nearly every respect from the contemporaneous orthodoxy of Western neoclassical economics.

Two of the school’s theoretical sources, Ivan Syroezhin’s theory of economic systems Janós Kornai’s *The Economics of Shortage*, share an agentive point of view on the economy. From Syroezhin, they gained a sophisticated model of the forwarding looking agentive and adaptive behavior of the enterprise, and within it of the importance of information asymmetries. This was not merely a theoretical knowledge, but also experiential: Syroezhin’s pedagogy, from his freshmen undergraduate lectures onward, was deeply based in simulation games.

From Kornai, they came to understand how rational situated agentive behavior led to aggregate malfunction. Kornai’s effect was one of disenchantment. He showed that manifestations of dysfunction like shortage were intrinsic to system. But more, from Kornai they gained a strong argument for the ultimate failure of any reform measures that stopped short of cutting the umbilical to the state budget by instituting private property. As long as enterprises were ultimately unafraid of loss-making and failure—whether enforced by gulag or creditors—they would continue to have incentives that would generate shortage.

These theories were the microeconomic complement to the macroeconomic vision supported by Yurii Yaremenko’s models of intersectoral interaction. Yaremenko told a story of the consequences for management of the polity of large-scale technological shifts, and conversely the way the disintegration of managerial capacity progressively retarded scientific-technological progress and its incorporation into production. This story lent causal and quantitative support to the perception of the late Soviet citizen that something was very wrong indeed. Yaremenko hoped for a recentralization of management as the prerequisite for a decades long readjustment of the productive structure, one that would raise the technological level of civilian production to that of military production; but the young economists concluded that this was a pipe dream. In an interview in 1993, pointing at the black box that his input-output model could not open, Yaremenko phrased the puzzle posed by the Soviet and Russian polity:

“Describing those processes, I felt a definite dissatisfaction from the lack of an adequate language of description. Strictly speaking, we’re not talking about
economic phenomena, but more properly they should be spoken of in the terms of sociology. The derivativeness of our economy with respect to the reproduction and expansion of those above-mentioned administrative-social structures is a problem that no one has so far correctly understood or appreciated, because we’re accustomed to living in the speculative world of economic determinism. And it’s hard for us to comprehend that our society is closer not to Europe or America, but rather to ancient Egypt, where the building of pyramids was the cementing element of the whole Egyptian civilization. Thusly, our economy in its development has no internal thought, but is only some sort of space for the reproduction and expansion of administrative structures."

The young economists gave an answer to this puzzle of the derivativeness of the economic with respect to the political, opening up the black box of Yaremenko’s macro-model, and giving it an institutionally grounded mechanism that explained its functioning.

The problem with which they began was that which every economist in the Soviet Union was concerned: how to reconstruct the economic mechanism so as to align managerial incentives with the plan, enabling intensive growth on the basis of scientific-technical progress. The idea of the economic mechanism enabled their search. In Yegor Gaidar’s very first publication, “On the structure of the economic mechanism,” written with his dissertation advisor, he carefully delimits the field of study of the economic mechanism from, on the one hand, the political economy of socialism, from, on the other,

357 Yurii V. Yaremenko, Ekonomicheskie Besdey. Dialogi S S. Belanovskim (Moscow: Tsentr issledovanii i statistiki, 1999).
management. The economic mechanism ws that with respect to which, no matter that they are all socialist, and no matter that they might use some of the same methods and techniques of management, the countries of actually existing socialism differed. The young economists intensively studied Hungary, Yugoslavia, Poland, the GDR, Czechoslovakia, and the Soviet Union in the period of NEP for alternative economic mechanisms. (They did not study or have any knowledge of China.) They were initially enchanted by the Hungarian and Yugoslav models, but as their understanding of the administrative market deepened, the enchantment faded. The political command over resources insidiously undermined the economic mechanisms of these countries. Their mechanisms, just as that of the Soviet Union, did not function as they were ought to have.

At the same time, the theory of the administrative market was born out of the encounter of the given tools with particular problematic situations. The breakthroughs that made everything click came from the field. In the one case, the field was at the lowest levels of the administrative command system in the hinterlands: collective farm managers. In the other, it was at the highest levels of the very center of the system: Gosplan. In both cases, actual interaction with the agents of the system revealed that it had long sense ceased to be an administrative command system. Synthesizing this experience by means of their theoretical sources, the young economists converged on a new understanding of the polity in which they lived, and the potentials for its further evolution.

A CRITIQUE OF ACTUALLY EXISTING SOCIALISM

We can get a first approximation to understanding this critique is by triangulating its position with respect to the optimal planners and the input-output modelers.

The optimal planners were *normative* theorists. They did not systematically study the institutions of the Soviet Union. They created an ideal mathematical structure, and then dreamed up institutions that might realize it. This ideal structure was the place from which their veridiction issued, the truth of which they spoke. In contrast, the young economists were *empirical* theorists. They began not from the math but from the institutions as they actually existed. This to them was very important. They had, indeed, quite a bit of scorn for the mathematics of their elders. Their truth was issued from the structure of Soviet reality itself. Chubais said, “We were already little interested in any sort of altogether abstract theoretical conclusion. Maybe because of this economico-mathetical methods to our school, in distinction to the CEMIists, were not very respected, to put it mildly. Even though we had strong mathematicians, like Yarmagaev. We understood that if these weren’t all toys, than in the best case they were means of disciplining though, and no more. The content are not in the formulae—the content was in the contents.”

