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The Flat Tax: An Examination of the Baltic States

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Abstract

The idea of a flat tax, a tax levied at a single rate, has become an increasingly discussed and implemented fiscal strategy across Europe and the rest of the world. Estonia, Latvia, and Lithuania adopted flat tax systems in 1994 and 1995, making them the first modern countries to adopt flat tax structures. They subsequently experienced unprecedented economic growth, shocking the world as they emerged as "Baltic Tigers" at the turn of the century. Russia adopted a flat tax regime in 2001, and more than a dozen countries currently maintain some sort of flat tax structure today. However, the actual effect of the flat tax rate on the Baltic countries' economic growth remains debated.

Though there is clearly timing a correlation between the Baltic States' economic growth and the implementation of the flat tax, the current economic analysis on the effect of the flat tax rate is largely confined to Russia. Additional research and analysis needs to be completed before determining whether the success of the "Baltic Tigers" can, and if so, to what extent, be attributed to their flat tax policies. The Baltic States are an appropriate laboratory for a number of reasons: they have the longest history for examination, and have many similarities between them including, economy, geographical location, and relationship to Europe. These similarities allow the analysis to control for unique factors in the individual countries and isolate the effect of a flat tax.

Looking at revenue, GDP, and labor supply data, this paper attempts to analyze the effect of the flat tax on these three Baltic states. Using the analysis on these countries, this paper attempts to discuss whether a flat tax rate is an effective and potent growth strategy for transitional economies. The findings of these analyses do not indicate that the flat tax has any definitive positive impact on growth, equity, or labor supply. However, without the simplicity of the flat tax such growth may not have been able to occur in the early years of the Baltic states' independence.

THE FLAT TAX: AN EXAMINATION OF THE BALTIC STATES

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Jack Jarmon

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TABLE OF CONTENTS

Introduction: Flat Taxes in the Baltic States

Following the collapse of the Soviet Union, a period of transition and privatization began across Eastern and Central Europe. During this time, fiscal strategy was not at the forefront of policy discussions. Initially, all newly independent countries inherited the tax system used by the Soviet Union.[1] This Soviet style tax system included turnover and enterprise profit taxes and was generally inefficient under the newly liberalized and privatized economies.[2] Thus, as these countries began to transition into a market economy and a private sector emerged, the creation of new tax laws became increasingly necessary.[3]

Beginning with Estonia's flat tax reform, tax policies in transitional economies began to receive increasing attention.[4] Estonia adopted a flat tax rate in 1994, followed by Lithuania in 1994 and Latvia in 1995.[5] Since the Baltic states' adoption, other Central and Eastern European countries have followed, including the Russian Federation in 2001, the Slovak Republic and Ukraine in 2004, and Georgia and Romania in 2005.[6] The publicity from the flat tax reforms has generated debate in other transitional economies including Poland, Slovenia, Hungary and the Czech Republic.[7]

The flat taxes of the Baltic states—Estonia, Latvia, and Lithuania—do not follow the exact model laid out by Robert Hall and Alvin Rabushka or Steve Forbes in the works

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[1] Emil, et al., *Tax Reform in the Baltics, Russia, and Other Countries of the Former Soviet Union.* Washington DC: International Monetary Fund, 1999, p. 1.
[2] Stepanyan, Vahram, "Reforming Tax Systems: Experience of the Baltics, Russia, and Other Countries of the Former Soviet Union." Washington DC: International Monteary Fund, 2003, p. 12.
[3] Emil, et al., p. 1.
[4] Saavedra, Pablo, "Flat Income Tax Reforms," Washington DC: The World Bank, 2007, p. 254.
[5] Ibid, p. 256.
[6] Ibid, p. 255.
[7] Ibid, p. 253.

The Flat Tax[8] and *Flat Tax Revolution.*[9] A pure flat tax system has not yet been

integrated in any country thus far,[10] and the idea of a "flat tax" has come to be used much

more loosely than the Hall and Rabushka sense. Today it generally refers only to a single

marginal tax rate[11] on income earned.[12] The primary difference between the theoretical

Hall and Rabushka flat tax and the current structure in the Baltic states is that in addition

to a personal income and corporate tax rate, all three countries continue to have value-

added taxes (VAT), whose rates vary between 5 and 18 percent. Additionally, the reforms

introduced tax-free allowances or deductions which add some progressive elements to the

system.[13] The allowance is generally a minimum income below which individuals are not

taxed.[14] The flat tax countries have also introduced social contributions,[15] which account

for a significant part of revenue.[16] However, the three countries are still considered to be

flat tax regimes because they operate predominantly single tax systems under which

nearly every citizen, regardless of income earned, pays the same marginal tax rate.[17]

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[8] Hall, Robert E. and Alvin Rabushka, *The Flat Tax*. Stanford: Hoover Institution Press, 2007.

[9] Forbes, Steve. *Flat Tax Revolution*:*Using a Postcard to Abolish the IRS*. Washington, D.C: Regnery Publishing, Inc. 2005.

[10] Ministry of Finance, Czech Republic. "Macroeconomic Outlook: Fiscal Outlook: Topic 4, Flat tax in Practice." Czech Republic: 2009.

[11] Marginal tax rate refers to marginal tax rate is the tax rate that applies to the taxpayer's last dollar of taxable income. (http://www.fairtax.org/PDF/WhatIsTheDifferenceBetweenTaxRates.pdf)

[12] Keen, Michael; Kim, Yitae, and Ricardo Varsano. "The 'Flat Tax(es)': Principles and Evidence." IMF Working Paper No. 06/218. International Monetary Fund, September 2006, p. 714.

[13] Saavedra, p. 258.

[14] Ibid, p. 258.

[15] Social contributions include social security contributions by employees, employers, and self-employed individuals, as well as other contributions to social insurance schemes operated by governments (nationmaster.com).

[16] Keen, p. 714.

[17] Murphy, Richard. "A Flat Tax for the UK? The Implications of Simplification." ACCA, p. 21.

Table 1. Current flat taxes (rates in percent)

Country	Flat tax adopted	Personal income tax rates			Corporate income tax rate			Basic allowance
		Before[a]	After[a]	2007	Before[a]	After[a]	2007	
Estonia	1994	16-33	26	22[b]	35	26	22[c]	Modest increase
Lithuania	1994	18-33	33	27[d]	29	29	15	Substantial increase
Latvia	1997	25 and 10	25	25	25	25	15	Slight reduction
Russia	2001	12-30	13	13	30	35	24	Modest increase
Ukraine	2004	10-40	13	15	30	25	25[e]	Increase
Slovak Rep.	2004	10-38	19	19	25	19	19	Substantial increase
Georia	2005	12-20	12	12	20	20	20	Eliminated
Romania	2005	18-40	16	16	25	16	16	Increase

(a) Rates relate to year before and after adoption of the flat tax
(b) Rate reductions planned, to 20% in 2009, 19% in 2010, and 18% from 2011
(c) Tax on distributed profits only since 2000. Rate planned to be reduced in step with the personal income tax rate
(d) Rate planned to be 24% from 2008
(e) Rate reductions planned, to 22% in 2010 and 20% in 2012 are planned
Source: Keen et al., 716

Table 2. Tax Structures in the Baltic Countries

Country	Savings Taxed	Pensions Taxed	Oversees Earnings Taxed	Capital Gains Taxed	Inheritence Tax	Other Tax Deductions and Reliefs
Estonia	✓	Mainly	✓	Mainly	X	X
Latvia	✓	Some	✓	✓	✓	✓
Lithuania	✓	X	✓	✓	X	✓

Source: Murphy, Richard. "A Flat Tax for the UK? The Implications of Simplification." ACCA, p. 22.

Looking at these tax rates, Alvin Rabushka, co-author of *The Flat Tax*, noted that "all of these countries are flat tax regimes in the sense that there's only one marginal rate of tax above the threshold. None of them meet 100% of the criterion of the [Hall and Rabushka framework]… but in every case they are better than what they replaced."[18] In each country, the new tax system, while not entirely flat, created a less progressive tax scheme than the one it followed.

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[18] ACCA, p. 23. The Baltic countries, like other transitional economies, inherited a Soviet style tax system, which included turnover and enterprise profit taxes. These did not operate efficiently under privatization. (Stepanyan, p.12) In almost all transitional economies, the tax reform included the abolishment of the enterprise profit and turnover taxes and the introduction of a personal income tax, enterprise tax, and a value added tax. (Stepanyan, p.12)

While prior to the flat tax implementation all three states were suffering from inefficiency and economic stagnation,[19] the three experienced unprecedented growth following the tax reform. When Estonia's prime minister Mart Laar established a 26 percent flat tax on business and personal income in 1994, Estonia's economy was contracting.[20] With the flat tax, Estonia established personal exemptions of about $1000 a year.[21] The tax rate has since been reduced to 22 percent, and is scheduled to be reduced to 18 percent by 2011.[22] Since the implementation of the tax reforms, Estonia has experienced an average growth of 9 percent each year after adjusting for inflation.[23] With a population of 1.4 million people, it attracted $890 million in foreign direct investment in 2003 and $926 million in 2004, more than 10 times what China, with a population of more than 1.2 billion, received.[24]

Lithuania and Latvia also experienced tremendous turnaround following the establishment of their flat tax rates. Lithuania emerged as the fastest growing economy in the Baltics, with a 6.7 percent growth rate in 2002, 9 percent in 2003, and 8 percent in 2004.[25] Latvia has experienced an average growth rate of about 4 percent a year since the flat tax, and its inflation, which was 25 percent in 1995 was down to less than 4 percent by 2003.[26]

However, controversy remains as to whether or not the success of the Baltic Tigers can be attributed to the flat tax system, as well as about the effectiveness of flat

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[19] Shen, Raphael. *Restructuring the Baltic Economies: Disengaging Fifty Years of Integration with the USSR*. Westport, CT: Praeger Publishers, 1994, p. 1.
[20] Forbes, p. 97.
[21] Ibid. p. 96.
[22] Mitchell, Daniel J. "Baltic Beacon." *Wall Street Journal* Europe. June 20, 2007.
[23] Ibid.
[24] Forbes, p. 97; cia.gov.
[25] Ibid. p. 98.
[26] Forbes, p. 98.

taxes in general. Some scholars and policy makers point to the success in the Baltic

countries as evidence for a flat tax's success. In a 2006 IMF paper and in subsequent

discussions, Michael Keen argues that the effect of the flat tax is generally ambiguous.

He poses the question not as "whether more countries will adopt a flat tax," but "as

whether those that have it will move away from it."[27] Yet, in a 2007 article for *The Wall

Street Journal* Europe, the CATO institute's Daniel Mitchell pointed to Estonia's success

with a flat tax, arguing that "the flat tax has helped Estonia become one of the world's

fastest growing economies." Mitchell claims that the lower tax rates and greater

simplicity have led to a Laffer Curve effect, where tax revenues almost doubled since

2000, and corporate tax receipts increased by more than three times.[28]

Although the flat tax has received much attention in the news and political

discussions, there has been little analysis examining its effects. There is copious

economic literature analyzing the effects of tax changes, yet few studies, either

theoretical or empirical, on the flat tax. Except for Russia and the Slovak Republic, and

more recently Estonia,[29] there appears to be no household level analyses looking at the

effect of the flat tax. Michael Keen noted that there "is an evident need for studies in

other flat tax countries along similar lines, and for work, too on the impact of the flat

tax…"[30]

Understanding the actual effect of the flat tax reforms in the Baltic states has

enormous payoff for the fiscal policy of other transitional economies and countries in

[27] Keen, p. 712.
[28] Mitchell
[29] Staehr, Karsten. "Estimates of Employment and Welfare Effects of Personal Labour Income Taxation in a Flat-Tax Country: The Case of Estonia." Estonia: Bank of Estonia, 2008. A discussion of the analysis is found in the Estonia chapter.
[30] Keen, p. 741.

general. After looking at its neighbors, Russia adopted a 13 percent flat tax in 2001 on personal income, making it the first major economy to adopt a flat tax.[31] Since then, more than a dozen countries both within and outside the former Soviet Union have adopted flat taxes.[32] Debate ensues between research institutes, scholars, and those in government throughout America and Europe about whether a flat tax is an appropriate fiscal policy.[33]

The Baltic states were the first to adopt a flat tax, and therefore have the most years to examine in looking at its effect. They present three similarly sized countries with similar economies and relationships to Europe that experienced unprecedented economic growth following the implementation of a flat tax rate. Yet there remains little analysis on these countries and the effect of their 1990s fiscal policy and any analysis generally yields an inconclusive verdict. This is for several reasons including a lack of household level analyses, the tax systems of the countries including some progressive features, and the tax changes occurring during a precarious macroeconomic situation where many reforms occurred simultaneously. By better understanding the effect of flat taxes in these countries on their growth, policy makers can gain deeper insight on fiscal policy and growth strategies in the former Soviet Union and transitional economies. This paper analyzes the Baltic countries on an individual and aggregate level and discusses whether a flat tax rate is an effective and potent growth strategy for transitional economies.

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[31] Ivanova, Anna; Keen, Michael, and Alexander Klemm. "The Russian Flat Tax Reform." IMF Working Paper, International Monetary Fund, January 2005. p. 2.
[32] Forbes
[33] Rabushka, Alvin. "The Flat Tax Gains Momentum." Stanford: The Hoover Institute, August 3, 2004.

Theory of a Flat Tax

The main architects of modern flat tax theory are Robert Hall, Alvin Rabushka, and Steve Forbes. Hall and Rabushka, both of Stanford University and the Hoover Institute, first proposed a flat tax in a 1981 *Wall Street Journal* article. In 1995, they published their book, *The Flat Tax*. Steve Forbes, editor-in-chief of Forbes magazine and president and chief executive officer of Forbes Inc. ran in the 1996 and 2000 United States Republican presidential primaries with the flat tax serving as a focal point of his campaign.[34] In 2005, Forbes published a book, *Flat Tax Revolution*, in which he laid out his arguments for a flat tax.

The underlying element of a flat tax is that a charge is levied at a uniform percentage rate on all transactions liable to the tax. The flat tax can take a number of forms, including a tax on all of one's income levied at a single rate, a tax of a single rate levied on some parts of one's income, and a tax charged on purchases or consumption within the economy. This single tax rate means there is a fixed marginal tax rate, not necessarily a fixed average tax rate.[35]

The principle behind both Hall and Rabushka's as well as Forbes' flat tax proposals is that people are taxed on their consumption, not on their investment or savings. Their tax is levied at a fixed rate on some parts of people's income. Both plans propose doing this through a single income tax and a single corporate business tax.[36] Hall and Rabushka propose that both wage and business income is taxed at 19 percent,[37] while

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[34] Forbes, p. xvii.
[35] ACCA, p. 9. Marginal tax rate is the rate on the last segment of income earned. The average tax rate is the ratio of the amount of taxes paid to taxable income. (Fairtax.org: What is the difference between statutory, average, marginal, and effective tax rates?, p. 2).
[36] Hall and Rabushka, p. 90; Forbes, pp. 60, 66.
[37] Hall and Rabushka, p. 83.

Forbes suggests that the federal income tax and a corporate tax be levied at 17 percent of

profits.[38] Forbes also suggests generous exemptions for adults and children.[39] Both

proposals eliminate deductions on interest payments[40] as well as eliminating taxes on

dividends and interest payments.[41] Additionally, both propose that only domestic

operations should be taxed.[42]

Hall and Rabushka explain that their tax proposal is in fact a consumption tax or

tax on spending, as income is taxed once, and investment and sales are not taxed.[43]

Therefore, by measuring consumption as income minus investment, citizens would be

taxed only on their consumption.[44] Hall and Rabushka as well as Forbes agree that taxing

income is preferred to imposing a sales or value-added tax.[45] Arguments for this

preference include that a sales tax would tax the poor, who would be exempt from an

income tax.[46] Forbes also argues that a sales tax or VAT would raise the price of many

goods and services, devastate the housing market by increasing the price of houses, and

increase tax avoidance and evasion.[47]

The three primary advantages of a flat tax system, as Hall and Rabushka lay out,

are increased economic growth, simplicity, and equity. They argue that a flat tax, with a

single marginal tax rate, will provide increased incentives to work, thus increasing

entrepreneurial activity, capital formation, and national output.[48] Hall and Rabushka also

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[38] Forbes, pp. 60, 66.
[39] Forbes, p. 60.
[40] Hall and Rabushka, p. 92; Forbes, p. 68.
[41] Hall and Rabushka, p. 92; Forbes, p. 63.
[42] Hall and Rabushka, p. 117; Forbes, p. 69.
[43] Hall and Rabushka, pp. 63, 79, 81.
[44] Ibid.. p. 83.
[45] Hall and Rabushka, p. 81; Forbes, p. 80.
[46] Hall and Rabushka, p. 81.
[47] Forbes, p. 85.
[48] Hall and Rabushka, p. 127.

claim that under their flat tax system, interest rates, which are untaxed, will be lowered

since lenders will no longer be concerned about interest tax and borrowers, no longer

receiving deductions for interest paid, will be less inclined to borrow.[49] They add that by

lowering the tax rate in a uniform income tax, there will be increased compliance and

decreased tax avoidance and evasion, thus generating increased tax revenues.[50] Forbes

adds that the tax will incentivize more productive work and additional risk taking.[51] The

additional investment from the flat tax should create wealth, and this creates additional

government revenue.[52]

Furthermore, both tax proposals set forth claim to be "postcard" tax reforms, with

the tax forms being able to fit on postcards, making tax payments significantly simpler.