They shared the empirical orientation to Soviet reality with the input-output modelers. It was probably for this reason that they felt themselves more at home with them. Many of the younger economists worked at Anchishkin and Yaremenko’s Institute for National Economic Forecasting after it split off from CEMI in 1986; many of

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359 Anatolii Chubais, “‘Ni Pri Kakikh Usloviakh…”
Glagkov’s new recruits were input-output modelers trained there. And when reformers came to power, they quickly promoted older input-output specialists to positions of relatively high rank, deputy ministers and the like. But the input-output modelers’ version of empiricism was quantitative. Their object of study appeared as masses and masses of data. Virtuosi of input-output modeling like Kossov, Ershov and Yaremenko knew about as much about the Soviet productive forces as anyone in the country ever did or would—insofar as the productive forces could be made to leave traces that could be refined into data. The empiricism of the younger economists in contrast was institutionalist and qualitative. They were interested in the contexts and methods of decision making. But once they understood the mechanism, they felt little need to measure it.

On the other hand, they shared with the optimal planners an understanding of production as a structure of the interests of a multiplicity of agents. The input-output modelers had an essential technological, not economic understand of their object of study. For the input-output modelers, in contrast to the optimal planners and the theorists of the administrative market, were no economic agents to take into account except the Party that decided upon the plan from the menu of consistent plans produced by the models. But whereas the ideal structure of optimal allocation gave a perfect alignment of interests, the young economists had no such ideal structure with which they were measuring reality. In reality, there was no guarantee of the alignment of interests. The results of agents pursuing their interests was the presupposition from which optimal planning began, but it was the open question toward which administrative market analysis strove.
But more deeply, the optimal planners preserved a point of view of the totality. There was a place from which the interests of all economic agents could be totalized, the place of the economic sovereign. It was occupied by the Party. The young reformers’ break from this point of view was profound. Foucault analyzes a similar point in the epistemological transition from the Physiocrats to Adam Smith. The *Tableau Économique* offered to the sovereign a point of view by which he might surveil the entirety of the body politic and know the unwisdom of intervening in the economic process. For all his passivity, he remained sovereign, and vice versa.\(^{360}\) For Adam Smith, there is no standpoint from which to view the totality. Smith’s is a negative doctrine that proves the impossibility of such a standpoint. The famous metaphor of the “invisible hand” seems to hold out the promise of such a point. From the standpoint of this hand that arranges things such that the pursuit of individual interest accomplishes the common good, does not the totality appear? But there is no invisible hand: it is a transcendental illusion. Reason is continually tempted to act as though there were such a point of view.

Economic rationality is not only surrounded by, but founded on the unknowability of the totality of the process. *Homo economicus* is the one island of rationality possible within an economic process whose uncontrollable nature does not challenge, but instead founds the rationality of the atomistic behavior of *homo economicus*. Thus the economic world is naturally opaque and naturally non-totalizable. It is originally and definitively constituted from a multiplicity of points of view which is all the more irreducible as this same multiplicity assures

their ultimate and spontaneous convergence. Economics is an atheistic discipline; economics is a discipline without God; economics is a discipline without totality; economics is a discipline that begins to demonstrate not only the pointlessness, but also the impossibility of a sovereign point of view over the totality of the state that he has to govern. Economics steals away from the juridical form of the sovereign exercising sovereignty within a state precisely that which is emerging as the essential element of a society’s life, namely economic processes. Liberalism acquired its modern shape precisely with the formulation of this essential incompatibility between the non-totalizable multiplicity of economic subjects of interest and the totalizing unity of the juridical sovereign.361

This truth in the name of which the young reformers spoke was that of the impossibility of totality. It was the truth of the economic. And it had no place within the regime of truth on which the Soviet Union was founded.

The reform economics of the 1960s and 1970s had sought to reestablish a jurisdiction for economics as a truth-producing discourse so that they could speak a truth to the Soviet system to reform and rationalize it. The subsequent generation occupied this space of authorized veridiction as a way to speak truth against the Soviet system. They pointed to its intrinsic irrationality, impossibility, politico-economic corruption and moral corrosiveness, and more: its tendency towards its own destruction, and the need to hasten its end. In the late 1980s and early 1990s, as the reforms of perestroika caused the system to fly apart and glasnost’ revealed moral rot, their critique of the state could appear as

361 Michel Foucault, The Birth of Biopolitics, p. 282.
part of a common cause with the dissident intelligentsia. It could become a discourse promising liberation.
THREE EPILOGUES IN PLACE OF A CONCLUSION

I. A FRACTURED FIELD: POWER AND ECONOMIC EXPERTISE IN THE RUSSIAN GOVERNMENT ACROSS TWO DECADES OF CRISIS

When I arrived in Moscow in 2010, it had been to study think tanks as a site where theory become politics, and vice versa. But the institutions called “think tanks” often seemed to be straw structures, with no institutional reality beyond their business cards.

The late Soviet pattern involved three pyramids of institutions: the universities, the Academy of Sciences, and the branch ministry institutes. The Academy of Sciences institutes were the primary site of fundamental research. They were huge, often employing even a thousand researchers. They were given to institutional autarky leading to massive, monolithic, and stagnant structures and punctuated by periods of schism when some younger star found sufficient patronage to strike out on his own. On the other hand there was a university system that produced very little research. Within, the institutes were organized hierarchically into sections and then into laboratories, themselves ruled by a strict hierarchy of seniority. The branch institutes were subordinated to different parts of the state planning and managerial apparatus.

In the first years of transition, the bankrupt Russian state dramatically cut funding to all of the above, at the same time as hyperinflation reduced the value of salaries. The institutes hemorrhaged researchers: anyone who could leave for more profitable employment did, and almost no new researchers were trained and hired.