Finally, as Hall and Rabushka argue, the flat tax is equitable as the taxpayer pays taxes in

direct proportion to his income, with those earning more, paying more.[53] Additionally,

they claim, that by lowering taxes, the government allows increased individual liberty, as

higher taxes threaten individual freedom.[54]

Today, the main discussions surrounding a flat tax include the arguments that a

flat tax creates simplicity, increased administrative efficiency, as well as greater

incentives for investment, savings, and labor force participation through lower marginal

tax burdens.[55] In theory, the less a tax rate alters someone's economic behavior, the more

efficient it is. Therefore, a tax of the same rate across income levels should theoretically

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[49] Ibid. p.143.
[50] Ibid. p. 44.
[51] Forbes, p. 71.
[52] Forbes, p. 71.
[53] Hall and Rabushka, p. 41.
[54] Hall and Rabushka, p. 43.
[55] Saavedra, p. 254.

alter one's behavior less and create greater economic efficiency.[56] Additionally, proponents argue that flat taxes decrease tax arbitrage, in which tax liability is shifted from high to low income groups.[57]

The idea behind taxation as it relates to labor is that on the supply side, it is assumed that taxpayers adjust the labor supply they provide in response to taxation changes. [58] As the tax rate rises, if there were no supply side response, government revenue would continue to rise linearly, since higher taxes mean higher revenues. However, the typical supply response causes labor supply to decrease with an increase in tax rate, leading to what is known as the Laffer Effect: a peak and then decline of labor supply as tax rates increase.[59] Therefore, low tax rates and less progressive tax structures may increase the labor supply, especially if it is elastic, particularly among higher income individuals. However, flat tax rates can also reduce labor supply among lower income individuals if these individuals are not exempted from at least some element of the tax.[60]

Equity also plays a part in the discussion surrounding the flat tax. While a main argument and motivation for the flat tax has been to create growth and investment, the main opposition has been that the flat tax is inequitable; under a flat tax system, taxpayers on the same income level all pay the same taxes, the higher income individuals do not bear a heavier burden proportionally than low income ones.[61] Flat tax proponents argue, however, that with the implementation of exemptions, which exempt the lowest level of

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[56] Ibid. p. 255.
[57] Ibid, p. 255.
[58] Stepanyan, Vahram. "Reforming Tax Systems: Experience of the Baltics, Russia, and Other Countries of the Former Soviet Union." Washington DC: International Monetary Fund, 2003, p. 24.
[59] Laffer, Arthur B. "The Laffer Curve: Past, Present, and Future." Washington DC: The Heritage Foundation, 2004
[60] Saavedra, p. 255.
[61] Saavedra, p. 255.

income from paying taxes, and the removal of loopholes, of which the higher income

people are generally able to take greater advantage, a flat tax actually makes the tax

structure more equitable.[62]

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[62] Ibid, p. 255.

Literature Review

The analytical literature on the effect of flat tax rates in the former Soviet Union and transitional economies has been largely confined to studies on Russia, and it does not agree on the effect of Russia's flat tax. The existing literature analyzes whether an actual role of the flat tax can be demonstrated in affecting Russia's revenue growth or in increasing compliance in tax payments in Russia.

In 2003, Sergei Sinelnikov-Mourylev, Said Batkibekov, P. Kadochnikov, and Denis Nekipelov of the Institute for Economies in Transition published a paper examining the effect of Russia's 2000 reform to decrease the personal income tax rate.[63] The authors look at the Russian Longitudinal Monitoring Survey (RLMS) and examine whether the personal income tax (PIT) base increased more in areas that faced the greatest reduction of marginal tax rate. The authors do find a significant effect, and attribute about half of the tax revenue gain to the reduction in marginal tax rates.[64]

The first major work examining the effect of a flat tax rate, as opposed to only a decrease in marginal tax rate, was published in 2005 by Anna Ivanova, Michael Keen, and Alexander Klemm for the International Monetary Fund. The authors also look at the RLMS throughout pre and post reform periods and build on the work of Sinelnikov-Murylev et al. by measuring the effect of the tax on revenue, compliance, and labor supply using micro-level panel data.[65] The authors looked at revenue performance across levels of government.[66] Although revenue from the personal income tax did increase by

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[63] Sinelnikov-Mourylev, Sergei; Batkibekov, Said; Kadochnikov, P., and Denis Nekipelov. "Assessment of the Results of Personal Income Tax Reform in Russia." Moscow: Institute for Economies in Transition, 2003.
[64] Ivanova, Keen, and Klemm, p. 5.
[65] Ibid. p. 5.
[66] Ibid. p. 15.

about 25 percent in real terms, revenue from all but three sources significantly increased as well, suggesting an underlying cause beyond the change in personal income tax.[67] They use a "differences in differences" methodology to compare individuals who are affected by the reform with those relatively unaffected.[68] However, they found no evidence of a supply-side effect of the flat tax. In fact, they found that Russia received lower tax revenues from those affected by the 2001 reform.[69] The authors also found labor supply changes to be the same for those affected and unaffected by tax reform.[70] However, they did find that compliance increased by about one third, either due to the reform itself or accompanying changes in enforcement.[71]

Following this 2005 IMF paper, Michael Keen, Yitae Kim, and Ricardo Varsano published a paper for the IMF in 2006 examining the effect of the flat tax.[72] Looking at data from Russia and Slovakia,[73] they find that there is no evidence of a Laffer-type response, where revenue is generated as a result of a tax cut. They did find evidence that compliance improved in Russia, although, they could not establish a direct link to tax reform rather than changes in enforcement occurring around the same time.[74] The authors also did not find that the flat tax had a direct impact on work incentives. The one study that looks at households' responses to the flat tax examines Russia, and does not find a significant impact on work produced.[75]

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[67] Ibid. pp. 15-16.
[68] Ibid. p. 23.
[69] Ibid. p. 39.
[70] Ibid. p. 40.
[71] Ibid. p. 1.
[72] Keen, Michael; Kim, Yitae, and Ricardo Varsano. "The 'Flat Tax(es)': Principles and Evidence." IMF Working Paper No. 06/218. International Monetary Fund, September 2006.
[73] Keen, Kim, and Varsano, p. 24.
[74] Ibid. p. 36.
[75] Ibid. p. 27.

In 2008, Yuriy Gorodnichenko, Jorge Martinez-Vazquez, and Klara Sabirianova

Peter for the National Bureau of Economic Research, published a paper examining the

effect of Russia's flat tax reform on tax evasion and worker productivity.[76] The authors

also use the 1998 and 2000-2004 rounds of the Russian Longitudinal Monitoring Survey.

Their approach to evaluating compliance is to examine differences between reported

consumption and reported income.[77] The authors also develop a framework to assess

deadweight loss from the PIT where there is tax evasion.[78]

While Ivanova, Keen, and Klemm's paper does not separate the effects of

improved voluntary tax compliance and improved enforcement, the NBER paper

attempts to do so. They find that tax evasion was reduced most among those who

experienced the largest decrease in tax rates.[79] However, they find that there is no effect

of tax enforcement policies on compliance and that instead the flat tax reform played a

significant role in decreasing tax evasion.[80] By extension, the authors find that the flat tax

helped generate greater revenues for Russia in 2001 and the years to follow.[81] The

authors also look at increased productivity as a result of the tax reform and find that the

increased productivity due to the tax reform is small relative to the tax evasion

response.[82] Thus, the efficiency gain the authors find, though existent, is smaller than

prior approaches.[83]

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[76] Gorodnichenko, Yuriy; Martinez-Vazquez, Jorge, and Klara Sabirianova Peter. "Myth and Reality of Tax Reform: Micro Estimates of Tax Evasion Response and Welfare Effects in Russia. NBER Working Paper 13719. National Bureau of Economic Research, January 2008.
[77] Gorodnichenko, Martinez-Vazquez, and Peter, p. 4.
[78] Ibid. p. 4.
[79] Ibid. p. 3.
[80] Ibid. pp. 3, 36.
[81] Ibid. p. 36.
[82] Ibid. p. 36.
[83] Ibid. p. 37. See Chetty, Raj; Looney, Adam and Kary Kroft. "Salience and Taxation: Theory and Evidence." NBER Working Paper 13330. National Bureau of Economic Statistics, 2007.

One source of potential problems with the 2005 IMF and 2008 NBER papers is that their data source, the Russian Longitudinal Monitoring Survey is a voluntary survey, meaning the best and worst off people in society are underrepresented. This can be both because people are unwilling to disclose their actual income and because they have no home, and the RLMS is an address based survey.[84] Additionally, the data used in analyzing Russia is affected by the country's increasingly valuable energy resources, with natural gas prices reaching a peak in 2001.[85] The authors of the 2005 IMF paper reject the idea that energy prices alone could have contributed to the increase in personal income tax revenue.[86] However, the presence of this variable invites research in other countries without such a confounding effect. Finally, the existing literature looks at a relatively short time span (since 2001), and examining countries with longer time elapsed since reform can be useful in understanding the effect of flat taxes.

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[84] Ivanova, Keen, and Klemm, p. 21.
[85] Ibid. p. 16.
[86] Ibid. pp. 16-17.

Methodology

The existing literature measures tax revenue, compliance, and labor supply, primarily focusing on Russian data and surveys. In order to more effectively understand the effect of the flat tax on transitional economies in general, and on the Baltic countries in particular, this work attempts to expand the base and scope of existing analysis. The first approach will be to examine the flat tax in each of the Baltic countries: the background and reasons for implementation as well as the effect of the flat tax and the discussion surrounding it.

The country level analysis for Estonia and Latvia will primarily focus on the effect of the flat tax on labor supply. The analysis for Estonia is from a Bank of Estonia working paper by Karsten Staehr, "Estimates of Employment and Welfare Effects of Personal Labour Income Taxation in a Flat-Tax Country: The Case of Estonia."[87] Staehr looks at how people react to economic incentives, particularly personal income taxes, in the labor market using the 2005 Estonian Labour Force Survey, comprised of approximately 16,500 working age individuals, about 8,000 of which are active in the labor market. Latvia's labor participation decision was also examined. Due to a lack of data, there is no labor supply analysis on Lithuania. The only household or individual level information for Lithuania was proprietary. Therefore, the discussion regarding Lithuania is general, examining macroeconomic indicators such as GDP and tax revenues.

The discussion of the flat tax in each of the Baltic countries is heavily weighted towards Estonia. This is for a variety of reasons. Firstly, there is significantly more information available about its early years after gaining independence in general. The

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[87] Bank of Estonia, 2008

prime minister of Estonia at the time, Mart Laar, wrote both a book as well as articles about Estonia's experience since gaining independence in general and its experience with the flat tax in particular, and this does not exist for Latvia and Lithuania. While there are accounts of various parts of the transitional years available from a variety of sources on these countries, there is not information available as comprehensive as that for Estonia.

Additionally, when reaching out to contacts in each of the Baltic states, people from Estonia were generally more responsive. After contacting the directors of every major research institute in Estonia, Latvia, and Lithuania, three people were forthcoming with information from Estonia, while two from Latvia were and only one from Lithuania was. Finally, the only analysis completed on the effect of the flat tax in any of the Baltic states was on Estonia. Therefore, when looking at the Baltic states on a country by country level, the analysis is really weighted towards Estonia. Even though Latvia and Lithuania are discussed on an individual level, these countries are really used to look at the Baltic states on an aggregate level and compare them with other former Soviet Union countries.

The aggregate analysis, focusing on the effect of the flat tax across a group of countries is conducted using several methods. The effect on revenue and GDP is analyzed by the World Bank using a "differences-in-differences" method. A fixed effect regression was also used to examine the effect on GDP, growth and inflation. The effect on equity, or extent of income redistribution was conducted by examining Gini coefficients. This analysis, conducted by Salman Zaidi of the World Bank, compares Gini coefficients across time, across countries, and before and after tax payments. The discussion on compliance and simplicity is mainly based on anecdotal and descriptive evidence, with

the exception of a case study of Russia conducted by IKK, since these measures are by nature difficult to measure and quantify.

A major difficulty with the analysis on the flat tax is data aggregation. In general, data for the early 1990s in transitional economies is inconsistent and unreliable, as those economies had a limited state apparatus and resources for recording information. This was particularly apparent in aggregating personal income tax revenue information, which was of greatest relevance for an analysis on the flat tax. The only available information that consistently provided personal income tax revenue information starting before 1994 was personal income tax as a percentage of GDP. This was the greatest challenge when looking at aggregate information, particularly when conducting a cross country analysis. When looking at individual countries, the aggregation of labor supply data posed a challenge. Even though household level data was available for Latvia, it yielded peculiar results in which people worked less as their wages increased. This suggested that there was something wrong with the dataset, either in measurement techniques or sampling. Thus, overall, the greatest challenge in examining the flat tax lies in the empirical analysis.

The Case of Estonia

Background

Estonia, located on the eastern coast of the Baltic Sea, borders Latvia to the south, Russia to the East, and Finland across the sea. Its territory is 45,226 square kilometers and had a population of approximately 1.34 million at the beginning of January 2007.[88] It declared its independence from Germany in 1918 and was occupied by the Soviet Union in 1940.[89] When Estonia received its independence from the Soviet Union in 1991, its economy was devastated. Life under communist rule caused serious setbacks to the country's growth. While Estonians enjoyed a similar standard of living to its neighbor Finland prior to communist rule in 1939, by 1987, Estonia's growth domestic product was about $2000 per capita, compared to Finland's of $14,370.[90] Any hopes that the removal of communism would revitalize the economy were challenged soon after Estonia's independence.

In 1992, industrial production declined by more than 30 percent – a decline more severe than the Great Depression – price inflation ran at more than 1,000 percent, and fuel prices rose by more than 10,000 percent. Estonia, completely dependent on Russia, which accounted for 92 percent of Estonian trade, had little to offer the foreign markets. Stores in Estonia were empty, and bread and dairy products were rationed as people stood in lines to buy food.[91] As inflation increased – prices increased twenty-two fold between

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[88] KPMG. *Investment in the Baltic States: A Comparative Guide*. Latvia: KPMG Baltic SIA, 2007, p. 2.
[89] Laar, Mart. "The Estonian Economic Miracle," in *Backgrounder*. Washington DC: The Heritage Foundation, August 7, 2007, p. 1.
Laar, Mart. *Estonia: Little Country that Could*. London : Centre for Research into Post-Communist Economies, 2002, p. 32.
[90] Laar, "The Estonian Economic Miracle," pp. 1-2.
[91] Ibid, p. 2.

1991 and 1992 – banks ran out of money to distribute salaries and pensions.[92] In March

1992, completely depleted of the Estonian currency, the town of Tartu introduced its own

currency, which was printed on the back of old Soviet ration coupons.[93]

Looking into a bleak future, Estonians saw the need for change and on July 6,

1992, the Estonian Supreme Council decided that the first democratic elections since

World War II should be held on September 20, 1992.[94] The newly elected government

was led by Pro Patria Union, a radical reform-minded right of center party, composed of

smaller right-wing parties.[95] Of the 680,044 citizens entered in the electoral register,

458,052 or 67.8 percent voted, and the Pro Patria coalition received 22 percent of the

votes.[96] After no presidential candidate won a majority during the first round of elections,

Lennart Meri, the Pro Patria candidate, won the presidential elections in the second

round. Pro Patria then named Mart Laar its candidate for Prime Minister. Laar, who

began his term as prime minister at the age of 32 years old, proceeded to build a coalition

in the Riigikogu, the Estonian parliament. On October 19, the Riigikogu authorized Laar

to form the Government of the Republic.[97]

Mart Laar, the Architect of Estonia's Economic Reforms

Laar, who served as the Estonian prime minister from 1992 to 1994 and 1999 to

2002 saw Estonias's emergence from communism as an opportunity to reform. Looking

to Lescek Balcerowicz, the designer of the Polish economic reformation, Laar noted that

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[92] Laar, *Estonia: Little Country that Could*, p. 119.
[93] Ibid, p. 119.
[94] Laar, "The Estonian Economic Miracle," p. 2.
Laar, *Estonia: Little Country that Could*, p. 137.
[95] Laar, "The Estonian Economic Miracle," p. 2.
Laar, *Estonia: Little Country that Could*, p. 98.
[96] Laar, *Estonia: Little Country that Could*, p. 142.
[97] Ibid.

a radical economic program, launched as quickly as possible, had a better chance of success than several prolonged measures.[98] Balcerowicz's theory was based on the assumption that domestic liberalization and freedom from foreign domination create a mass psychology in which the people in which the people are more likely to consider major changes than in a normal situation. This mass psychology allows the opportunity for major political reforms.[99] Thus, Laar saw a short window of opportunity, during which, radical reforms had to be passed in order to ensure their success.[100] He noted that transitional economies that do not utilize this time of "extraordinary politics" would greet less favorable economic conditions going forward.[101]

Thus, Laar immediately set forth with a series of economic reforms. Considering the lack of resources and small time frame he saw available, Laar wanted the reforms to be as simple as possible.[102] His first goal was macroeconomic stabilization. Monetary reform in Estonia had begun prior to Laar's election with the Estonian kroon introduced in June 1992 as the national currency.[103] Using a currency board system, the kroon was pegged to the German mark, the Deutsche mark, at one German mark for eight kroons.[104] The Deutsche mark was a strong currency, and the kroon began to create confidence in the Estonian economy.[105]

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[98] Laar , "The Estonian Economic Miracle," p. 2.
[99] Laar, *Estonia: Little Country that Could*, p. 163.
[100] Laar, "The Estonian Economic Miracle," pp. 2-3.
[101] Ibid, p. 3.
[102] Ibid, p. 3.
[103] Ibid, p. 3.
[104] Laar, *Estonia: Little Country that Could*, p. 125.
Laar, "The Estonian Economic Miracle," p. 3.
[105] Laar, "The Estonian Economic Miracle," p. 3.