*Early Transition*
But the first years of Russian independence produced an immediate flowering of institutions on a new pattern. Part of the prehistory of the think tanks, which I cannot get in to here, is the flowering of the so-called 'informal clubs' in the period 1986-1991. I note that just to put it aside.

Yegor Gaidar, the leader of the transition government, had managed to create his own institute, called now after several name changes, the Gaidar Institute for Economic Policy, shortly before the end of the USSR. It was superficially an institute of the Academy, but really it was a means for him to prepare a team for government. It served as additional support for his administration’s reforms and a source for bureaucratic cadres. Many other members of his circle quickly formed their own pocket think tanks. They knew they would not long be in government and they needed bases of operations to which to retire when out of political favor. Secondly, aside from these pocket think tanks formed by politicians, a series of smaller think tanks were formed by entrepreneurial academics, often with the explicit support of their former institution, and usually either focused on more narrow policy fields or providing more of the services of a polling or consultant firm. And thirdly, there were think tanks formed explicitly at the initiative of international financial organizations and governments.

All of these types of think tanks were able to draw a variety of academics—mostly pro-market in political persuasion—from those impoverished Academy institutes and universities, but they themselves were vulnerable. They were dependent on either—or, usually, both—political patronage or foreign foundations (including above all Soros'
OSI, the EU’s TACIS and TEMPUS programs, and USAID, but also including, MacArthur, Ford, Carnegie, the IMF, the World Bank, and SIDA.)

In 1991 there were almost no economists, in the sense of specialists in the functioning of markets, directly within the state hierarchy. There were the theoreticians of the Academy of Sciences, and the planning economists in largely neglected research institutes subordinated to Gosplan. When the reformers were swept into Yeltsin’s government, they came primarily from among the youngest of the Academy theoreticians. But the ministries over which they presided were staffed by the old bureaucrats and planners. The young economists created two coordinating institutes, parallel to government, the Working Center for Economic Reforms and the Russian Privatization Center. These both coordinated policy across the ministries, and served as a contact point for foreign advisors.

But they had a second function as well. They raised a new generation of economists with policy research experience, these yet younger economists began to accept appointments at the level of head of department of a ministry or deputy minister, with a wave around approximately 1997 and another around 2000-2002.

Interfaces

Western economists arriving on foreign aid technical assistance contracts found their task very frustrating. The young economists of the Gaidar government were to varying degrees interested in receiving this advice, but they were few, they were very busy, and they were concentrated at the very top of the administrative hierarchy. The two
major new institutions the Gaidar government created in order to orchestrate and oversee the massive work of reform, the Working Center for Economic Reforms and the Privatization Center, did provide an environment for sustained and effective interaction. But deep within the ministries, the Western economists found very little common language with which to discuss, and felt their efforts to be almost wholly ineffective. This was of course not helped by the short durations of their visits.

The foreign sponsored think tanks created during and after the first burst of capitalist reforms employed Russian economists and provided a notional 'home' for the short-term Western visitors. The Russians on staff could speak the right language to interact with the ministries, and their repeated interaction with the Westerners trained them to speak the right language to interact with the international economics community. In at least one case that I know of building this cadre of so to speak 'bilingual' Russian economists was a conscious strategy of a Swedish think tank director to enable the facts of Western orthodox economics to travel; in others it was more likely accidental.

These think tanks not only provided an interface between Western experts and the Russian bureaucracy, but also a conduit of information to the Western international economic institutions and banking community. Several think tanks were largely engaged in producing data for these institutions and analytical writing, either on contract or in the form of periodicals. These periodicals had a nearly complete monopoly on the foreign, English-language market for current, up to the minute information about the Russian economy during the 1990s and early 2000s. In the 2000s these have been replaced or supplemented by bank analytical departments.
After 1998

This system was unstable: without a civil society producing demand for their products and supplying funds for operations, one failed grant application or one demotion of a patron could spell the end of the think tank. After the 1998 default, devaluation, and the resurgence of oil prices, international financial institutions and foreign money began to withdraw and many of the young institutes folded. (Some few do continue to get foreign support, now from private foundations more than public bodies.)

The surviving think tanks tended to conform to a pattern: they have strong ties to one or another academic institute, and a director who is directly connected to a patron in a ministry of government. The think tanks are not formally part of the institutes, nor are they formally in-house research departments of the ministries. (And I exclude here the think tanks that engage primarily in polling and consulting.) This pattern will be explored in depth in a minute.

The other option for a researcher is to work in one of the inhouse research centers in one of two galaxies that receive probably the lions share of state contracts: the Higher School of Economics and the network that consists of Academy of National Economy-Gaidar Institute-Academy of Foreign Trade, which have overlapping management and staffs. These institutions/networks, with their well-entrenched patrons and enormous budgets (they are subordinated directly to the presidential administration, rather than to the Ministry of Education or the Academy of Sciences), have poached researchers from existing think tanks or organizationally incorporated smaller think tanks. (HSE, for
example has over a dozen in-house economics research centers, and has swallowed whole
the Expert Institute and the Development Center.)

The institutional changes, though, should not be overemphasized, for there is a
deeper stability of personnel. The chief economist of Sberbank, a former employee of
CSR and CEFIR, put it in perspective: the “expert community” (nauchnoe
soobshchestvo) is not large and everyone knows everyone, so when you want to put out a
contract for research, first you think of who you want to hire, then you figure out through
which “legal face” (iuridicheskoе litso) you need to approach them this year. Two
institutes which have been at different times the recipients of the patronage of Putin and
Medvedev respectively, the Center for Strategic Research (CSR) and the Institute for
Contemporary Development (INSOR), have made this their own organizational strategy,
maintaining only skeleton staffs and putting together teams for projects as contracts are
tendered.

Think tanks were formed outside of but sponsored by government-sponsored
research institutes and patronized by the state hierarchy while remaining outside of it
because of a combination of financial and control incentives. Directors of Academy of
Sciences institutes were able to funnel resources (often largely non-monetary, such as
office space) to a carefully picked and trusted group of institute employees rather than
disperse them throughout a large organization. The employees of the new institute were
able to pay non-pay-scale salaries to themselves, to solicit foreign funds, and to compete
for both state and nascent private sector contract work. (The foreign foundations’
requirement that the recipients of grants be NGOs, in the name of building civil society,
was a strong catalyst for the development these think tanks parallel to state organs rather than within them.) They were also able to shape their own work schedules and priorities rather than submitting to the demands of the institute, to dare more politically contentious positions than their sponsor might be able to express, and were freed from the bureaucratic avalanche of reports, permissions, budgets, memos, etc. With the state providing the vast preponderance of contract work and almost non-existent domestic philanthropy, institute salaries and resources, meager as they might be, provide a fallback should state contracts temporarily dry up.

A similar mix of reasons led think tanks to be formed outside of the government itself. Ministers were likewise able to funnel resources to a carefully selected group, rather than throughout their ministry, and to ignore ministerial pay scales. And employees were able to be more politically venturesome and free of bureaucracy. The think tanks also provided a base of power for the patron to fall back on should he be temporarily be out of government. State contracts provide if not all then the vast majority of think tank incomes, and it is thus essential for a think tank to have a patron to steer the ostensibly open contracts to it. Think tanks with the contacts to get contracts beyond their ability to fulfill may then act as subcontractors to other think tanks. And, sometimes they need to steer contracts to client think tanks and then subcontract them back in order to get around conflict of interest rules.

In both cases, of course, the independent structure would provide a layer of non-transparency to launder state or foundation money, in the form of kickbacks, back to the sponsor and/or the patron.
Russia officially has a public and open state tender system, which requires that state contracts must be announced on a government website and a statutory period must elapse before the winner is announced. However, my sources tell me that they almost never compete for their contracts. In most cases they are directly contacted by employees of the ministries with whom they have developed longterm working arrangements, either at the level of head of the department or deputy minister. Upon receiving a request for work, the terms of the contract are worked out, and research is immediately begun, and only then is the contract put up for bid.

An important stimulus to the contracting system is the overwork of the lower level ministry employees, who, bombarded by urgent requests from above, have little time to work on longer-term research projects and more far-sighted planning. But ministry employees interact with think tank researchers on more than just a contract research basis. Indeed, depending on who you ask, the most important interaction is outside of the contract system. Researchers themselves often have the impression that the research they submit in fulfillment of a contract is of no interest to anyone. One economist and senior bureaucrat confirmed to me this impression. The research might only be received after when it would have been useful; it also might never have been needed in the first place, yet the earmarked budget monies must be spent. But, while under contract, the ministry feels able to call on the institute researchers on short notice for personal, orally-given advice. This senior bureaucrat suggested to me that this is in fact what is happening: the ministry primarily wants this advice on demand, but the only way to pay for it, is through the research contracting system. That is, researchers do not
act as scientists, producing rigorous analysis or facts, rather they act as gurus or experts, who produce wisdom, the nature of which is mysterious to its recipients. This is a very different mode of knowledge production, of expertise. Note that this capacity of the experts, this wisdom, is of course only the result of the years and years of contract work they have undertaken on the topics about which their wisdom is sought. So the system functions, even as it misunderstands its own nature.

This function of the researcher as expert or oracle is replicated at the very highest levels of government, where a dozen of the most senior economic advisors, including several think tank directors, are regularly consulted directly by the handful of most senior policymakers. One of them was the director of NES, Sergei Guriev.

II. ON THE POLITICAL ECONOMY OF NON-DEMOCRACIES: SECOND-ORDER THEORY OF TRANSITION TO CAPITALISM

Guriev’s flight

On April 30th, 2013, the news broke that Sergei Guriev, the rector of the New Economics School (NES) of Moscow, the center of my fieldwork, had fled the country. Despite increasing political pressure on opposition figures and non-governmental organizations over the preceding months, this news shocked the Moscow political and business elites. Guriev was the most visible economist in Russia, a regular editorialist for its most prominent papers and guest on radio shows, the face of Western economics in Russia, the rector of its most prestigious institution of economic research, a member of the board of several of the most important state corporations, an old friend of the deputy
prime minister and the economic advisor to the president, and one of the inner circle of “wise men” that advised the President and Prime Minister on economic affairs. In other words, he was firmly of the establishment, even one of its stars. He ought to have been untouchable.

To understand what happened requires holding Guriev the political figure and Guriev the economist together. I take him and his close collaborators, especially his second in command, Konstantin Sonin and his wife, Ekaterina Zhuravskaya, as both the result of a purposeful attempt to extend the network of economic knowledge in order to effect political change and also as historically-situated agents reflecting on this experience to generate a fundamental reconceptualization of the economic itself. Within the theoretical space thereby opened, and guided by their distinctly post-Soviet liberal vision, they elaborated an interpretation of the political economy of Russia that guided them as political actors.

This is, I take it, an illustration of a more general Foucauldian point about economics and political liberalisms. Economics is not just a disciplinary body of knowledge. Rather, it is always a situated form of critique of the political present in order to propose re-programmings of the state action that manages social life.