The next step in macroeconomic stabilization was balancing the budget, which required major cuts in subsidies as well as reducing the size of the government.[106] These changes included the cutting of subsidies for state-owned companies, which led to the development of private companies.[107] All endowments and subsidies were cut first, followed by restrictions were placed on internal costs and ministry investments.[108] Though the International Monetary Fund offered a loan to balance the budget, Laar and the Estonian parliament refused, choosing to "build the future of Estonia on the momentum for radical reforms, not loans."[109] After several months, the Estonian parliament succeeded in balancing the budget and presented the balance budget to the Riigikogu on December 14, 1992.[110] From that point on the parliament required that only a balanced budget could be presented to the Estonian parliament.[111]

Laar noted that essential to the success of the reforms was changing the attitude of the Estonian people. He said that many "had to be shaken free of the illusion…that somehow somebody else would solve their problems for them."[112] Laar said that under the Soviet Union, people were not used to taking initiatives or assuming risks and that the people needed to be energized and take responsibility for themselves.[113] Cutting subsidies to state owned industries gave those of the Soviet mentality the message that they needed to begin working in order to succeed.[114]

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[106] Ibid, p. 4.
[107] Ibid, p. 5.
[108] Laar, *Estonia: Little Country that Could*, p. 179.
[109] Laar, "The Estonian Economic Miracle," p. 4.
[110] Laar, *Estonia: LittleCountry that Could*, p. 180.
[111] Laar, "The Estonian Economic Miracle," p. 4.
[112] Ibid, p. 5
[113] Ibid, p. 5.
[114] Ibid, p. 5.

By 1993, the inflation rate dropped to 89.8 percent from 1,000 percent in 1992.

By 1995, it reached 29 percent. Trade began to look westward and exports grew

rapidly.[115] With what Laar considered the first stages of reform, monetary reform and

macroeconomic stabilization, he began the second stage of reforms. One of the next steps

Estonia took in its reforms was opening its economy to world markets, reducing trade

tariffs and non-trade barriers and abolishing export restriction, with nearly all export

restrictions were removed by 1992.[116] The free trade policy increased competition,

growth, and reconstruction, ultimately bringing Estonia new companies, which opened

export oriented factories.[117] Estonia refused aid during this time, looking to free trade as a

way to increase foreign direct investment and growth.[118]

The final major economic reform that occurred in the early transition years was

privatization. The government eliminated all state banks, implemented property reform,

and privatized the economy.[119] The development of a legal order created a favorable

environment for a market economy to develop, for foreign investment to take place, and

to combat corruption.[120] The first laws of property reform were passed in early 1992,

focusing on returning nationalized or confiscated property to the original legal owners.[121]

When returning property was not possible, people were given privatization vouchers as

compensation. The privatization vouchers allowed people to purchase minority shares of

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[115] Ibid, p. 5.
[116] Laar, "The Estonian Economic Miracle," pp. 5-6.
Laar, *Estonia: Little Country that Could*, p. 237.
[117] Laar, "The Estonian Economic Miracle," p. 6.
[118] Laar, "The Estonian Economic Miracle," p. 6.
[119] Ibid, p. 8.
[120] Laar, *Estonia: Little Country that Could*, p. 228.
[121] Laar, "The Estonian Economic Miracle," p. 8.

privatized companies or land. By the end of May 1994, about 50 percent of state-owned

businesses or enterprises were transferred into private ownership or control.[122]

The Flat Tax

On January 1, 1994, Estonia introduced a flat-rate personal income tax of 26

percent, thereby becoming the first European country to adopt a flat personal income

tax.[123] Previously, Estonia followed a progressive tax system with the top personal

income tax rate in 1993 held at 33 percent.[124] The former system included a personal

income tax, a corporate income tax, and a value added tax. Social security benefits were

funded by a 20 percent payroll tax.[125]

The implementation of the flat tax was done almost entirely on Laar's personal

initiative.[126] In explaining his motivation for the flat tax introduction, Laar argued that in

order to achieve a favorable business environment, limiting regulation was not enough.[127]

He claimed that people's enthusiasm towards starting new companies declined

considerably when realizing "the tax system punished success"[128] and said that Estonia

needed a tax system that favored saving and investment.[129] His objectives were to

implement a system that was simple, inexpensive to apply, and was as transparent and

understandable as possible.[130] As a transitional economy with a weak state apparatus,

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[122] Laar, *Estonia: Little Country that Could,* p. 262.
[123] Laar, "The Estonian Economic Miracle," p. 9.
Staehr, Karsten. "Estimates of Employment and Welfare Effects of Personal Labour Income Taxation in a Flat-Tax Country: The Case of Estonia," p. 9.
[124] Saavedra, Pablo. "Flat Income Tax Reforms," p. 258.
[125] Laar, *Estonia: Little Country that Could*, pp. 92-93.
[126] Ibid, p. 273.
[127] Laar, "The Estonian Economic Miracle," p. 9.
[128] Laar, "The Estonian Economic Miracle," p. 9.
[129] Laar, *Estonia: Little Country that Could*, p. 272.
[130] Laar, "The Estonian Economic Miracle," p. 9.

Laar explained that Estonia would face major challenges implementing and collecting

revenues complex, Western-like model tax system. He wanted a tax system to have as

broad a base and as few exemptions as possible so that there would be a minimized

incentive to avoid tax payments. He also noted that tax rates should be low in order to

encourage activity in the economy.[131]

However, initially seen as a radical measure, the idea of a flat tax did not receive a

lot of support initially.[132] At the beginning stages, international advisers and local

bureaucracy both opposed the flat tax, arguing that it would not work, and that if it did, it

would destroy the "pillars of society."[133] Facing a tight state budget, Ministry of

Financial Affairs officials thought the idea was very risky.[134] When the government

proposed the bill of the new Income Tax Act to the Riigikogu on September 13, 1993, it

faced several heated debates. Finally a compromised was reached with the bill's

opponents, and on December 8, 1993, the Riigikogu passed the new Income Tax Act and

established a 26 percent income tax for both businesses and people.[135] Even once the act

was passed, however, people were opposed to it as well.[136]

The flat tax reform took place concurrently with other fiscal reforms. Estonia

entered into agreements with several countries, including Finland, Sweden, and Germany

in order to improve co-operation between national tax boards and avoid double taxation

between countries. Additionally excise duties were increased. This increase, however, led

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[131] Laar, "The Estonian Economic Miracle," p. 9.
[132] Laar, *Estonia: Little Country that Could*, p. 273.
[133] Laar, *Estonia: Little Country that Could,* p. 274.
[134] Ibid, p. 274.
[135] Ibid, pp. 274-275.
[136] Ibid, p. 276.

to a great deal of alcohol and tobacco smuggling, which ultimately lost the state hundreds of millions of kroons.[137]

The flat tax remained in place when Pro Patria government was voted out of government one year after the reform, in 1995, one year after the reform, and has remained in place throughout different ruling parties and coalitions until today.[138] Its overall framework has remained intact, though exemptions and rates have fluctuated. Additionally, there has been a pension reform, which changed the allocation of social tax revenue as well as an introduction of compulsory unemployment insurance.[139] The two parties that have been proponents of the flat tax since the beginning of discussions are the Pro Patria and Estonia reform parties.[140] There has been some opposition to the flat tax from the left wing Estonian Centre Party, which made it a general point in the past three elections. However, so far the Central Party has been willing to drop this in return for a chance to join the coalition, demonstrating that those who oppose the flat tax do not place replacing the tax very high on their agenda.[141]

Estonia's Tax System

Estonia's tax system consists of an income tax, a value added tax, excise taxes, and a social tax. There are also a few taxes set by local governments, including land tax and sales tax, but the share of these taxes is negligible in overall taxation.[142] The benefit system is also largely national, with municipalities providing a few small local

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[137] Ibid, p. 277.
[138] Laar, "The Estonian Economic Miracle," p. 10.
[139] Staehr, p. 9.
[140] Tarvo Tamm, phone interview, February 6. 2009.
[141] Alari Paulus, phone interview, February 13, 2009; Tarvo Tamm, phone interview, February 6, 2009.
[142] EUROMOD, p. 5

benefits.[143] The personal income tax operates on a flat rate, which began at 26 percent in

1994 and has gradually been decreased to 21 percent.[144] Along with the personal income

tax, there is a basic allowance, currently 2,250 EEK, as well as an increased basic

allowance in the case of children, a pension allowance, and a sickness allowance. These

allowances can be deducted from a person's income during the taxation period. In

addition to the allowances, there are several tax deductions, which include compulsory

unemployment insurance contribution payments, housing loan interest payments, and

training expenses.[145] Estonia's government revenue comprises about one third of its total

GDP.[146]

External Influences

In the early years of Estonia's transition, there were a number of sources that

helped shape Laar and the early government's thinking about reforms. Think-tanks from

abroad, such as the Heritage Foundation, the International Republican Institute, and the

Adam Smith Institute[147] in addition to the newly formed local Estonian think-tanks,

served as one influencing. These think tanks organized events at which most of the

reform agenda was presented and discussed.[148] Additionally, though Laar did not adopt

specific recommendations from large foreign entities, he did look to the principles of

international institutions such as the World Bank, the IMF, and EC Phare programme.[149]

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[143] EUROMOD, p. 5.
[144] EUROMOD, p. 26.
[145] EUROMOD, p. 26.
[146] 2003: 36.4% of GDP; 2005: 35.4% of GDP; tax receipts: 31.6 % in 2003 and 31.0% in 2005-EUROMOD country report- Estonia
[147] Another think-tank that served as an influence was Timbro in Sweden, Laar, "The Estonian Economic Miracle," p. 3.
[148] Laar, "The Estonian Economic Miracle," p. 3.
[149] Laar, *Estonia: Little Country that Could*, p. 220.

Additionally, Estonia looked to other transition countries' experiences when creating and implementing its reforms, with West Germany serving as a major source of influence. The June 20 date of Estonia's currency reform purposely coincided that of West Germany's forty-four years earlier.[150] Laar was a Christian democrat, familiar with the work of Erhardt and other West German thinkers, and he and the other reformers looked to West Germany when implementing his reforms in Estonia.[151] Such principles Laar looked to included monetary stability, free market entry, the institution of private property, and a liberal economic policy, with limited intervention in economic affairs.[152] A feature of West Germany that played an important role in Estonia's development was to carry out economic reforms rather than create a welfare state.[153]

However, the closest examples were those in Eastern and Central Europe. The Polish reform consisted of balancing the public sector budget, limited central bank financing, and economic policies lined to income policies and fixed exchange rates.[154] The goal was to create an economy with private ownership, free markets, and integration into the world markets.[155] Laar studied the Polish economy, noting its successes such as shock therapy, and mistakes, such as the lack of institutional reform.[156] Laar also looked to Hungary's abolition of special advantages given to foreign investments, the Czech Republic's privatization, and East Germany's establishment of separate agencies to assist privatization.[157]

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[150] Ibid, pp. 144-145.
[151] Ibid, pp. 144-145.
[152] Ibid, p. 146.
[153] Ibid, p. 147.
[154] Ibid, pp. 155-156.
[155] Ibid, p. 156.
[156] Ibid, p. 157.
[157] Laar, pp. 158-159.

With regard to the flat tax specifically, Laar looked to Milton Friedman, who proposed a proportional income tax when creating its tax reform.[158] The only other models of a flat tax for Laar to examine were in Jersey, Guernsey, and Hong Kong.[159] Laar does in fact point to Hong Kong, which implemented a 15 percent flat personal income tax in 1947, and the success of the flat tax there when promoting Estonia's tax structure.[160] Laar saw Estonia as "the Hong Kong of Europe," according to Karsten Staehr, Professor of International and Public Finance and banking and Chair of Finance and Banking at Tallinn University of Technology in Estonia.[161] Staehr explained that Laar drew a comparison based on China's proximity to Russia but contact and relationship with the rest of the world.[162]

Evaluation of Estonia's Flat Tax System

Personal income tax, general government revenue, and GDP have increased since the adoption of a flat tax. However, the revenue increase has not been consistent, and the revenue and GDP figures alone do not indicate any conclusive impact of the flat tax.

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[158] Laar, p. 159, 272.
[159] Mitchell, Daniel. "Flat World, Flat Taxes.."
[160] Laar, "Flat Tax."
[161] Karsten Staehr, phone interview, February 10, 2009.
[162] Staehr phone interview
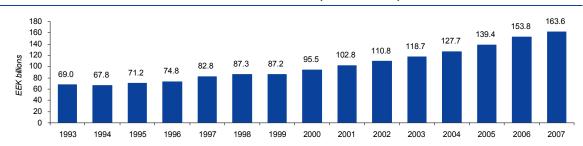
Chart 1. Estonia GDP (1993 – 2007)
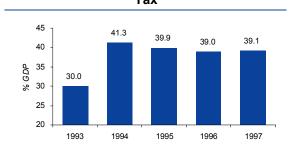
(a)   GDP is in constant prices with 2000 serving as the base year.
Source: International Monetary Fund, World Economic Outlook Database, October 2008

Chart 2a. Personal Income Tax Revenue in Estonia During the Early Years of the Flat Tax

Chart 2b. Total Government Revenue in Estonia During the Early Years of the Flat Tax

Source: Recent economic developments, IMF; Stepanyan, p. 16; International Monetary Fund, Tax Reform in the Baltics, Russia, and Other Countries of the Former Soviet Union, 1999, p. 3.

Additionally, as measured by simplicity Estonia's tax system has demonstrated signs of success. Anecdotally, there is a perception that overall people support the tax system, it is seen as fair, and there is a general belief that compliance has increased.[163] Filing returns can be done in about 10 to 15 minutes, and 84 percent of people file online.[164] There were several macroeconomic indicators to indicate economic improvement since January 1, 1994, although it is difficult to isolate the effect of the flat tax. Staehr said that the simplicity, clarity and transparency of the system allowed economic occur, but the tax system is now what turned the country around. "Estonia got a

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[163] Staehr phone interview Alari Paulus, Tamm
[164] Stossel, John. "Springtime for Taxes." Townhall.com, April 18, 2007.

tax system that was fairly transparent so it didn't stand in the way for the economy

turning around," Staehr said.[165]

The most comprehensive analysis completed on Estonia's taxation system is

presented in a Bank of Estonia working paper by Karsten Staehr, "Estimates of

Employment and Welfare Effects of Personal Labour Income Taxation in a Flat-Tax

Country: The Case of Estonia."[166] Staehr looks at how people react to economic

incentives in the labor market. Staehr uses the 2005 Estonian Labour Force Survey,

comprised of approximately 16,500 working age individuals, about 8,000 of which are

active in the labor market to examine the employment and welfare effects of personal

labor income taxation.

Staehr first distinguishes between the extensive decision of whether or not to

participate in the labor force and the intensive decision of how many hours to work. He

looks at people from across income groups and evaluates how a change in tax rates

affects both their decision to participate in the labor force and how much labor to supply

if they are participating.[167] The average tax rate affects the extensive decision of whether

or not to work at all, while the marginal tax rate affects the intensive margin of how many

hours to work.[168] He examines labor force participation as a decision between other uses

of time and working.[169] The Estonian Labor Force Survey provides information only on

labor force participation, not hours worked. The number of hours worked are determined

as a function of the hourly after-tax return on employment and other variables.[170]

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[165] Staehr, phone interview.
[166] Bank of Estonia, 2008
[167] Staehr, p. 7.
[168] Ibid, p. 20.
[169] Ibid, p. 18.
[170] Ibid, p. 19.