_The antagonisms burst into the open_

When I began my fieldwork in 2010 with Guriev as both my institutional host and one of my primary informants, Moscow was in the midst of a slow-moving crisis. Over the previous decade, President Putin had squashed all quasi-independent centers of
power, announcing his intentions in 2003 with the nationalization of the oil major Yukos and the imprisonment of its politically-minded owner, Mikhail Khodorkovsky. The liberals of the 1990s suppressed their hopes for democracy and settled for increments of market-oriented economic reform whenever the political winds favored them. Meanwhile, oil revenues, which had accounted for most of the decade’s economic growth, and from which the government provided services and patronage to various constituencies, were falling even as the non-oil economy slowed. The elite were worried about the tacit pact they had made with the Russian people in which they promised sustained economic growth for acquiescence to undemocratic and self-enriching rule.

The economic policy community had two proposals. Liberals argued that the economic sclerosis was only the other face of the political system. Political reform would enable the market institutions distorted by cronyism, embezzlement, and capture to function as intended, allowing domestic business to grow and inducing foreign investment. Their opponents instead argued for using the accumulated oil largesse to jumpstart what were taken to be leading sectors of the twenty first century economy, and for industrial policy to protect and nurture them.

This status quo was shattered on December 5th, 2011, the day after the contested parliamentary elections. To the surprise of the attendees no less than of the authorities, a protest at Chistie Prudi drew 5,000 people, an order of magnitude more than any in the previous decade, and they refused to leave. Over the next year the protest movement gathered strength, hopes for reform rose, and then, with Putin’s re-election, fell dramatically. By fall 2012 the movement was attempting to reorganize without an
electoral focus, and the government cracked down. Prominent oppositionists were harassed or imprisoned, new anti-protest laws were passed, NGOs were audited and raided.

Alexei Navalny emerged as the most important opposition leader, a lawyer who had started a blog that outed official corruption on an unimaginable scale. The core of his platform was eliminating corruption by instituting political pluralism, from which all else was to follow. Guriev and Sonin were among his close advisors and public supporters, all while continuing to advise the Prime Minister and President on economic policy.

_The Western Wind_

But Guriev and Sonin were more than public figures. They and their colleagues at NES represent both the first flowering of a longterm plan for installing liberal economic governance in Russia and an important evolution in the field of knowledge. I will address each aspect of these in turn.

In 1991, as the Soviet Union was disintegrating following the failed coup, the Israeli economist Gur Ofer visited Moscow economics institutes. The head of the reformist Central Economic Mathematical Institute (CEMI), Valery Makarov, a student of Nobel Prize winner Leonid Kantorovich, proposed to Ofer the foundation of a school to teach state-of-the-art Western economics in Russia. As luck would have it, Ofer had just been discussing the lack of such education with George Soros. The NES model initially depended on foreign professors to teach everything but mathematics, and then sent the best students abroad for PhDs. The intent from the start was to create a cohort of
world-class economists that could then be recruited back to restructure the domestic profession and become an internationally fluent domestic policy elite. Ofer’s model was exactly what the Chicago macroeconomist Don Patinkin had done to the economics faculty of Hebrew University in the 1950s and 1960s. The school opened its doors in 1992, and graduated its first class in 1994. With Guriev’s appointment as rector in 2004, the School was handed over to its own students.

But aside from NES itself, NES’ returning students had another employer. RECEP was a part of the EU’s technical assistance program (TACIS), a gathering of five different targeted consulting relationships under one roof that employed a mixture of Russian economists and Western economists that visited monthly. A young economist named Erik Berglof worked on trade, industrial policy, and competition policy with the Ministry of Economic Development and Trade. Berglof felt that his ministerial partners neither understood what he tried to tell them, nor were interested in it. When RECEP came up for tender again in 1996, Berglof formed a consortium of institutions, and re-applied with a new concept for a new kind of think tank. He intended to create a local environment of Russians that could serve as an interface between Western policy advice and domestic bureaucracies, a chain of mediators to enable economics’ facts to travel. Sonin and Zhuraskaya were among his first hires. Several years later, it was renamed CEFIR—the Center for Economic and Financial Research. The acronym was a triple play on words, referencing both a type of Russian pastry, and the Western wind, the Zephyr. In 2005, it merged with NES.
Guriev’s phenomenal rise into the highest state councils and stature as public intellectual seemed the perfect realization of the hopes of NES’ and CEFIR’s founders.

*From “Transition economics”*...

But the other side of this extension of the network of knowledge into the former Soviet space, was that the knowledge produced in it also changed. The subfield of “transition economics” emerged in the early 1990s but by the mid-2000s dissolved into the new, wider subfield of “new political economy.”

“Transition economics”’ arrow of reasoning proceeds from macroeconomics—stable price level, healthy state finances, a good foreign exchange position—to microeconomics. The macroeconomists most involved were from Harvard and Yale. They were policy-centered, and thus old-style Keynesians who saw an economy as requiring management, not new style anti-interventionist real business cycle theorists. The microeconomic policy prescriptions are what economists call “first best”: they are basic prescriptions derivable from theory without taking into account any feedbacks from the ways in which existing institutions deviate from the theoretical ideal.