The first stage in his analysis is to create a function that predicts individual's income as a function of individual characteristics such as age, gender, ethnicity, and education. He estimates the log of hourly labor income[171] and uses this to predict the pay for all of the individuals in the same, including the approximate 1,600 people who reported not having an income when they were active in the labor market and the 600 people who were not working.[172] Staehr suggests that the low predicted average hourly rate (about 19.5 EEK per hour) may be a reason for non-participation in the work force.[173]

The next part of Staehr's analysis is his examination individuals' labor supply. Staehr does this using Heckman's selection model.[174] His analysis shows that different factors determine participation versus hours supplied in the labor market.[175] The labor supply depends on the log after-tax pay as well as other characteristics such as age, gender, and education.[176] He also looks at labor supply across different income groups based on their hourly income: low, middle-low, middle-high, and high.[177] As in the general case, the hourly after-tax wage affects the labor participation positively.[178] The labor elasticities are significant for labor participation but not for the intensive margin, indicating that after-tax income does not affect the hours individuals work in a meaningful way.[179] This must be considered, however, along with the fact, that the

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[171] The log function is used when measuring growth because the difference of two log functions gives the growth.
[172] Ibid, pp. 21-23.
[173] Ibid, p. 23.
[174] Ibid, p. 24. The Heckman selection model is a model that accounts for selection bias in the independent variables.
[175] Ibid, p. 24.
[176] Ibid, p. 23.
[177] Ibid, pp. 28-29.
[178] Ibid, p. 2.
[179] Ibid, p. 29.

concentration of hours spent working in the labor survey were at 0 and 40 hours a week, since most people do not work part time.[180] The labor elasticities found are generally in line with those found in other studies.[181]

Staehr's analysis, particularly that of elasticities of labor supply, has a number of implications for Estonia's tax system. He suggests that tax rates affect participation in the labor market, while has only a negligible effect on working hours of those already active in the labor force.[182] He includes several assumptions in his discussions. One assumption is that individuals will react the same way whether the change in after-tax income is from taxes or another factor. A second assumption is that tax rate changes affect only labor supply and not other factors such as income prior to taxes. Thirdly, it is assumed that there is a long enough time horizon that any response in labor supply can take place.[183] The fourth assumption is that the analysis is constrained by the lack of information on the behavior and income sources of non-working individuals.[184] A change in the personal income tax affects labor supply by affecting the average tax rate. Finally, lack of information forces Staehr not to include certain tax exemptions.[185]

Staehr conducts two different tax policy experiments to look at effect on labor supply. In the first experiment, the basic exemption is reduced from 1700 EEK to 1530 EEK per month. The low and middle group decreased their employment substantially, while the high income group was less affected and has a relatively low labor participation elasticity. The total employment decreases by 0.48 percentage point.[186] In the second

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[180] Ibid, p. 29.
[181] Ibid, p. 35.
[182] Ibid, p. 2.
[183] Ibid, p. 32.
[184] Ibid, p. 33.
[185] Ibid, p. 33.
[186] Ibid, pp. 33-34.

experiment, Staehr increases the tax rate by 1 percentage point so that average post-tax hourly income decreases the most for those in the high income group.[187] However, the greatest increases in employment are found in the middle income groups because they have higher labor elasticities. In this experiment, total employment decreased by 0.36 percentage points.[188] Both of these experiments suggest that tax changes have sizeable effects, which are basically comparable between the experiments.[189] The first experiment, however, has the greatest effect among the low income group, while the second has the greatest effect among the middle groups.

The final step in Staehr's analysis is the examination of the marginal cost of public funds (MCPF) from raising personal income taxes.[190] The marginal cost of public funds is a measure of the cost to the private sector from a marginal increase in tax revenue.[191] It is essentially the money lost to society from employers not employing and employees providing labor at the socially efficient point and is measured by 1 plus the amount of initial tax revenue displaced per 1 EEK generated.[192] The MCPF in his analysis is about 4.7 for the low income group, 4.3 for the middle-low income group, 2.3 for the middle-high income group, and 1.3 for the high income group.[193] These results make sense, since for a low income worker, in order to raise an additional 1 EEK of revenue, the income tax pressure must be raised significantly, which lowers employment and decreases initial tax revenue. For a high income worker, it would not require as much

[187] Ibid, p. 34.
[188] Ibid.
[189] Ibid.
[190] Ibid, p. 7.
[191] Ibid, p. 35.
[192] Ibid, p. 37.
[193] Ibid, p. 38.

income tax pressure to raise 1 EEK of revenue and high income workers are less

responsive to a change in taxes.[194]

Table 3. The Marginal Cost of Public Funds, Two Different Tax Policies

	Low	Middle-low	Middle-high	High	Full sample[a]
Baseline					
Basic exemption lowered	4.65	4.28	2.30	1.34	1.83
Tax rate increased	4.65	4.28	2.30	1.34	1.62
Excluding pension contributions					
Basic exemption lowered	1.56	1.58	1.38	1.15	1.28
Tax rate increased	1.56	1.58	1.38	1.15	1.23
Including value added tax					
Basic exemption lowered	18.24	108.11	3.74	1.49	2.45
Tax rate increased	18.24	108.11	3.74	1.49	1.99

(a)   Full sample results are calculated using weights of each sub-sample.
(b)   The starting point is a basic exemption equal to 1700 EEK and a tax rate equal to 24%.
Source: Staehr, p. 38

Staehr's paper is the first to consider the welfare cost of taxation in Estonia and

one of the few that quantify the welfare effect of taxation for transitional countries. It

looks at the labor elasticity, or labor responsiveness, to a change in the marginal tax rate.

Labor elasticity is relevant to the flat tax since the idea of taxation is that at higher levels

it disincentives people from working. Therefore, the government would want to tax

people who are less responsive to the tax in order to eliminate the loss to society from

people not working, and tax the people who are more responsive to a tax less, since they

will provide labor regardless. Staehr's analysis shows that low income individuals are the

most responsive to a change in tax rate. Therefore, taxing low income individuals will

cause them to stop working while the high income group will generally continue to work.

Given this information, it would be more efficient to have a more progressive tax where

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[194] Ibid.

the low income people are taxed less and the higher income are taxed more. Therefore,

Staehr's findings indicate that the current Estonian flat tax is inefficient in that more

revenue may be achieved by taxing the higher income people more and the lower income

people less.

The Case of Latvia

Background

Located in between Estonia and Lithuania, Latvia has a population of approximately 2.23 million.[195] Its geography is strategically important, as the capitals of both Estonia and Lithuania are within a few hour drive, and Latvia serves as a transport route between Russia and western Europe.[196] Its main sources of foreign direct investment are nearby countries, primarily Germany, Sweden, Denmark, Finland, and Estonia.[197] Latvia initially gained its independence after the first World War but was occupied again in World War II and then became part of the Soviet Union.[198] Although Latvia emerged independent from the Soviet Union in 1991, it was deeply embedded in the planned economy. The conditions in newly independent Latvia were dismal, with an annual inflation rate of more than 900 percent in 1992.[199]

Like Estonia, Latvia chose a "shock therapy" model of reform, which included rapidly transitioning to a market economy while simultaneously implementing legislative change.[200] Reforms in Latvia began as early as early 1991 when state regulations were removed from retail price setting. Monetary reforms began in 1992, with the introduction of the Latvian rubble as a temporary currency on May 7. Soviet rubble circulation was stopped on June 20, 1992.[201] By 1993, people began to gain confidence in the markets the when the currency was stabilized. Foreign trade had already begun to be directed to the

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[195] *Encyclopædia Britannica*, "Latvia."
[196] KPMG, p. 6.
[197] "Latvian Business Guide." Investment and Development Agency of Latvia, p. 8.
[198] "Country Profile: Latvia." BBC.
[199] "Latvia – Postindependence Economic Difficulties." U.S. Library of Congress.
[200]Bleire, Daina, Ilgvars Butulis, Inesis Feldmanis, Aivars Stranga, and Antonijs Zuna, *History of Latvia: the 20th Century,* p. 494.
[201] Ibid.

west, and the exports to Russia and other eastern ports were beginning to decline.[202]

Through controlling the money supply, the Bank of Latvia brought inflation down to 2.6

percent in December 1992 kept it at less than 3 percent a month through the following

December. In 1993, the annual inflation rate was reduced to 35, and it reached 28 percent

in 1994.[203]

On March 5, 1993, the second stage of Latvian monetary reform began with the

introduction of the lats (1 lats = 200 rubles). The lats was pegged to the Special Drawing

Rights, which is a basket of currencies in the IMF's unit of account.[204] The currency

reform led to macroeconomic stabilization, a stabilized exchange rate, and a reduction of

inflation relatively quickly. However, the reform also led to a banking crisis, since many

banks attracted depositers with high interest rates, hoping inflation would remain high. In

1995, several commercial banks either went bankrupt or suspended operations.[205]

Latvia also engaged in privatization during the early 1990s. This occurred at a

slower pace than expected given Latvia's experience with a private economy prior to

World War II. By mid-October 1993, only nineteen out of more than 2,000 state-run

businesses were privatized, and an agency charged in charge of privatizing industry was

established only in November 1993.[206] A main reason for this was because the Latvian

government attempted to honor the claims of former owners or their descendants to

regain property, and the right to make these claims was upheld until the end of 1993.[207]

Thus, while retail and services, small manufacturing and agricultural enterprises engaged

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[202] George Viksnins, phone interview, January 16, 2009.
[203] "Latvia – Postindependence Economic Difficulties." U.S. Library of Congress.
[204] Bleire, et al., p. 494.
[205] Ibid.
[206] "Latvia – Postindependence Economic Difficulties." U.S. Library of Congress.
[207] Ibid.

in rapid privatization in the early 1990s, Privatization of large state enterprises and apartments, however, did not begin until the mid 1990s and occurred at a much slower pace, with most large industries not privatized until 1999.[208]

During the 1990s the economic structure of Latvia changed as well. In 1990, manufacturing comprised the greatest percentage of GDP, accounting for 35.6 percent. In 2001, services accounted for 70.4 percent of GDP with manufacturing accounting for about 20. Transport of oil accounted for the main growth item in the service sector, while manufacturing declined largely because of the close of big industrial enterprises.[209] Latvia also executed strict budgetary control to bring inflation down.[210]

The Flat Tax

A main reason for the flat tax was to increase the simplicity of tax administration. Prior to the flat tax implementation, Latvia was operating a tax system, enacted in 1991, with five rates ranging between 15 and 35 percent.[211] Like in Estonia, the reforms of the early 1990s took place rapidly, and there was little room to discuss long term change.[212] Additionally, like the other reforms in Latvia, the flat tax reflected the sentiment that now that Latvia was free of excessive government intervention, people wanted to move in the opposite direction.[213] People became "eager…radical political ideas," according to one source who was there at the time, and "passionately believed in it." In 1994, the personal

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[208] Bleire, et al., p. 495.
[209] Ibid.
[210] Ibid, p. 496.
[211] Stepanyan, Vahram. "Reforming Tax Systems: Experience of the Baltics, Russia, and Other Countries of the Former Soviet Union," p. 27.
[212] Raita Karnite, phone interview, February 11, 2009.
[213] Peteris Straunis, phone interview, February 10, 2009.

income tax rate was set at 25 percent, with the top marginal tax rate of 35 percent. In
1997, the 25 percent rate was fixed for all levels of income.[214]

Unlike in Estonia, the flat tax was not widely debated in Latvia.[215] Professor
George Viksnins of Georgetown University, who served as senior advisor to the Latvian
Central Bank from 1992 until 2006, said that there was not a large public reaction.[216] The
people "just adjusted," according to Raita Karnite, a researcher at Institute of Economics,
Latvian Academy of Sciences..[217] She said that Social Democrats wanted a differentiated
tax structure, but they composed only a small part of decision makers.[218] Viksnins
attributed the lack of debate to the fact that so much of people's income was received in
the informal economy. He explained that generally people's salary was composed of the
formal income, which was taxable, and the "envelop money." Since envelop money was
negotiated with the employer and given informally and secretly, it was untaxed. Viksnins
argued that people did not debate tax rates because if they were too high, people would
"put more [of their salary] in the envelop."[219] Karnite also said that an argument for the
flat tax was that under a progressive tax, people who earned more were more likely to
hide their incomes.[220]

The flat tax is still not under serious public debate in Latvia; the main discussions
revolve around the size of the tax, which since its implementation has been reduced to 25
percent.[221] The idea of moving away from the flat tax has generally not been discussed in

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[214] Stepanyan, p. 27.
[215] Viksnins, phone interview.
[216] Ibid.
[217] Karnite, phone interview.
[218] Ibid.
[219] Viksnins, phone interview.
[220] Karnite, phone interview.
[221] Ibid.

public forums.[222] However, some individuals express discontent with the tax system. One individual who works for a bank in Latvia but wishes to remain unnamed due to political sensitivity, argues that the tax system has "undermined [growth] in a very dangerous way." He said that although simplicity may have helped tax collections to an extent, most statements made about the flat tax are unfounded. He said that lower tax rates would make collection easier independent of the flat tax. He believes that people in the 90s had "childhood trauma" or socialism and state intervention, which had caused those opposed to the flat tax to be stigmatized. This person believes that now that there is an economic crisis, where Latvia and other flat tax countries are suffering, and progressive tax countries surviving, people will be able to challenge the basis and idea of a flat tax.

Influences

Like Estonia, Latvia was able to look to different countries and there were external influences that played a role in the decision to make a flat tax. Latvia received advice from international organizations, particularly the European Union, since Latvia was trying to integrate into the EU at the time.[223] Latvia's government also consulted with German tax specialists on the value added tax as well as consultants from Denmark. Karnite said that research institutes did not play a role, as there were no economic research institutes, and the economic research in universities mostly dealt with education.[224]

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[222] Peteris Straunis, phone interview..
[223] Karnite, phone interview.
[224] Ibid.

Latvian Tax System

In 1994, the "Law on Personal Income Tax" established a 25 percent income tax rate on all levels of annual income[225] except for a 10 percent tax on the highest income, which was eliminated in 1997.[226] Thus, the adoption of the flat tax caused the marginal and average tax rates to increase for those with the highest levels of income. In 1995, "The Law on Value Added Tax" set forth a 19 percent value added taxes. Some product groups, such as newspapers and magazines, received a reduced 5 percent value added tax.[227] In 2004, the corporate tax rate was reduced from 35 percent to 15 percent,[228] becoming one of the lowest in the EU.[229]

Evaluation of Latvia tax System

There have been no formal studies from the government or in universities on the effect of the flat tax in Latvia. Since the flat tax, Latvia has seen overall a consistent increase in GDP. However, this does not serve as any indication of the success of the flat tax, only that the flat tax did not impediment to economic growth.
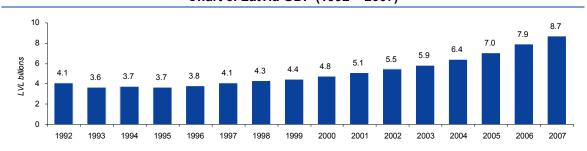
Chart 3. Latvia GDP (1992 – 2007)

(a)   GDP is in constant prices with 2000 serving as the base year.
Source: International Monetary Fund, World Economic Outlook Database, October 2008

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[225] Latvia: 5.1.5 Tax Laws." *Compendium of Cultural Policies and Trends in Europe.*
[226] Keen, Michael; Yitae Kim, and Ricardo Varsano. "The 'Flat Tax(es)': Principles and   Evidence." International Public Finance, 15 (2008), 743.
[227] Latvia: 5.1.5 Tax Laws." *Compendium of Cultural Policies and Trends in Europe.*
[228] Edwards, Chris. "Catching Up to Global Tax Reforms.
[229] "Latvian Business Guide." Investment and Development Agency of Latvia, p. 2.

Looking at other macroeconomic indicators, there is also no conclusive indication of an impact of the flat tax on personal income tax revenue, government revenue, or GDP. While revenues have increased during this time, they also fell during some years, and it is difficult to attribute an increase in revenues to the flat tax.

Chart 4a. Personal Income Tax Revenue in Latvia During the Early Years of the Flat Tax
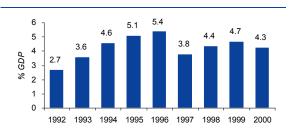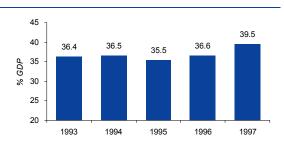
Chart 4b. Total Government Revenue in Latvia During the Early Years of the Flat Tax

Source: *Recent economic developments, IMF; Stepanyan, p. 16; International Monetary Fund, Tax Reform in the Baltics, Russia, and Other Countries of the Former Soviet Union, 1999, p. 3.*

The effect of the flat tax on labor supply in Latvia was also examined. This analysis was done using data from the World Bank's Household Expenditure and Income Data for Transitional Economies (HEIDE).[230] The dataset contains household and individual level data for people in Latvia from 1997 to 1998 and was analyzed data for the male household heads. The information used in the analysis included gender, age, education, labor force participation (employed or not working), wages, non-labor income, and number of children (under the age of 14). Not working individuals included both those who are unemployed and inactive, and only individuals above the age of 25 were used in the analysis. Those who identified themselves as self-employed to be counted as

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[230] This analysis was completed with the assistance of Dr. Flavio Cunha, Assistant Professor of Economics, University of Pennsylvania. A full description of the analysis is included in Appendix X.

employed and their income from self-employment was counted as part of their wages. In this situation

The first step in the analysis is to estimate the wage one would receive based on age and education. However, the problem with this estimation is that wages in the dataset are only for those employed, creating a selection problem. The people who are already in the workforce have certain characteristics and made certain decisions that enabled them to work and these will be reflected in the wages they receive. Therefore, the labor force participation should be taken into account as a factor in the wages instead of assuming that unemployed people would receive comparable wages to those employed. Therefore, in order to estimate, β for the wage in such a way, a Heckman selection model is used (Table 4).[231]

The "select" component of the table shows the coefficients, or effect, of independent variables (age, education, non-labor income, and number of children) on the decision to work. Using this information, the "wagey" component of the table shows the effect of the variables age and education on wage received. Using these coefficients, the potential wage for non-working people can be predicted. Using the new wage for unemployed people found through the Heckman selection model, a probit[232] regression is used to predict the effect of wage on labor force participation.