There were three roots to the original “big bang” approach to transition. The first was monetary theory and stabilization policy, which, by the late 1980s, and in light of both Volcker’s term as president of the Federal Reserve and the Latin American crises, had come to a consensus that only drastic changes in the money supply could reset expectations and stem hyperinflation. It was this—and only this—that originally bore the name “shock therapy”. The second was the argument that there were complementarities
between different aspects of reform, such as price liberalization and privatization that the positive effects of one reform would be muted or even reversed without others. The third was the conclusion that macroeconomic stabilization had to be backed up by microeconomic reforms, especially liberalization of factor markets and privatization, in order to be permanent and robust in the post-Bretton Woods international economic environment.\footnote{Marion Fourcade-Gourinchas and Sarah L. Babb, “The Rebirth of the Liberal Creed: Paths to Neoliberalism in Four Countries,” \textit{American Journal of Sociology} 108, no. 3 (2002): 533–79.} This was in response to the disappointments of development lending, and is what is called “structural adjustment”.

...to “the new political economy”

But as the 1990s progressed, transition did not proceed as expected. For economists there were four major problematizations—“puzzles” as they call them—about post-Soviet transition. First, price liberalization caused output to fall sharply, whereas it ought to have moved the economy closer to equilibrium, at which the volume of sales ought to be maximal. Second was the “great divide” in performance between Central and Eastern Europe and the Former Soviet Union. Third was the extraordinary and unexpected success of China. And fourth was that mass privatization led not to investment and profit maximization but rather to asset-stripping by the new owners.

The reaction to these puzzles was to turn to the institutions required for theoretically good policies to generate their intended results. In doing so, they both drew from and contributed to fundamental discipline-wide shifts. The time was ripe: the advances in sub-disciplinary specialties that drew upon the game-theoretic reformulation
of the core of microeconomics of the 1980s—contract theory, law and economics, mechanism design, and corporate finance—allowed the incorporation of the challenges posed by the New Institutional Economics into the mainstream of microeconomics. Seeing the puzzles through these lenses was thus part of a fundamental reconstruction of the object of economics, a turn from a focus on markets and price theory to contracting, transactions and their institutional environment. Rather than thinking in terms of infinite commodity markets with infinite agents, the problem became one of describing non-standard situations, where a small number of carefully specified agents with different incentives and information states acted strategically.363

The young economists of CEFIR and NES came of age in a Russia in which the consensus was that the transitions to both capitalism and democracy had failed, and they sought to understand why. The crucial paper around which understanding crystallized was Joel Hellmen’s “Winner Take All” (1995), which argued that the winners of early reform block further reform to continue to enjoy extraordinary rents while using their gains to protect themselves in the absence of a functioning legal environment. The nation becomes trapped in what is called a “bad equilibrium.” Sonin, Zhuravskaya, and Guriev expanded this insight into a whole research program, investigating such questions as why dictators might chose incompetent subordinates or when they might kill them, why oligarchies have weak property rights, how the existence of oil wealth changes political competition and weakens civil society, how control of media helps disorganize a dictator’s opponents, why firms might prefer to barter, and why the absence of political

competition in a federal system leads to the under provision of public goods on the local level.

If these sounds like the problems of Russia, that is because they are are theorizations of it. But in very few of these papers will you find any mention of Russia. Rather, you will find page after page of game theory. These economists share a basic vision of Russian political economy that they are piecemeal formalizing with the most contemporary tools, purifying of local specificity, and contributing to a wider field of research. Thus in a few short years, transition economics had flowered, founded its journals and had its conferences, and collapsed into the rapidly growing field of “the new political economy”.

Early transition economics saw politics and economics as separate, it bracketed politics, and thus ended up with a vision in which the only political problem was achieving a temporary monopoly on political power in order to jam through a reform package, so-called “market Bolshevism”. But the new vision “endogenizes politics”: that is to say, it sees the evolution of political power and policy and economic growth in dynamic interrelation, mediated by the institutions that frame interaction. It institutes a second-order politico-economic reflection on first-order questions of narrowly economic change. From the perspective of this hermeneutic, and guided by a certain kind of liberal vision, the Russia of 2012 presented new tactical possibilities.

_The twin drivers_
According to Guriev, Sonin, and Zhuravskaya, situated in the network positions thus created and theorizing with the tools that they had developed, Russian political economy thus had two drivers. The first was the “exogenous constraint” of oil prices. When prices fell, demand for good policy advice would rise, and the liberals would gain power within government to make incremental reforms. The second was the gradual “endogenous” growth of a broad segment of property owners—not just oligarchs—with an demand for the enforcement of property rights and the rule of law, a kind of modernization theory redux. In 2012 the two drivers seemed to be moving strongly in the same direction. Guriev, acting on this understanding, played both sides, providing policy advice at the top of the political system and assisting Alexei Navalny in his bid to be the voice of “the new middle class”.

But the system did not respond as he hoped. The crackdown spread, and Guriev found himself under attack. In the absurdist retrial of Mikhail Khodorkovsky, then President Medvedev had ordered an expert analysis, in which Guriev offered the opinion that the charges were unfounded. He subsequently found himself under investigation by the general procurator, on the grounds that NES had accepted money from Yukos ten years before—well before Guriev had become rector. He hurriedly consulted his friends in government, who told him that this time they could not protect him. Then he bought an airline ticket to Paris.

III. POST-SOVIE T LIBERALISM IN SEARCH OF ITS FUTURES PAST
In March of 2011, Russia seemed stable, and indeed people spoke of stagnation, of political apathy, under the Putin-Medvedev tandem. Advocates of democratization attempted to explain the supposed political “apathy” of the Russian citizen in a nearly every theoretical language. The political party system had become United Russia, two Kremlin-sponsored parties on the Left and Right, and a tame rump Communist Party. Much commentary both East and West had devolved to a new Kremlinology, trying to divine from the bureaucratic and rhetorical tea leaves the relative positioning of what were then called the two Kremlin clans represented by the twinned heads of state. On the one hand, there was a grudging respect for Putin’s claimed restoration of order, a respect slowly being eroded as that order more and more revealed itself as a kleptocracy, if a less dramatic one than the oligarchy in the age of Yeltsin. On the other hand there was a hope that Medvedev’s slogan of “modernization” might also involve a degree of political liberalization.