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[231] The Heckman selection model used to account for selection bias. This occurs when the independent variables depend on unmeasured variables, which also impact the independent variable. Here, the wages in the model are just for those who are working, which presents a bias in the wage data. Therefore, the regresion first models whether or not one is employed. Then, using this information, it models what the wage would be based on different factors.

[232] A probit regression is a nonlinear regression model designed for binary dependent variables. (Stock and Watson, 389) In this case, the dependent variable was binary with the outcomes unemployment = 0 and unemployment = 1. Each coefficient given by the probit regression gives the expected change in the probability that Y (labor force status) = 1. (Stock and Watson, 391)

Table 4. Heckman Selection Model: The Effect of Age and Education on Wage

		Coef.	Std. Err.	z	P>|z|	95% Conf. Interval	
Wagey	AGE	3.899	2.727	1.43	0.153	-1.447	9.244
	AGE2	-0.031	0.032	-0.99	0.325	-0.093	0.031
	Educat	54.130	4.138	13.08	0.000	46.020	62.240
	_cons	-86.847	61.436	-1.41	0.157	-207.260	33.566
Select	AGE	0.165	0.018	9.07	0.000	0.129	0.200
	AGE2	-0.002	0.000	-12.04	0.000	-0.003	-0.002
	Educat	0.268	0.028	9.48	0.000	0.213	0.324
	NONLABORY	-0.002	0.000	-5.82	0.000	-0.003	-0.001
	CHILDN	0.068	0.034	1.97	0.049	0.000	0.135
	_cons	-2.547	0.445	-5.73	0.000	-3.419	-1.676
	/athrho	-0.155	0.081	-1.90	0.057	-0.314	0.005
	/lnsigma	4.970	0.017	293.15	0.000	4.936	5.003
	Rho	-0.153	0.079	-0.30	0.005		
	Sigma	143.971	2.441	139.27	148.835		
	Lambda	-22.086	11.558	-44.74	0.568		

Source: HEIDE Database, The World Bank, 1997-98

Table 5. Probit Regression: The Effect of Wage, Education, and Children on Labor Force Participation

Lfs	Coef.	Std. Err.	z	P>|z|	95% Conf. Interval	
WAGEITAX	-0.001	0.000	-3.71	0.000	-0.002	-0.001
Educat	0.464	0.026	17.52	0.000	0.412	0.516
CHILDN	0.425	0.029	14.65	0.000	0.368	0.482
_cons	-1.049	0.066	-15.9	0.000	-1.178	-0.920

Source: HEIDE Database, The World Bank, 1997-98

Looking at the probit regression there is a negative coefficient on wage in the probit regression. The negative coefficient on age is not what economic theory would predicts; a negative coefficient on wage indicates that as wage increases, people are less likely to work. There are a number of possibilities for why this outcome would occur for

the analysis. One reason is that the data itself is inaccurate: people reported inaccurately or it was transcribed and input inaccurately. A second possibility is that the labor force composition in transitional economies is unique in that the older generation was educated in a communist country while the younger generation was educated in a democratic, capitalist country. This could cause the older generation, who receive higher wages (this is indicated through the Heckman analysis) to be less useful in the new economy and therefore employed less.

A third possibility is that those who earn the highest wages will enter the informal economy. This is particularly relevant since the data is from 1997 to 1998. In 1997, the 10 percent tax on income for those in the highest tax bracket was eliminated, causing all levels of income to be taxed at 25 percent.[233] As George Viksnins of Georgetown University explained, people did not debate tax rates because if they were too high, people would receive more of their salary informally, either through the informal sector or untaxed income. Thus, this analysis suggests that it is possible the flat tax actually caused increased involvement in the underground economy. If this is the case, then the flat tax in Latvia may have had a negative impact on the formal economy.

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[233] Keen, Michael; Yitae Kim, and Ricardo Varsano. "The 'Flat Tax(es)': Principles and   Evidence." International Public Finance, 15 (2008), 743.

The Case of Lithuania

Background

The largest and most populated Baltic state, Lithuania is located to the south of Latvia and also shares borders with Belarus, Poland, and Russia.[234] Lithuania is a home to 3.4 million citizens, 67 percent of which live in urban areas.[235] After losing its independence to the Soviet Union in World War II, Lithuania re-established it in March 1990, thereby becoming the first Soviet republic to declare independence.[236] Like the other Baltic states, Lithuania faced a dismal economic situation upon gaining its independence. During its early years after independence, more than 90 percent of Lithuania's trade was with the rest of the former Soviet Union and it operated an inefficient industrial sector.[237] Between 1991 and 1993, Lithuania's industrial output dropped by half and faced an even sharper decline in agricultural production.[238] Inflation, increased from 225 percent in 1991 to 1,100 percent in 1992, while wages dropped by 30 percent that year.[239]

Thus, soon after gaining independence, Lithuania underwent a series of reforms. Among these was a privatization reform. In 1991, the Law on Initial Privatization of State Property was passed, and from 1991 to 1995 Lithuania enacted a voucher privatization program, which restored agricultural land to former owners and provided former collective farm workers land. It also moved housing from state to private ownership and transferred ownership of small and medium enterprises from state to private ownership Between 1992 and 1994, Lithuania saw rapid privatization especially for small

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[234] KPMG, p. 12.
[235] Ibid, p. 13.
[236] "Background Note: Lithuania." United States Department of State.
[237] Ibid.
[238] Kiinzer, Stephen. "Lithuania Decides to Try Flexibility." The New York Times, Jan. 3, 1993.
[239] "Lithuania – Economics Reforms." U.S. Library of Congress.

businesses, farms and houses, and by November 1994, more than 5,000 enterprises had been privatized.[240] The voucher privatization generated nearly Lt 150 million in proceeds (more than US$40 million), most of which were received by State Privatization Fund.[241] Another major reform undertaken in Lithuania was monetary reform. On June 25, 1993, the central bank introduced the litas as the national currency, which became the sole form of tender that August. It was pegged at the US dollar.[242]

At the beginning of its independence, Lithuania had hundreds of different types of taxes, which served as its main sources of budget revenues. At the beginning of the transition, however, budget revenues fell, as activity moved to the private sector and "hidden" economies.[243] In 1992, Lithuania saw its lowest revenue collection, when tax revenue fell to 26 percent. Yet even in 1992, Lithuania was beginning to see a turnaround. That year, Lithuania's inflation rate was reduced and lessened every each year since. Since then, revenues have ranged between 27.5 and 32.5 percent of GDP, and the country saw positive economic growth every year beginning in 1995.[244]

Among the changes that led to such outcomes in the early years of Lithuania's transition was a decrease in expenditure of Lithuania's general government budget.[245] Lithuania's constitution was written at the beginning of the transition period. It defined the fundamental elements of the Lithuanian public expenditure system as well as a state and municipal budget. Thus from the beginning of independence, there was a unified

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[240] Ibid.
[241] World Bank, "*Lithuania: An Opportunity for Economic Success, Volume 2*, p. 165.
[242] "Lithuania – Economics Reforms." U.S. Library of Congress.
[243] Vaicenavicius, Rimantas. "Lithuanian Fiscal Policy: Experience and Challenges," in *Lithuania: From Transition to Convergence*, p. 202.
[244] Ibid, pp. 199-200.
[245] Ibid, p. 200.

state budget.[246] Since independence, the government and parliament set a high priority towards staying within the approved budget deficit, and the government has tried to reduce the budget deficit in order to decrease inflation and contain the buildup of foreign debt. Expenditures were decreased to 32.5 percent in 1994, 31.8 percent in1995, and 30.5 percent in 1996 as the government began to consolidate financial resources. Between 1994 and 1997, progress was made in reducing the budget deficit, with the fiscal deficit declining to 1.8 percent of GDP in 1997.[247]

Another tool used to finance the budget deficit was treasury bills. In 1994, Lithuania created a domestic treasury bills market, in 1995, a one-year treasury bond was issued, and in 1998 two-year bonds were issued. From 1994 to 1997, more than one-third of all bills were sold to foreign investors, and domestic treasury bills financed 65 percent of the central government deficit in 1994 alone. Since 1994, the Lithuanian government has focused on foreign financing of its debt. Within just a year, the central government was able to increase foreign financing by more than 2.5 times and reduce domestic financing. By 1997, the stock of treasury bills comprised almost 7 percent of GDP. This strategy marked a change in Lithuania's financing since, until 1995, international financial institutions such as the IMF, World Bank, and EBRD were the main sources of external finance. However, since 1995, the Lithuanian government has been able to access international capital markets, and in 1995 alone, $60 million were borrowed through private Eurobond placements. By 1996, foreign commercial borrowing and bond issues comprised 88 percent of overall debt financing.[248]

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[246] Ibid, p. 204.
[247] Ibid, p. 200.
[248] Ibid, p. 207.

The Flat Tax

Fiscal policy was also included in changes made in Lithuania. In 1991, upon independence, Lithuania implemented a progressive tax system with tax rates ranging between 18 and 33 percent. In 1994, the government set a fixed flat tax rate of 33 percent.[249] However, according to Jonas Cicinskas, Lithuania had really seen a flat tax system since the Soviet Union, which imposed a flat personal income tax of 13 percent across the USSR. A flat personal income tax was the natural tax structure for the early years of Lithuania's independence Cicinskas explained. With a rapid pace of reforms and precarious economic situation in Lithuania's early years, discussions regarding taxes did not attract a great deal of attention.[250]

Other Tax Reforms

Among the tax reforms introduced in the 1990s was the introduction of the general turnover tax and then the VAT in 1994.[251] The main motivation behind these indirect taxes was to adopt a market-friendly tax system that was compatible with EU requirements and to meet revenue needs. The share of indirect taxes, such as the VAT and customs tax has been increasing this year. In practice it is easier to administer indirect taxes than direct income taxes, and these taxes have contributed a large share of state budget revenues.[252] The VAT was introduced at 18 percent, and its share of the national budget has risen from 29.5% in 1994 to 40% in 1998. Revenues from the excise

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[249] Stepanyan, Vahram. Reforming Tax Systems: Experience of the Baltics, Russia, and Other Countries of the Former Soviet Union, p. 27.
[250] Jonas Cicinskas, phone interview, March 19, 2009.
[251] Vaicenavicius, p. 202.
[252] Ibid.

tax grew as well, going from accounting for 1.1% of GDP in 1994 to 3.1 percent in 1998. It has a specific rate, therefore taking inflation into account.[253] As opposed to the implementation of indirect taxes, where a major motivating force was meeting EU requirements, the creation of direct taxes was primarily internally driven. In 1993, direct taxes accounted in the national budget accounted for 11 percent of GDP.[254] By 1998, this figure had dropped to 7 percent. Currently, Lithuania has a 24 percent personal income tax rate and a 15 percent corporate tax rate.[255]

Another element to tax reform was a change in tax administration. In the 1990s, the share of economic activity in shadow economy had reached 40 percent demonstrating a need to improve tax administration and have more equitable distribution of the tax burden.[256] A reform in tax administration accompanied the changes in tax law. In 1995, a tax administration law was passed by parliament, which established the Central Tax office in accordance with European Union requirements. The administrative reforms were aimed at reducing the number of local offices and increasing efficiency.[257] From 1995 to1996, the central office of the State Tax Inspectorate, established to be distinct from the Ministry of Finance, reorganized local tax offices according to function. By 1999, the State Tax Inspectorate established ten local district offices instead of 56.[258]

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[253] Ibid.
[254] Ibid.
[255] KPMG, pp. 53, 74.
[256] Ibid.
[257] Ibid.
[258] Ibid.

Effect

Lithuania introduced a 33 percent flat tax rate, which was the highest personal income tax rate the country had seen prior to reform, and tax revenues increased subsequently.[259] However, like in the case of Estonia and Latvia, it is difficult to conclude an effect of the flat tax on revenues since other reforms occurred simultaneously. Additionally, personal income tax revenues dropped to pre-reform levels the year and there was no consistent increase of personal income or total government revenues.

Chart 5a. Personal Income Tax Revenue in Lithuania During the Early Years of the Flat Tax
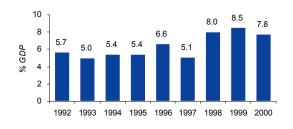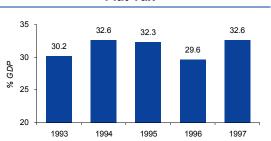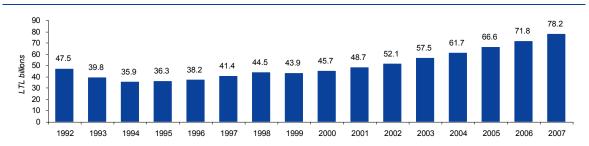
Chart 5b. Total Government Revenue in Lithuania During the Early Years of the Flat Tax

Source: Recent economic developments, IMF; Stepanyan, p. 16; International Monetary Fund, Tax Reform in the Baltics, Russia, and Other Countries of the Former Soviet Union, 1999

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[259] Saavedra, Pablo. "Flat Income Tax Reforms," p. 260.
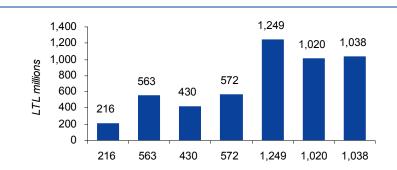
Chart 6. Lithuania GDP (1992 – 2007)

(a)   GDP is in constant prices with 2000 serving as the base year.
Source: International Monetary Fund, World Economic Outlook Database, October 2008

Furthermore, there are years when GDP is increasing yet personal income tax revenues as a percent of GDP are falling. Looking at absolute revenue, Lithuania has, with the exception of 1995 seen an increase. However, the database whether this information if at constant or current prices.

Chart 7. Personal Income Tax Revenue in Lithuania

Source: World Tax Database, Ross School of Business, University of Michigan

Lithuania also maintains the highest tax rate compared to its peers, which would theoretically reduce compliance. Since the payoff from evading is higher, there would be a greater incentive structure to evade taxes.[260] The major challenge in analyzing the effect

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[260] "Lithuania – Economics Reforms." U.S. Library of Congress.

of the flat tax in Lithuania is the absence of non-proprietary household or individual level

information. Therefore, Lithuania is used to help understand the development of the flat

tax, but the specific effect on Lithuania is difficult to examine. However, Lithuania can

be used in aggregate, cross-country analyses in order to compare it to non-flat tax

countries.

Overall Findings of the Flat Tax: Aggregate Analysis

Revenue and Growth Effects

Proponents of the flat tax claim that a flat tax would provide increased incentives to work, leading to increased entrepreneurial activity and national output.[261] However, looking at the Baltic states, it is unclear if a flat tax yielded this effect. Since the flat tax implementations, the Baltic states did greet increased personal income tax revenue growth, both over time and in relation to other former Soviet Union countries. By 2000, Estonia and Lithuania saw personal income tax revenue comprising almost 8 percent of GDP.[262] All three of the states had similar or higher levels of revenue as the beginning of the transition process.[263]

Table 6. The Baltic States' Personal Income Tax Revenue in Comparison to Other Former Soviet Union Countries (% GDP)

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Estonia	7.0	8.2	7.9	8.7	8.3	8.1	8.5	8.7	7.8
Latvia	2.7	3.6	4.6	5.1	5.4	3.8	4.4	4.7	4.3
Lithuania	5.7	5.0	5.4	5.4	6.6	5.1	8.0	8.5	7.8
Average	**5.1**	**5.6**	**6.0**	**6.4**	**6.8**	**5.7**	**7.0**	**7.3**	**6.6**
Armenia	-	1.6	1.2	1.3	1.3	1.8	1.6	1.9	1.4
Azerbaijan	-	2.4	1.5	1.1	1.6	2.1	2.5	2.7	-
Georgia	-	0.2	0.3	0.6	0.8	1.1	1.7	1.9	1.8
Kazakhstan	2.5	2.4	1.8	2.0	2.2	2.4	1.7	1.8	2.0
Kyrgyz Republic	-	1.3	1.9	1.8	1.2	1.0	1.2	1.1	1.3
Moldova	1.8	1.6	1.7	2.5	2.5	2.8	2.2	1.6	1.5
Ukraine	-	2.0	3.0	2.9	3.3	3.5	3.5	3.4	3.8
Uzbekistan	2.5	2.8	2.6	2.8	3.6	4.0	4.0	4.1	3.6
Tajikistan	-	-	-	-	1.1	1.2	1.0	1.1	1.2
Russia	3.5	2.8	2.9	3.1	3.1	3.1	3.3	3.4	3.2
Average	**2.6**	**1.9**	**1.9**	**2.0**	**2.1**	**2.3**	**2.3**	**2.3**	**2.2**

Source: Recent economic developments, IMF; Stepanyan, p. 16

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[261] Explained in theory section of thesis (see pp--)
[262] Stepanyan, Vahram. "Reforming Tax Systems: Experience of the Baltics, Russia, and Other Countries of the Former Soviet Union, p. 16
[263] Ibid, p. 19.