With public political life at a standstill, the question became one of elite networks and alignments. Astute observers had long noticed that Putin’s rhetoric, which repudiated the fall of the Soviet Union as a “geopolitical catastrophe” and the 1990s as a “new time of troubles” did not accord with his government’s economic policies. Whereas Yeltsin’s governments have been excoriated for their “neoliberal” policies, they almost never met any of the IMF targets set for them, inflation never came down, and budgets never balanced. Only after the 1998 default, with Putin in power and oil prices high, did Russia implement the macro prudential policies urged on it from 1991 onward. Most impressively, it not only paid off its debts to its international creditors early but also built
an enormous foreign exchange reserve and stabilization fund. Macroeconomic stabilization was accompanied by slow but steady pro-market structural reforms in various areas, including of social benefits, of foreign exchange operations, of utilities and railroads, of the tax code, and of the commercial code. And in particular, the circle of economists swept into government in 1992 has continued to control the major organs of economic governance to this very day. The chorus of voices of their opponents, who have called for massive expenditure of the oil surplus on social support and economic development, have not found bureaucratic power or a ready ear in government.

But more fundamentally, something else has happened, something which Sergei Prozorov diagnoses as “liberal conservatism.”364 The state of play at the end of the 1990s—in the sense of the distribution of control over property and the fundamental organs of political representation—has, despite its widely felt illegitimacy, become a settlement. The post-Yeltsin governments have refused to reopen the question of privatization in any substantive way, have refused to reconsider a continued marketizing trajectory. (Khodorkovsky was no exception to this judgment.) If Yeltsin announced himself as a revolutionary break with the Communist past, and the founding of a new statehood, Putin says that the founding period is over and its basic results will have to be accepted. Any organized groups or strains of thought that rejected this, including the far right, the far left, or the varieties of liberalism founded on a conception of human rights as axiologically prior to the state, became excluded from political life. Practically speaking, their parties forced below the threshold of parliamentary representation or

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deregistered, their media organs selectively shut down by anti-extremist laws, their organizations shadowed by Kremlin-sponsored duplicates. They became, in the completely accurate phrase of Russian political discourse, the “non-systemic opposition”.

This also involved a rejection of the politics of history. As Kevin Platt argues, he Yeltsin years had been founded on a rejection of Soviet history. This rejection of course had its own return of the repressed, of conjunctions of the present with a past supposedly gone for good, in the form of nostalgia and grotesqueries. This is what made the red-brown coalition possible: the rhetoric of rupture made far-left politics reactionary. Other rejections were posed against this rejection, cuts into Russian history that distinguished the true history from historical betrayal at various historical depths. Russian history could be placed into parentheses at, for example, the death of Lenin, the Bolshevik revolution, the failure of the 1905 revolution, the end of serfdom, or the foundation of the Petrine imperium. But in the post-post Soviet of liberal conservatism, the vision of political history was based on the reassertion of continuity and an aestheticization of the genealogy of power. All epochs of Russian history, all iterations of Russian statehood, became blended together in an undifferentiated affirmation, in which Stalin and Peter, Pushkin and Malevich could sit comfortably side by side. The 1990s become not a revolution, but a period of temporary and atypical disorder.

Under liberal conservatism we also see a de-spatialization of narratives about Russia’s future. If, in the 1990s, Russia was alienated from its past, debates about its future took place through comparisons of reality to one or another foreign model. These

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proliferated as the disappointments of transition increased. From an initial love affair with an undifferentiated West that always meant the United States, opponents of quick transition raised the image of “Swedish model”. Later, South Korea and China appeared. And then, at the end of this period, the early 2000s, and also the end of the alphabet, Andrei Illarionov compared Russia to Zimbabwe. Under Putin, however, along with the reassertion of historical continuity, we see the reappearance of particularist ideologies that set Russia in opposition to Western geopolitical interests, social norms, and political ideologies, that position it in a distinct and unique imagined “Eurasia”.

While in the 1990s, the political polarity was between a Westernizing liberalism and a national-patriotic communism (the red-brown alliance), Putin gradually assumed a position that forced a restructuring of the political field. Now, liberalism was paired with a discourse about national sovereignty and a political *sondersweg* that would involve a strong centralized state, the “vertical of power”, guiding a market economy. The left was defanged by a de-ideologized dispensing of oil revenues to its various constituencies, the so-called *budzhetniki*. And so Putin has been able to occupy something like the exact center of the ideological space, a fact made uncomfortably manifest in the tortured alliance of iPad-toting liberals, leftists, and various more or less unsavory varieties of rightists during the protest cycle of 2011-2012.

In this condition, Medvedev’s campaign for a new “modernization” opened up only a very limited space for discussion. It was a label without content that the various monied interests, bureaucratic fiefdoms, and the networks of publicists and political technologists that attached to them competed to fill. Everyone was cast into the role of
advisors to the president. This conference, the Gaidar Forum, timed to coincide with the late economist’s birthday, was one of the many fora at which this competition took place and at which the contestants could try assess the state of play. An example of the peculiar Russian genre of the state conference, it blended panels of academics, oligarchs and business leaders, and top bureaucrats. At this conference two distinct visions of economic modernization were articulated, both of which take as their point of departure the slide of Russia to a peripheral position in the world economy based on extraction of oil and minerals.

The first, which I will call for short the technocratic, has often been viewed in the West through the lens of anti-Communist suspicion, but it is certainly not communist. This vision sees the problem of Russian development as one of technological catching up. Russia must leverage its financial and human resources to once again become a leading technological and industrial superpower. The state should use its accumulated oil largesse not only for massive infrastructural projects but also to invest in leading sectors of the world economy. They cite the Asian tigers as evidence that state-owned or financed holding companies can become engines for climbing the value-added ladder. This impulse is what gave rise to the founding of RusNano, a massive state investment in nanotechnology. Industrial policy should be coupled with protectionism and loose monetary policy. Corruption, the advocates of this point of view hold, should be dismissed. They point to China as evidence that endemic corruption and high growth can coexist. The economists pushing this point of view, such as Andrei Klepach and Andrei Belousov, are primarily situated in the Ministry of Economic Development, and the
think tank the Center for Macroeconomic Research and Short-term Forecasting. They are
descendants of the planning economists from the Soviet Scientific Research Institute of
Gosplan, whose primary technology was the input-output model, under which the
economy appears as a chain of different technologies.

The second, which I will call the liberals properly speaking, though both groups
are sometimes called liberal by those in the non-systemic opposition, proposes something
else entirely. They see autarkic modernization as being wasteful and unlikely to succeed.
Climbing the technological ladder will happen quickest by importing foreign technology
along with foreign investment, and along with foreign investment will come pressure for
better corporate governance and management, which will increase global
competitiveness. Not only is autarkic modernization therefore wasteful, but, given the
level of corruption, it cannot be effective. Massive state investment would in reality mean
simply massive theft from the state, and at the price of Russia’s hard-won
macroeconomic stability. Their counterproposal quickly slides from economic policy into
politics. Foreign direct investment and gains to competitiveness are only possible on the
condition that the business environment improves, and that means reducing corruption
and rent-seeking. That in turn requires political competition: a truly competitive
multiparty system and a vigorous media. These economists are the remnants of the
Gaidar government, economists who came of age in the 1980s, who are still ensconced in
the Ministry of Finance and the Central Bank, and at the think tank the Institute for the
Economy in Transition.
The broader liberal camp, while agreeing upon the desirability of democratization, takes a harder or softer line on its urgency. Ilya Kukulin has pointed out the significance of this debate, which circles around the interpretation of the 1960s. Anatoly Chubais, the current head of RusNano and the former chief of privatization in the 1990s, has come to see the present situation in analogy to the development of Russia after Stalin’s death. In his narrative of that period, the technological demands of military competition gave rise to a Soviet “middle class,” the “scientific-technical intelligentsia”, which became the social base for Gorbachev and then Yeltsin. This class, though, was nearly wiped out by the transformations of the 1990s and the massive fall in income they experienced. Accordingly, he hopes that state investment in science and technology, the founding of technology parks like Skolkovo around the country, and the gradual embourgeoisement of the Moscow corporate class will give rise to another wave of democratizing sentiment. He makes an identification between the 1960s and the 2000s, as incipient moments of massive social change in an unfree country.366

He has been remonstrated by others within the liberal camp, however, such as Yevgenii Gontmakher, who argues that contemporary economies require at least a minimal amount of political competition. Chubais in reply says that democracy won’t happen until there is a social class that requires it. A further reply, usually implicit because of its anti-populism, does not make a historical argument about the 1960s, but uses one of the scientific-intelligentsia’s characteristic tropes, made famous in the science fiction of the Strugatsky brothers. This is the trope of the Progressor, the visitor

from an unimaginably more advanced other world sent to this one to help lead it up the developmental ladder.\textsuperscript{367} In an unfree society populated by ignorant masses that are at best acquiescent and at worst the dormant repository of all sorts of atavistic nationalisms, social change can only come about by the conspiratorial revolution from above of an enlightened elite. The young reformers of the Gaidar government are sometimes understood as having seen themselves in this role. The association is too tempting: Yegor Gaidar’s family was very close with the Strugatsky’s, and Gaidar not only often quoted the Strugatsky brother’s fiction, but married Arkady Strugatsky’s daughter, his childhood friend. In the 2000s, the Progressor trope can blend with a fear of populism or nationalism allow liberals to make an argument for delaying democratization until liberal values have had time to permeate Russia culture. In Chubais’ circle there were those who were looking in 2011 for another team of future reformers.

You know, more or less, how the rest plays out. The liberal intelligentsia tries to get out ahead of Medvedev and force or encourage him to challenge Putin for democratization, and have their hopes dashed. Their social base, the Moscow corporate class and rump intelligentsia of the 1990s hits the streets, and to their dismay, outrage, and disgust fails to receive the support of the rest of the reset of the country. Putin destroys attempts at organized opposition. The liberal economists all more or less remain in place. Under what terms the debate will be carried out in the future, with what historical metaphors, and what models of political action, I dare not venture. I do guess that we will continue to see Russian futures premised on transformations that are not just

economic, even when they’re called economic policy and carried out by economists, but also sociocultural and sociopolitical. In the winter of 2014, Vladimir Yakunin, the President of Russian Railways, gave a speech in which he invoked a Eurasian cultural sondersweg and proposed development based on massive infrastructural project akin to the Soviet State Plan for Electrification (GOELRO). Even as Soviet history becomes less and less relevant every year for understanding Russian economic reality, its potency as a metaphorical resource for mobilizing alliances and imagining futures remains.


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