The World Bank conducted a differences-in-differences estimation to analyze the effect of flat tax reform on tax compliance, administration, and revenue generation.[264] This type of analysis involves looking at a group of countries, which includes both those who enacted the flat tax reform (the treatment group) and those that did not (the control group).[265] Looking at the outcomes of all the countries over time, the analysis helps determine the effect of the treatment, or flat tax reform, on the countries who received it.[266] The results of this regression of a flat tax on revenue are not statistically significant and therefore do not indicate an increase or decrease of revenues as a result of the flat tax implementation.[267] Real wage increase was the only variable significant at a 10 percent confidence level.[268] There were also inconclusive results for the effect of a change in corporate income tax revenues.[269]

The effects of the flat tax on GDP and GDP growth were additionally examined using a fixed effect regression analysis.[270] This analysis also yielded inconclusive results. A fixed effect regression analyzes the effect of something that occurs in each state but varies across time, in this case the flat tax implementation. The analysis on the effect of the flat tax on constant GDP yielded significant positive results at the 95 percent

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[264] Saavedra, Pablo. "Flat Income Tax Reforms," in *Fiscal Policy and Economic Growth: Lessons for Eastern Europe and Central Asia*, p. 273.
[265] Ibid.
[266] Ibid, p. 274.
[267] Ibid, p. 275.
[268] A 10 percent confidence level means that the chances of attaining the result if the result were inaccurate did not have any effect is below 10 percent. Inaccurate here would mean that the independent variable (flat tax) actually did not have an effect on the dependent variable (real wage increase). If the chances of attaining this result, given that the result is inaccurate, is below a certain threshold (here, 10 percent), the result is said to be "statistically significant at the 10% level." In this case, the only result that was found to be "statistically significant at the 10% level" was real wage increase.
[269] Saavedra, p. 275.
[270] This analysis was completed with the assistance of Flavio Cunha, Assistant Professor of Economics, University of Pennsylvania.

confidence level. However the analysis on the effect of the flat tax on the natural log[271] of

GDP did not yield statistically significant results. The effects of a flat tax on growth were

also not significant at the 95 percent level.

A fixed effect regression was also used to examine the effect of flat taxes on

inflation, with the idea being inflation is a signal for poor economic growth. If there is a

lack of growth and revenues in the economy, governments will use inflation as a tool to

raise money. Again, the results were inconclusive. The effect of a flat tax on the average

consumer prices[272] was significant at the 95 percent confidence level. However, this

yielded a positive affect on inflation. The effect of the flat tax on change in percent

change of consumer prices[273] was not significant at the 95 percent confidence level.

Table 7. Effect of Flat Tax (Independent Variable)

Dependent variable	Coefficient (on flat tax)[a]	Robust Standard Error	t-statistic	P-statistic	95% confidence interval	
GDP (constant)	987.881	352.968	2.80	0.006	288.310	1687.453
Natural log of GDP	-0.030	0.033	-0.91	0.367	-0.096	0.036
GDP growth rate	0.020	0.014	1.47	0.146	-0.007	0.047
Average consumer prices	47.569	11.605	4.10	0.000	24.569	70.568
Percent change of consumer prices	119.836	137.980	0.87	0.387	-153.846	393.519

(a)   Flat tax was an independent binary variable with 0 representing years prior to reform, 1 representing year of reform, and years after.
Source: Data from International Monetary Fund, World Economic Outlook Database, October 2008, analysis by Deena Greenberg with assistance from Flavio Cunha

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[271] Natural log of GDP is a way to measure GDP growth, since a percent change is the difference between natural logs.
[272] Average consumer prices are measured by averages for the year. The index is based such that the year 2000 = 100. (International Monetary Fund, World Economic Outlook Database, October 2008)
[273] Inflation is measured by annual percent change of average consumer prices for each year. (International Monetary Fund, World Economic Outlook Database, October 2008)

It is difficult to analyze and draw any conclusions about the effect of the flat tax across these countries for several reasons. Given that so many reforms were introduced concurrently with the flat tax implementation, it is highly probable that a regression on the flat tax will display some effect, regardless of whether or not there actually is correlation. Additionally, for many flat tax countries, the reason why they implemented a flat tax, among other reforms, was because they had a low level of GDP. Therefore, there may be a timing correlation between flat tax implementation and a rise in GDP, but the causality could be in reverse.

The specific revenue effects in the Baltic countries were discussed in the preceding chapters. The only other major analysis of a flat tax was in a study on Russia. Ivanova, Keen, and Klemm[274] looked at the effects of the flat tax on Russia using individual and household level data. In the Russian flat tax reform, the low income group, which was the larger group, was significantly less affected by the reform than the higher income group. Yet, personal income tax revenues fell for all groups except the low income group, which was the least affected.[275] Therefore, neither the country level nor aggregate level evidence indicates that the flat tax is significantly and positively correlated with economic growth.

Effects on Labor Supply

The overall effect on labor currently seems to be inconclusive. On a theoretical level, people will join the labor force if their after tax income compensates them for whatever fixed cost goes in to joining the work force and is higher than the benefits

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[274] Ivanova, Anna; Keen, Michael, and Alexander Klemm. "The Russian Flat Tax Reform." IMF Working Paper, International Monetary Fund, January 2005.
[275] Saavedra, p. 261.

received by not participating in the work force.[276] An increase in the tax threshold should encourage labor force participation since people can earn more and not pay taxes.[277] An increase in the marginal tax rate could cause people to leave the labor force, as when after tax income declines, labor becomes less attractive.[278]

One's labor supply decision is based on how his average tax rate and marginal tax rate are affected. If marginal tax rate falls, there is a substitution effect[279] towards increased labor, since the cost of leisure increases. If average tax rate rises, there will be an income effect[280] towards increased effort since, when one receives less after tax-income, the income effect will cause him to work more in order to compensate.[281] These effects differ significantly at different levels of income.[282] On a theoretical level, the effect on labor is largely uncertain.[283]

The empirical evidence for how a flat tax affects labor supply is limited due to lack of available data. Ivanova, Keen, and Klemm examined the effects in Russia using household level data. In the Russian flat tax reform, the low income group, which was the larger group, was significantly less affected by the reform than the higher income group. Ivanova et al. looked at the lower income group as the control group and the higher income group as the treatment group and compare behavior between the pre and post tax

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[276] Keen, Michael; Kim, Yitae, and Ricardo Varsano. "The 'Flat Tax(es)': Principles and Evidence," in *International Public Finance*, p. 731.

[277] Ibid, p. 731.

[278] A detailed framework for evaluating labor force participation decisions can be found in the Latvia chapter.

[279] When marginal tax rate falls, after tax income increases. Therefore, the reward received from working increases, and the opportunity cost of leisure increases. The substation effect causes someone with increased income to spend more time working than on leisure, since leisure becomes more "expensive."

[280] When marginal tax rate increases, after tax income falls. With decreased income, someone would want to work more in order to compensate for the income lost to taxes.

[281] Keen, p. 730.

[282] Ibid.

[283] Ibid.

reform periods. Their analysis suggested that there was no evidence for a labor supply change. Ivanova et al. did not find that gross income or hours worked increased more among the treatment group. They also found that the only group that did show a significant increase was the control group.[284]

Equity

On a theoretical level, it is not clear whether a flat or progressive tax system is more equitable in the sense of redistributing income from high to low income individuals.[285] Pre-tax income, Y, is assumed to be independent of the tax schedule, meaning people's salary does not depend on the tax structure in place. A tax system 'A' is assumed to be more progressive than a tax system 'B' if it has a more unequal distribution of tax payments; it is more progressive if the low income people pay a smaller share of all tax payments under A than B.[286] This model assumes that both tax systems raise the same revenue and focuses purely on equality.

In the case of the Baltic countries, there is a tax free level of income, which is greater under the flat tax than the progressive tax, meaning there was an increase in the threshold before which one was taxed under the flat tax reforms.[287] In this case, the low income individuals are paying less tax under the new flat tax structure than the preceding progressive tax system.[288] If the flat tax structure provides a higher minimum tax threshold, there are two possible outcomes. In the first case, the flat tax rate is at least as high as the highest pre-reform marginal tax rate. Therefore, the tax schedules cross only

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[284] Keen, p. 732.
[285] Ibid, p. 719.
[286] Ibid, p. 722.
[287] Ibid, p. 723.
[288] Ibid.
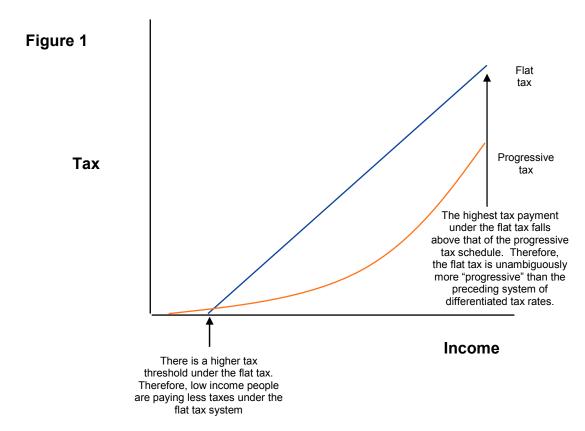
once (see figure 1).[289] This situation is comparable to what occurred in Latvia and

Lithuania after their flat tax reforms.[290] It is an unambiguously more progressive system

in the sense that on the low income side, fewer people have to pay taxes as the threshold

increases, and on the higher income side, the tax rate remains the same. Therefore, the

lower income people pay an overall lower share of total tax payments under the flat tax

system.

Figure 1

Tax

Flat
tax

Progressive
tax

The highest tax payment
under the flat tax falls
above that of the progressive
tax schedule. Therefore,
the flat tax is unambiguously
more "progressive" than the
preceding system of
differentiated tax rates.

Income

There is a higher tax
threshold under the flat tax.
Therefore, low income people
are paying less taxes under the
flat tax system

The second situation is that the flat tax lies in between the high and low ends of

the pre-reform tax levels. In this scenario the tax schedules cross twice (see figure 2).

This situation is comparable to what occurred under the Estonian reform.[291] In this case it

is ambiguous which tax system is more progressive because the lower income people are

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[289] Ibid.
[290] Keen, p. 724.
[291] Ibid.
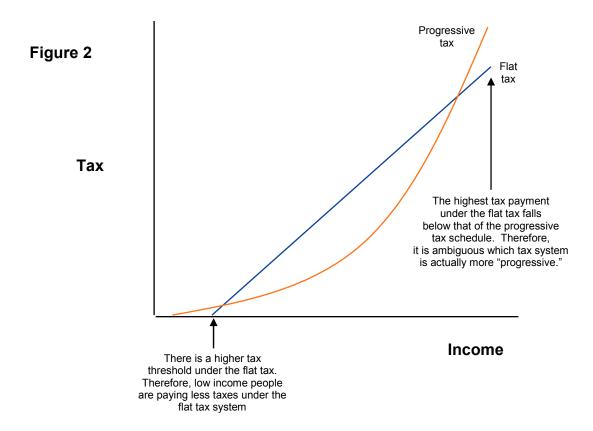
paying fewer taxes than under the previous structure, but the higher income group also pays a lower tax rate than it did before.[292] It is unclear whether or not the low income people pay a smaller share of the total tax payments under the new flat tax system. Therefore, with regard to redistribution of income, on a theoretical level, the higher the marginal tax rate of the flat tax, the less inequality there will be in after-tax income.[293]

Figure 2

Tax

Progressive tax

Flat tax

The highest tax payment under the flat tax falls below that of the progressive tax schedule. Therefore, it is ambiguous which tax system is actually more "progressive."

There is a higher tax threshold under the flat tax. Therefore, low income people are paying less taxes under the flat tax system

Income

The effects of flat taxes on income redistribution empirically have also been inconclusive. In "Main Drivers of Income Inequality in Central European and Baltic Countries – Some Insights from Recent Household Survey Data," Salman Zaidi examines indicators and causes of inequality in the EU8 countries, Poland, Hungary, Slovenia,

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[292] Ibid.
[293] Ibid, p. 725.

Slovakia, the Czech Republic, Latvia, Lithuania, and Estonia.[294] He uses data from the

2006 European Union Survey of Income and Living Conditions and data from the EU

SILC study to examine the Gini coefficients[295] of the EU8. The Gini coefficients are used

as a metric to measure income inequality in the different countries.

Table 8. Gini coefficient for income per capita				
Country	**1987-90**	**1993-94**	**1996-99**	**2006**
Czech Republic	0.19	0.23	0.25	0.27
Estonia	0.24	0.35	0.37	0.35
Hungary	0.21	0.23	0.25	0.34
Latvia	0.24	0.31	0.32	0.40
Lithunia	0.23	0.33	0.34	0.37
Poland	0.28	0.28	0.33	0.33
Slovakia	-	-	-	0.30
Slovenia	0.22	0.29	0.25	0.26

Source: Salman Zaidi, p. 7, 2006 World Bank staff calculations based on data from 2006 EU-SILC

The Baltic states, which adopted the flat tax between 1994 and 1995, show the

greatest income inequality overall and the Gini coefficient in fact increases since the

adoption of the flat tax.[296] While this alone does not conclude that flat taxes are less

equitable, it certainly does not make the case that a flat tax helps alleviate income

inequality. In looking at Zaidi's analysis, however, one must also realize that it is difficult

to look at long term Gini coefficient trends for countries, since countries often change the

household surveys used to aggregate information. Gini coefficients are highly sensitive to

such changes, and thus, long term comparisons should be seen only as broader estimates.

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[294] Zaidi, Salman. "Main Drivers of Income Inequality in Central European and Baltic Countries."
Washington DC: The World Bank, 2009, p. 4.
[295] A measure of income inequality for a country ranging from 0 to 1, with 0 being total equality (everyone
has the same income) and 1 being total inequality (1 person has all of the income, while everyone else has
no income)
[296] Ibid, p. 7.

Therefore, while it is likely that inequality has risen in the Baltic states since the adoption

of the flat tax, it is questionable whether this rise is as large as what the numbers suggest.

Zaidi also looks at the difference between pre tax and post tax Gini coefficients to

examine how much the tax is able to redistribute income.[297]

Table 9. Gini Coefficient of Income Inequality

Country	Pre-tax-benefit incomes	Post tax incomes	Difference in pre/ post tax Ginis	Ratio of pre/ post tax Ginis
Czech Republic	0.485	0.340	0.145	1.426
Slovakia	0.474	0.339	0.135	1.398
Hungary	0.568	0.429	0.139	1.324
Lithuania	0.540	0.413	0.127	1.308
Slovenia	0.471	0.369	0.102	1.276
Estonia	0.499	0.391	0.108	1.276
Poland	0.558	0.440	0.118	1.268
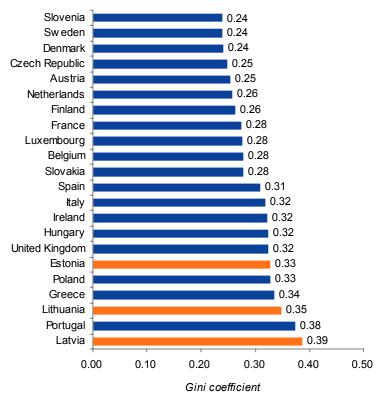
Source: Salman Zaidi, p. 13, 2006 World Bank staff calculations based on data from 2006 EU-SILC

Looking at the ratio between pre and post tax reforms, Estonia and Lithuania had

ratios of 1.28 and 1.31, which suggests that the flat tax has some redistributive effect on

overall income distribution. The higher the ratio is, the more redistribution is taking

place. This redistributive effect in the Baltic countries is comparable (in the middle for

Lithuania and on the lower end for Estonia) with the redistributive effect of the tax

schemes of the other EU8 countries. Thus, no definitive statement can be made as to the

exact redistributive effect of the flat tax, although it appears as though the flat tax has a

comparable redistribution to progressive tax countries. There is also no evidence from

this analysis that flat tax countries have significantly higher inequality overall than

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[297] Latvia is excluded from this analysis because the EU-SILC dataset does not provide data on gross incomes (pre tax data). This analysis looks purely on effect on income distribution and does not take into account other effects of taxation such as those on efficiency and labor output. Zaidi, p. 13.

progressive tax countries, an argument frequently used by opponents of the flat tax. This is the case when the Baltic countries are compared to both the EU8 countries and EU15.

Chart 8. Gini Coefficients in European Countries

Country	Gini coefficient
Slovenia	0.24
Sweden	0.24
Denmark	0.24
Czech Republic	0.25
Austria	0.25
Netherlands	0.26
Finland	0.26
France	0.28
Luxembourg	0.28
Belgium	0.28
Slovakia	0.28
Spain	0.31
Italy	0.32
Ireland	0.32
Hungary	0.32
United Kingdom	0.32
Estonia	0.33
Poland	0.33
Greece	0.34
Lithuania	0.35
Portugal	0.38
Latvia	0.39

Gini coefficient

Source: Salman Zaidi, p. 9, 2006 World Bank staff calculations based on data from 2006 EU-SILC

Studies have been conducted examining the income distribution effects of a flat tax in the Slovak Republic. The Slovak Republic implemented a tax reform in 2004, which included a 19 percent flat personal income tax, replacing a 10-38 percent rate schedule. The reform also included an increase in deductions and tax credits. A World Bank report examining the distributional impacts of these reforms found that the majority of household saw increased disposable incomes. The households that saw disposable income decline were those with more than two children where all adults were

unemployed, and therefore saw more benefits before the reform.[298] The study also found

that overall poverty decreased, suggesting that the personal income tax reform did have a

positive effect on alleviating inequity.[299] While this case study, like the discussion on the

Gini coefficients above, does not indicate a strong redistributive effect of the flat tax, it

does serve as one counterargument to the claim that the flat tax increases inequality.

Simplicity and Compliance

      The flat tax, marketed as the "postcard" reform, purports to make tax payments

significantly simpler. This simplicity may in fact be the strongest reason for a transitional

economy to adopt a flat tax. While the claims of increased growth and equity are not yet

substantiated in theory or practice, the flat tax does create a simpler system. Tax returns

can be filed in less than fifteen minutes[300] and most deductions and exemptions have been

removed. The system, overall, is simple. Jonas Cicinskas said that the conversations

today in Lithuania pay attention not to any complexity of the tax system but to whether or

not the system can be made more elaborate. Therefore, while it is not clear whether or not

a flat tax leads to revenue growth or is more equitable, it does create a simpler system.[301]

      While simplicity alone may not lead to increased growth, without a simple tax

structure, transitional economies will likely face increased difficulties in revenue

collection. Karsten Staehr explained that there is some anecdotal evidence from Ukraine

and Russia that the complexities of tax systems were so extreme that people decided it

was not worth doing anything. In the mid 1990s, during the Yeltsin era, Russians had so

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[298] Saavedra , p. 260.
[299] Ibid.
[300] Strossel, John. "Springtime for Taxes." Townhall.com.
[301] Cicinskas, phone interview, March 19. 2009.

much trouble getting tax revenues paid that tax police went out and raided companies,

even bakeries. Ukraine, as well, faced challenges during the beginning of its transition.

Looking at income tax revenue, Ukraine and Russia did not grow as much in the early

1990s. While the flat tax was likely not the only reason for the Baltic states' success, it

did not prevent this success from occurring. As Staher explained, "Estonia got a tax

system that was fairly transparent and easy to handle so it didn't stand in the way for the

economy turning around."[302]

Furthermore, simplicity should lead to increased payments due to increased

compliance, as a simpler tax system makes it easier for citizens to pay taxes. In general,

the effects of compliance are difficult to measure, as by nature, non-compliance is

difficult to quantify.[303] On a theoretical level, the impact of rates on compliance can

depend on the type of costs the taxpayer would incur in avoiding payment weighed

against the money saved from avoiding tax payments.[304] Looking at the effect of the flat

tax across countries that use it, compliance seemed to increase when both the personal

income tax and corporate income tax were enacted at the same rate.[305] States with less

burdensome tax regimes also showed increased compliance.[306]

An analysis of the Russian reform, performed by Ivanova, Keen, and Klemm does

suggest that compliance improved since flat tax implementation. They compared

consumption with income reported, assuming people would be more truthful about

consumption. Looking at ratio of reported income to actual income, Ivanova et al.

observed that for those affected by the reform, the ratio increased from 52 to 70

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[302] Staehr, Karsten, phone interview, February 10, 2009.
[303] Keen, p 735.
[304] Ibid, p. 734.
[305] Saavedra, p. 277.
[306] Ibid.

percent.[307] However, the researchers concluded that the increased compliance could not

necessarily be attributed to the flat tax, since there were also tax administration

improvements implemented simultaneously.[308]

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[307] Keen, p. 735.
[308] Saavedra, p. 261.

Conclusions

In general, the effects of a flat tax are difficult to isolate both on the country and aggregate level. In each country, the flat tax was generally accompanied by monetary, fiscal, and political reforms. With the exception of Ukraine, the flat tax reforms always followed a change in government.[309] Additionally, with the exception of Latvia, the tax reform included an increase in personal allowances.[310] Looking at both the theory and data, there is no clear evidence that the flat tax alone improves revenues, labor output, growth, or equity. In fact, with regard to redistribution, there is a case to be made that the flat tax redistributes income less than a progressive tax system. Furthermore, the case of Latvia suggested that the flat tax may actually increase involvement in the underground economy.

Thus, the main argument for the adoption of a flat tax in transitional economies is based on its simplicity. Transitional economies, with a newly formed government and limited state apparatus, are not as well positioned as their developed counterparts to implement a complex tax structure with differentiated levels of taxation. Therefore, the main advantage of a flat tax is that it sets in place a system where people can easily pay taxes and the government can easily administer taxes.

Looking at a flat tax in this vein, timing is essential to the reform. As Mart Laar noted, a reform launched as quickly as possible had a better chance of success than several prolonged measures.[311] Drawing on Balcerowicz's theory, that domestic liberalization and freedom from foreign domination create a mass psychology in which the people want, more than in a normal situation, to look towards the future and the

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[309] Keen, p. 739.
[310] Ibid, p. 718.
[311] Laar , "The Estonian Economic Miracle," p. 2.

greater good, Laar noted that radical reforms had to be passed in order to ensure their success.[312] Thus, perhaps the early implementation of the reforms more than the flat tax by itself is what allowed Estonia, Latvia, and Lithuania to become Baltic Tigers, while countries who had later implementation did not necessarily greet the same success. Furthermore, these tax policies cannot exist in isolation. In every successful case of a flat tax, monetary, governmental, and parallel fiscal reforms accompanied.

Thus, the question of whether or not to implement a flat tax in transitional economies cannot be looked at in a vacuum. There is no evidence that the flat tax by itself causes increased growth, equity, or compliance on its own. In fact, the analysis on the Baltic countries suggests that the flat tax may cause less income redistribution than progressive tax countries, and in the case of Latvia compliance may decrease under the flat tax. Therefore, while there is no definitive evidence that the flat tax creates growth, the simplicity of the flat tax appears to at least allow growth to take place during the early years of transition. However, past this period of initial development, there is no conclusive evidence that the flat tax is an appropriate model for continued growth.

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[312] Laar, "The Estonian Economic Miracle," pp. 2-3.

Appendix 1: Flat Taxes Across the World

Flat Taxes Across the World

Flat tax jurisdiction	Year enacted	Tax rate
Jersey	1940	20%
Hong Kong	1947	16%
Guernsey	1960	20%
Estonia[a]	1994	22%
Latvia	1995	25%
Lithuania[b]	1996	27%
Russia	2001	13%
Serbia	2003	14%
Slovakia	2004	19%
Ukraine[c]	2004	15%
Romania	2005	16%
Georgia	2005	12%
Iceland	2007	36%
Mongolia	2007	10%
Kyrgyzstan	2007	10%
Macedonia	2007	12%
Montenengro	2007	15%
Czech Republic	2008	15%
Albania	2008	10%

(a) originally 26%
(b) originally 33%
(c) originally 13%

Source:
Daniel Mitchell. "Flat World, Flat Taxes." Cato at Liberty, April 27, 2007
Alvin Rabushka. "The Flat Tax Spreads to the Czech Republic." hoover.org, 27 August 2008
Daniel Mitchell. "Albania Joins the Flat Tax Club." Cato at Liberty, April 9, 2007

Appendix 2: The Analysis of Labor Force Participation in Latvia

Using data from the World Bank's Household Expenditure and Income Data for Transitional Economies (HEIDE), the effect of the flat tax on labor force participation in Latvia was estimated. The dataset contains household and individual level data for people in Latvia from 1997 to 1998 and was analyzed data for the male household heads. The information used in the analysis included gender, age, education, labor force participation (employed, unemployed, or inactive), wages, non-labor income, and number of children (under the age of 14).[313]

The idea behind the analysis is that each individual tries to maximize a utility function, which is composed of consumption and leisure.

$$u(c, P, \varepsilon) = c + (\alpha_1 + \varepsilon)(1 - P) + \alpha_2 c(1 - P)$$

with c representing consumption and P representing employment, or labor force participation. $P = 1$ if someone is employed and 0 if someone is unemployed (those who are inactive are discarding from the analysis). Epsilon (ε) is a shock that causes someone to decide whether or not to work, it can be though of as disutility from labor, and α_1 α_2 are parameters.

Consumption is attained by taxable labor income (w) and non-labor income (y). The tax rate on wages, is represented by τ. This is represented by the function:

$$c = y + P(1 - \tau)w$$

Substituting consumption (c) into the original utility function, the utility for someone unemployed is (P=0) represented by

$$u(c, 0, \varepsilon) = (\alpha_1 + \varepsilon)(1 - P) + (1 + \alpha_2)y$$

and the utility for someone employed (P =1) is represented by

$$u(c, 1, \varepsilon) = y + P(1 - \tau)w$$

If someone is employed, their utility from employment is greater than their utility from being employed is greater than being unemployed

$$u(c, 1, \varepsilon) \geq u(c, 0, \varepsilon)$$
$$\text{and}$$
$$y + P(1 - \tau)w \geq (\alpha_1 + \varepsilon)(1 - P) + (1 + \alpha_2)y$$

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[313] This analysis was completed with the assistance of Flavio Cunha, Assistant Professor of Economics, University of Pennsylvania.

Solving this inequality for ε

$$\varepsilon \leq (1 - \tau)w - \alpha_2 y - \alpha_1$$

equation -1-

This is the level of shock for anyone who decides to work. Therefore, anyone with a shock above this level will decide not to work. These equations can help understand the decision of whether or not to work and how tax rate affects it. However, those who are unemployed do not have information on wages, since they are not working. Therefore, wages are estimated using the equation

$$w = x\beta + \eta \quad \text{equation -2-}$$

x is a variable that contains the variables age and education as well as a constant, and η is a shock that would cause someone's wage to change.

However, the problem with this estimation is that wages are only for those employed, creating a selection problem. The people who are already in the workforce have certain characteristics and made certain decisions that enabled them to work and these will be reflected in the wages they receive. Therefore, the labor force participation should be taken into account as a factor in the wages instead of assuming that unemployed people would receive comparable wages to those employed. Therefore, in order to estimate, β for the wage in such a way, a Heckman selection model is used.[314]

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[314] The Heckman selection model used to account for selection bias. This occurs when the independent variables depend on unmeasured variables, which also impact the independent variable. Here, the wages in the model are just for those who are working, which presents a bias in the wage data. Therefore, the regresion first models whether or not one is employed. Then, using this information, it models what the wage would be based on different factors.

Heckman Selection Model: The Effect of Age and Education on Wage

		Coef.	Std. Err.	z	P>|z|	95% Conf. Interval	
wagey	AGE	3.899	2.727	1.43	0.153	-1.447	9.244
	AGE2	-0.031	0.032	-0.99	0.325	-0.093	0.031
	educat	54.130	4.138	13.08	0.000	46.020	62.240
	_cons	-86.847	61.436	-1.41	0.157	-207.260	33.566
select	AGE	0.165	0.018	9.07	0.000	0.129	0.200
	AGE2	-0.002	0.000	-12.04	0.000	-0.003	-0.002
	educat	0.268	0.028	9.48	0.000	0.213	0.324
	NONLABORY	-0.002	0.000	-5.82	0.000	-0.003	-0.001
	CHILDN	0.068	0.034	1.97	0.049	0.000	0.135
	_cons	-2.547	0.445	-5.73	0.000	-3.419	-1.676
	/athrho	-0.155	0.081	-1.90	0.057	-0.314	0.005
	/lnsigma	4.970	0.017	293.15	0.000	4.936	5.003
	rho	-0.153	0.079	-0.30	0.005		
	sigma	143.971	2.441	139.27	148.835		
	lambda	-22.086	11.558	-44.74	0.568		

Source: HEIDE Database, The World Bank, 1997-98

After using the Heckman model to find the wage for unemployed people, a probit[315] regression is used to predict the effect of wage on labor force participation. First, equation -2- is placed into equation -1- (in place of w in equation 1),

$$\varepsilon - (1 - \tau)\eta \leq (1 - \tau)x\beta - \alpha_2 y - \alpha_1$$

and

$$\varepsilon - (1 - \tau)\eta \leq (1 - \tau)x\beta - \alpha_2 \gamma - \alpha_1$$

letting

$$\varepsilon - (1 - \tau)\eta = \upsilon$$

then

---

[315] A probit regression is a nonlinear regression model designed for binary dependent variables. (Stock and Watson, 389) In this case, the dependent variable was binary with the outcomes unemployment = 0 and unemployment = 1. Each coefficient given by the probit regression gives the expected change in the probability that Y (labor force status) = 1. (Stock and Watson, 391)

$$\upsilon \leq (1-\tau)x\beta - \alpha_2 y - \alpha_1$$

<div align="right">**equation -3-**</div>

If ε and η are normally distributed,[316] represented by

$$\begin{bmatrix} \varepsilon \\ \eta \end{bmatrix} \sim N \begin{bmatrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_\varepsilon^2 & \sigma_{\varepsilon\eta} \\ \sigma_{\varepsilon\eta} & \sigma_\eta^2 \end{pmatrix} \end{bmatrix}$$

Then

$$\upsilon = \varepsilon - (1-\tau)\eta \sim N(0, \sigma_\varepsilon^2 - 2\sigma_{\varepsilon\eta}(1-\tau) + (1-\tau)^2\sigma_\eta^2)$$

In this equation, we are defining, the variance of υ to be

$$\sigma_\upsilon^2 = \sigma_\varepsilon^2 - 2\sigma_{\varepsilon\eta}(1-\tau) + (1-\tau)^2\sigma_\eta^2$$

Therefore,

$$\frac{\upsilon}{\sigma_\upsilon} \sim N(0,1)$$ is normally distributed

Going back to equation 3, we can divide both sides by σ_υ

$$\frac{\upsilon}{\sigma_\upsilon} \leq \frac{(1-\tau)x\beta - \alpha_2 y - \alpha_1}{\sigma_\upsilon}$$ **equation -4-**

Therefore, the probability that someone works is found by finding the normal distribution in equation 4.[317]

$$\Pr(P=1) = \Pr\left[\frac{\upsilon}{\sigma_\upsilon} \leq \frac{(1-\tau)x\beta - \alpha_2\gamma - \alpha_1}{\sigma_\upsilon}\right]$$
$$= \Phi\left[\frac{\upsilon}{\sigma_\upsilon} \leq \frac{(1-\tau)x\beta - \alpha_2\gamma - \alpha_1}{\sigma_\upsilon}\right]$$

However, in order to find what $\dfrac{(1-\tau)x\beta - \alpha_2\gamma - \alpha_1}{\sigma_\upsilon}$ is, the variables in the equation need to be found. We know τ, the tax rate is 25% is Latvia. Therefore, the variables

---

[316] Something normally distributed means that it has a bell shaped distribution. Something that has a standard normal distribution has a normal distribution with a mean 0, and a variance of 1, denoted N(0,1)
[317] Random variables with the N(0,1) distribution, denoted by Z, have a cumulative distribution function denoted by Φ. Therefore, the probability that $Z \leq c = \Phi(c)$ (Stock and Watson, 39).

$\dfrac{\beta}{\sigma_v}, \dfrac{\alpha_2}{\sigma_v}, \dfrac{\alpha_1}{\sigma_v}$ can be estimated using a probit regression. This will give the effect of wage on labor participation.

Probit Regression: The Effect of Wage, Education, and Children on Labor Force Participation

lfs	Coef.	Std. Err.	z	P>|z|	95% Conf. Interval	
WAGEITAX	-0.001	0.000	-3.71	0.000	-0.002	-0.001
educat	0.464	0.026	17.52	0.000	0.412	0.516
CHILDN	0.425	0.029	14.65	0.000	0.368	0.482
_cons	-1.049	0.066	-15.9	0.000	-1.178	-0.920

Source: HEIDE Database, The World Bank, 1997-98

```
    ___  ____  ____  ____  ____ tm
   /__    /   ____/   /   ____/
  ___/   /   /___/   /   /___/   10.1   Copyright 1984-2008
   Statistics/Data Analysis         StataCorp
                        4905 Lakeway Drive
                        College Station, Texas 77845 USA
                        800-STATA-PC        http://www.stata.com
                        979-696-4600        stata@stata.com
                        979-696-4601 (fax)
```

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     Serial number: 1910516915
       Licensed to: Chris Sabella
                 Univ of Penn

Notes:
     1. (/m# option or -set memory-) 4.88 MB allocated to data

. use C:\Users\krb-user16\AppData\Local\Temp\Temp1_LATHH.ZIP\LATHH.DTA

. drop if gender == 2
(4410 observations deleted)

. drop if AGE < 25
(86 observations deleted)

. replace lfs = 0 if lfs == 3
(1093 real changes made)

. replace lfs = 0 if lfs == 2
(185 real changes made)

. gen PITAXAGE = (1-.25)*AGE

. gen PITAXAGE2 = (1-.25)*AGE2

. gen NONLABORY = familyy + totpeny + socassy + unempy + othsocy + pritry + othery

. replace wagey = . if lfs == 0
(1278 real changes made, 1278 to missing)

. heckman wagey AGE AGE2 educa, select(AGE AGE2 educa NONLABORY CHILDN)

Iteration 0:   log likelihood = -13531.895
Iteration 1:   log likelihood = -13527.583
Iteration 2:   log likelihood = -13527.401
Iteration 3:   log likelihood = -13527.4

Heckman selection model   Number of obs   =   3194
(regression model with sample selection)   Censored obs   =   1278
                                    Uncensored obs   =   1916

                                Wald chi2(3)   =   188.43
Log likelihood = -13527.4   Prob > chi2   =   0.0000

```
------------------------------------------------------------------------------
          |    Coef.   Std. Err.     z    P>|z|    [95% Conf. Interval]
----------+-------------------------------------------------------------------
wagey     |
      AGE |  3.898506   2.727143    1.43   0.153   -1.446596   9.243608
     AGE2 | -.0312363   .0317081   -0.99   0.325   -.0933831   .0309106
    educat |  54.12978   4.137876   13.08   0.000    46.01969   62.23987
    _cons | -86.8468    61.4364    -1.41   0.157   -207.2599   33.56634
----------+-------------------------------------------------------------------
select    |
      AGE |  .1646233   .0181477    9.07   0.000    .1290544   .2001922
     AGE2 | -.0022389   .0001859  -12.04   0.000   -.0026033  -.0018745
    educat |  .2682636   .0282978    9.48   0.000     .212801   .3237263
 NONLABORY | -.0020653   .0003548   -5.82   0.000   -.0027608  -.0013699
    CHILDN |  .0675066   .0342675    1.97   0.049    .0003436   .1346696
```

```
    _cons |  -2.547142   .4447073   -5.73   0.000   -3.418752  -1.675531
-------------+----------------------------------------------------------------
   /athrho |  -.1546265   .0813673   -1.90   0.057   -.3141035    .0048504
   /lnsigma |   4.969613   .0169522  293.15   0.000    4.936387    5.002838
-------------+----------------------------------------------------------------
       rho |  -.1534059   .0794524                    -.3041656    .0048504
     sigma |   143.9711   2.440623                     139.2662     148.835
    lambda |  -22.08601   11.55836                     -44.73999    .5679624
------------------------------------------------------------------------------
LR test of indep. eqns. (rho = 0):   chi2(1) =    2.19   Prob > chi2 = 0.1393
------------------------------------------------------------------------------

. gen wagecarrot = (3.898506*AGE)+(-.0312363*AGE2)+(54.12978*educa) - 86.8468 if
l
> fs == 0
(1916 missing values generated)

. gen WAGEI = .
(3194 missing values generated)

. replace WAGEI = wagey if lfs == 1
(1916 real changes made)

. replace WAGEI = wagecarrot if lfs == 0
(1278 real changes made)

. gen WAGEITAX = (1-.25)*WAGEI

. prob lfs PITAXAGE PITAXAGE2 WAGEITAX educa CHILDN

Iteration 0:   log likelihood = -2149.7613
Iteration 1:   log likelihood = -1410.7917
Iteration 2:   log likelihood = -1320.6277
Iteration 3:   log likelihood =  -1309.001
Iteration 4:   log likelihood = -1308.7778
Iteration 5:   log likelihood = -1308.7777

Probit regression                       Number of obs   =      3194
                                        LR chi2(5)      =   1681.97
                                        Prob > chi2     =    0.0000
Log likelihood = -1308.7777             Pseudo R2       =    0.3912

------------------------------------------------------------------------------
       lfs |    Coef.   Std. Err.     z    P>|z|    [95% Conf. Interval]
-------------+----------------------------------------------------------------
  PITAXAGE |   .2404037   .0242867    9.90   0.000    .1928026    .2880047
```

```
PITAXAGE2 | -.0032573  .0002477  -13.15  0.000   -.0037429  -.0027717
 WAGEITAX | -.0008492  .0003251   -2.61  0.009   -.0014864  -.0002119
   educat |  .2913997  .0312334    9.33  0.000    .2301834   .352616
   CHILDN |  .0498893  .0340255    1.47  0.143   -.0167994   .116578
    _cons | -2.853505  .4460625   -6.40  0.000   -3.727771  -1.979238
```

Note: 10 failures and 0 successes completely determined.

. prob lfs WAGEITAX educa CHILDN

Iteration 0:   log likelihood = -2149.7613
Iteration 1:   log likelihood = -1816.6116
Iteration 2:   log likelihood = -1809.9957
Iteration 3:   log likelihood = -1809.9818

Probit regression   Number of obs   =   3194
                                       LR chi2(3)   =   679.56
                                       Prob > chi2   =   0.0000
Log likelihood = -1809.9818   Pseudo R2   =   0.1581

----
     lfs | Coef. Std. Err.   z   P>|z| [95% Conf. Interval]
-------------+---
  WAGEITAX | -.0010865 .0002929   -3.71 0.000   -.0016607 -.0005124
   educat | .4641372 .0264911   17.52 0.000   .4122157   .5160587
   CHILDN | .4253114 .0290355   14.65 0.000   .3684028   .48222
    _cons | -1.049016 .0659652 -15.90 0.000   -1.178306 -.9197267

```

**Appendix 3: Fixed Effect Regression: The Effect of the Flat Tax on Macroeconomic Variables**

**Independent Variable**: The Flat Tax
**Dependent Variables**: Constant GDP, the Natural Log of Constant GDP, GDP Growth, Average Consumer Prices, and Percent change of Consumer prices

```
      ___  ____  ____  ____  ____ tm
     /__    /   ____/   /   ____/
    ___/   /   /___/   /   /___/  10.0   Copyright 1984-2007
   Statistics/Data Analysis        StataCorp
                        4905 Lakeway Drive
                        College Station, Texas 77845 USA
                        800-STATA-PC       http://www.stata.com
                        979-696-4600       stata@stata.com
                        979-696-4601 (fax)
```

24-student Stata for Windows (network) perpetual license:
     Serial number: 1910517433
       Licensed to: UPenn Library
                 UPenn Library

Notes:
     1. (/m# option or -set memory-) 1.00 MB allocated to data

. (11 vars, 153 obs pasted into editor)
gen y91=(year==1991)

. gen y92=(year==1992)

. gen y93=(year==1993)

. gen y94=(year==1994)

. gen y95=(year==1995)

. gen y96=(year==1996)

. gen y97=(year==1997)

. gen y98=(year==1998)

. gen y99=(year==1999)

. gen y00=(year==2000)

. gen y01=(year==2001)

. gen y02=(year==2002)

. gen y03=(year==2003)

. gen y04=(year==2004)

. gen y05=(year==2005)

. gen y06=(year==2006)

. gen y07=(year==2007)

. areg gdpconstant d y91 y92 y93 y94 y95 y96 y97 y98 y99 y00 y01 y02 y03 y04 y0
> 5 y06 y07, absorb (country) robust

Linear regression, absorbing indicators   Number of obs =   135
                                          F(17, 109) =   1.00
                                          Prob > F   = 0.4618
                                          R-squared   = 0.9678
                                          Adj R-squared = 0.9604
                                          Root MSE   = 1336.1


```
------------------------------------------------------------------------------
             |               Robust
 gdpconstant |    Coef.   Std. Err.     t    P>|t|    [95% Conf. Interval]
-------------+----------------------------------------------------------------
          d |  987.8814  352.9682    2.80   0.006     288.31     1687.453
        y91 | -738.2672  473.5873   -1.56   0.122   -1676.902    200.3675
        y92 | (dropped)
        y93 | -446.8312  397.5854   -1.12   0.264   -1234.833    341.1702
        y94 | -1072.965  542.0343   -1.98   0.050   -2147.259    1.329748
        y95 | -1287.252  611.4006   -2.11   0.038   -2499.028   -75.47554
        y96 | -1361.374  679.2993   -2.00   0.048   -2707.723   -15.02473
        y97 | -1327.847  653.6942   -2.03   0.045   -2623.447   -32.24601
        y98 | -1331.396  715.6017   -1.86   0.066   -2749.696    86.90308
        y99 | -1229.528  610.7527   -2.01   0.047    -2440.02   -19.03656
        y00 | -1032.862   477.211   -2.16   0.033   -1978.678   -87.04511
        y01 | -1023.531  472.5538   -2.17   0.032   -1960.117   -86.94453
        y02 | -908.8833   452.294   -2.01   0.047   -1805.315   -12.45128
        y03 | -838.4506  472.3306   -1.78   0.079   -1774.595    97.69334
        y04 | -859.4514  575.9256   -1.49   0.139   -2000.917    282.0145
        y05 | -892.4767  765.9421   -1.17   0.246   -2410.549    625.5956
        y06 |  -661.332  924.782    -0.72   0.476    -2494.22    1171.556
```

```
        y07 | -388.0627  1137.767  -0.34  0.734  -2643.081   1866.955
       _cons | 3149.629   381.027   8.27  0.000   2394.446   3904.813
------------+----------------------------------------------------------------
     country | absorbed                              (9 categories)
```

. areg lngdpconstant d y91 y92 y93 y94 y95 y96 y97 y98 y99 y00 y01 y02 y03 y04
> y05 y06 y07, absorb (country) robust

Linear regression, absorbing indicators   Number of obs =   135
                              F(17, 109) =   47.73
                              Prob > F   = 0.0000
                              R-squared   = 0.9985
                              Adj R-squared = 0.9982
                              Root MSE   = .10722

```
------------------------------------------------------------------------------
            |              Robust
lngdpconst~t |    Coef.  Std. Err.    t   P>|t|   [95% Conf. Interval]
------------+----------------------------------------------------------------
          d | -.0300845  .0332009  -0.91  0.367  -.0958875   .0357185
        y91 | -.0905873  .1178873  -0.77  0.444  -.3242361   .1430614
        y92 | (dropped)
        y93 | -.1817699  .1467523  -1.24  0.218  -.4726281   .1090883
        y94 | -.2493644  .1282827  -1.94  0.054  -.5036165   .0048877
        y95 |  -.243105  .1256889  -1.93  0.056  -.4922162   .0060062
        y96 |  -.219146  .1236687  -1.77  0.079  -.4642533   .0259614
        y97 |  -.177759  .1210539  -1.47  0.145  -.4176839   .0621659
        y98 | -.1454835  .1231075  -1.18  0.240  -.3894786   .0985116
        y99 | -.1469642  .1211389  -1.21  0.228  -.3870577   .0931292
        y00 | -.0971353  .1205261  -0.81  0.422  -.3360141   .1417436
        y01 |  -.033733  .1215514  -0.28  0.782  -.2746438   .2071778
        y02 |  .0203457  .1218449   0.17  0.868  -.2211469   .2618384
        y03 |  .0935733  .1234979   0.76  0.450  -.1511955   .3383421
        y04 |  .1755822  .1258539   1.40  0.166  -.0738562   .4250206
        y05 |  .2497877  .1303868   1.92  0.058  -.0086348   .5082101
        y06 |  .3312048  .1316378   2.52  0.013    .070303   .5921066
        y07 |  .4132897  .1320782   3.13  0.002    .151515   .6750643
       _cons | 5.099774   .1150799  44.32  0.000   4.871689   5.327859
------------+----------------------------------------------------------------
     country | absorbed                              (9 categories)
```

. areg growthrate d y91 y92 y93 y94 y95 y96 y97 y98 y99 y00 y01 y02 y03 y04 y05
> y06 y07, absorb (country) robust

Linear regression, absorbing indicators   Number of obs =   127
                              F(16, 101) =   .

```
                          Prob > F     =
                          R-squared    = 0.6290
                          Adj R-squared = 0.5372
                          Root MSE     = .04417
```

```
------------------------------------------------------------------------------
             |            Robust
 growthrate |   Coef.   Std. Err.    t   P>|t|   [95% Conf. Interval]
-------------+----------------------------------------------------------------
         d |  .0197955  .0135011    1.47  0.146   -.0069869    .046578
       y91 |  (dropped)
       y92 | -.1518617        .         .      .        .          .
       y93 | -.1518149  .0382629   -3.97  0.000   -.2277182  -.0759116
       y94 | -.1144721  .0414078   -2.76  0.007   -.1966141  -.0323301
       y95 | -.0605896   .024461   -2.48  0.015   -.1091137  -.0120655
       y96 | -.0391294    .02087   -1.87  0.064    -.08053   .0022712
       y97 | -.0217017   .025896   -0.84  0.404   -.0730725   .0296691
       y98 | -.0482351  .0207862   -2.32  0.022   -.0894692   -.007001
       y99 | -.0608397  .0199847   -3.04  0.003    -.100484  -.0211954
       y00 |   -.00953   .019555   -0.49  0.627   -.0483219   .0292618
       y01 |  -.001499  .0172246   -0.09  0.931    -.035668    .03267
       y02 | -.0074798  .0148185   -0.50  0.615   -.0368757   .0219162
       y03 |  .0061269  .0175393    0.35  0.728   -.0286664   .0409202
       y04 |  .0071663  .0164627    0.44  0.664   -.0254912   .0398238
       y05 | -.0050359  .0163569   -0.31  0.759   -.0374836   .0274118
       y06 |   .008861  .0155071    0.57  0.569   -.0219009   .0396229
       y07 |  .0095289  .0166819    0.57  0.569   -.0235635   .0426212
     _cons |  .0533355  .0150955    3.53  0.001    .0233902   .0832809
-------------+----------------------------------------------------------------
    country |  absorbed                          (9 categories)
```

. areg inflationaverageindex d y91 y92 y93 y94 y95 y96 y97 y98 y99 y00 y01 y02
> y03 y04 y05 y06 y07, absorb (country) robust

Linear regression, absorbing indicators   Number of obs =   136
                          F(17,   110) = 21.33
                          Prob > F   = 0.0000
                          R-squared   = 0.7750
                          Adj R-squared = 0.7238
                          Root MSE   = 37.64

```
------------------------------------------------------------------------------
             |            Robust
inflationa~x |   Coef.   Std. Err.    t   P>|t|   [95% Conf. Interval]
-------------+----------------------------------------------------------------
         d |  47.5685  11.60544    4.10  0.000   24.56923   70.56776
```

```
  y91 |  -34.22176   16.55273   -2.07   0.041   -67.02539   -1.418133
  y92 |  (dropped)
  y93 |   19.39849   18.58037    1.04   0.299   -17.42344    56.22042
  y94 |   14.42051   17.53338    0.82   0.413   -20.32654    49.16755
  y95 |   23.89607   16.16433    1.48   0.142   -8.137839    55.92998
  y96 |   36.80545    16.9429    2.17   0.032    3.228598    70.38229
  y97 |   31.98886   20.35601    1.57   0.119   -8.351972     72.3297
  y98 |   39.43308    19.6419    2.01   0.047    .5074386    78.35873
  y99 |   52.98786   18.82546    2.81   0.006    15.68023     90.2955
  y00 |    67.8732   16.62035    4.08   0.000    34.93556    100.8108
  y01 |    82.7357   14.83566    5.58   0.000    53.33489    112.1365
  y02 |   94.22681   16.08627    5.86   0.000     62.3476     126.106
  y03 |    99.5122   17.60557    5.65   0.000     64.6221    134.4023
  y04 |   100.4205   21.73536    4.62   0.000    57.34615    143.4949
  y05 |   105.0319   21.14874    4.97   0.000    63.12002    146.9437
  y06 |    118.898   23.16041    5.13   0.000    72.99948    164.7965
  y07 |   132.3608   24.40622    5.42   0.000    83.99334    180.7282
 _cons |   13.45215   12.47747    1.08   0.283   -11.27527    38.17957
-------------+----------------------------------------------------------------
  country |  absorbed                               (9 categories)
```

. areg inflationaveragechange d y91 y92 y93 y94 y95 y96 y97 y98 y99 y00 y01 y02
> y03 y04 y05 y06 y07, absorb (country) robust

```
Linear regression, absorbing indicators          Number of obs =     128
                                                 F( 16, 102)  =       .
                                                 Prob > F      =
                                                 R-squared    = 0.4010
                                                 Adj R-squared = 0.2542
                                                 Root MSE      = 371.98


-------------------------------------------------------------------------------
           |              Robust
inflationa~e |    Coef.   Std. Err.    t    P>|t|   [95% Conf. Interval]
-------------+----------------------------------------------------------------
         d |   119.8364   137.9799    0.87   0.387   -153.8461    393.5188
       y91 |  (dropped)
       y92 |    49.265        .         .       .         .           .
       y93 |   1087.898   798.6037    1.36   0.176   -496.1283    2671.925
       y94 |   3.960492   108.7713    0.04   0.971   -211.7869    219.7079
       y95 |    -118.61   86.94411   -1.36   0.176   -291.0632    53.84321
       y96 |  -192.9846   91.22635   -2.12   0.037   -373.9317    -12.0376
       y97 |  -199.1093   100.1973   -1.99   0.050   -397.8501   -.3684249
       y98 |  -209.4179   92.30642   -2.27   0.025   -392.5072   -26.32855
       y99 |  -200.9527   91.87995   -2.19   0.031   -383.1961   -18.70924
       y00 |  -205.7827   91.16781   -2.26   0.026   -386.6136   -24.95175
```

```
   y01 |  -219.9058   96.53944   -2.28   0.025   -411.3913    -28.4203
   y02 |  -231.8868   96.18664   -2.41   0.018   -422.6726   -41.10108
   y03 |  -246.4525   103.2111   -2.39   0.019   -451.1713   -41.73372
   y04 |  -272.7276   121.3908   -2.25   0.027   -513.5057   -31.94949
   y05 |  -298.0695   142.9483   -2.09   0.040   -581.6068    -14.5321
   y06 |  -299.2742    143.096   -2.09   0.039   -583.1045   -15.44402
   y07 |  -299.1732   143.1783   -2.09   0.039   -583.1668   -15.17973
  _cons |   185.1668   84.90502    2.18   0.031    16.75812    353.5755
-------------+----------------------------------------------------------------
  country |   absorbed                                (9 categories)
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