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The Economics of Education

Abstract

A comprehensive survey of the history and contemporary issues in the economics of education, and especially cost effectiveness research. Designed for courses on the economics of education.

Keywords

returns to education, cost-effectiveness

Disciplines

Economics | Educational Assessment, Evaluation, and Research | Education Economics

THE ECONOMICS OF EDUCATION

*Henry M. Levin**

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* William Heard Kilpatrick Professor of Economics and Education, Teachers College, Columbia University and the David Jacks Professor of Higher Education and Economics, Emeritus, Stanford University.

INTRODUCTION

The United States and most other countries devote a huge share of their resources to education. In 2008–09, the U.S. spent considerably more than one trillion dollars in institutional expenditures on education from kindergarten through higher education.¹ What is notable is that this figure does not include preschool or spending on education and training by businesses or the military. Nor does it include private tutoring or the types of specialized lessons provided to children and adults by public and private entities such as the YMCA, Boys and Girls Clubs, and after-school academies. Even so, the official spending statistics accounted for almost eight percent of Gross Domestic Product, a percentage that would surely rise to over ten percent if all educational spending were included, more than one of every ten dollars of national income.² This amount considerably exceeds the spending on the military and is second only to the health care sector. Moreover, this spending has doubled in real terms (adjusted for price level inflation) between 1986–87 and 2008–09.³

Presumably this huge resource commitment is justified by the large benefits of education in generating higher productivity and income, technological and cultural progress, and preparation of the young for adult roles as citizens in the economic, political, and social life of our society.⁴ And it is the challenge that is at the heart of economics, how to allocate a scarcity of overall resources to a multiplicity of competing ends.⁵ When one views the economic side of education, there are many questions that are raised. How much of our national, local, and household resources should be allocated to education? How should education be produced? Who should pay for education? What are the returns to educational investment? What is the role of education in

¹ THOMAS D. SNYDER & SALLY A. DILLOW, DIGEST OF EDUCATION STATISTICS: 2009, at 47 Table 26 (2010), available at <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2010013>.

² *Id.*

³ *Id.* at 48 Table 27.

⁴ See, e.g., AMY GUTMANN, DEMOCRATIC EDUCATION 287 (1987); WALTER W. MCMAHON, HIGHER LEARNING, GREATER GOOD: THE PRIVATE AND SOCIAL BENEFITS OF HIGHER EDUCATION 181, 254–55 (2009).

⁵ This challenge is developed and evaluated in the classic work, LIONEL ROBBINS, AN ESSAY ON THE NATURE AND SIGNIFICANCE OF ECONOMIC SCIENCE 14–15 (2d ed., rev. & extended 1945).

economic growth and development? How can education be used to gain greater economic equality? What are the best ways to finance education for efficient use of resources and equity?

Given the historical magnitude of the resources devoted to education and the important economic issues that arise, it is rather surprising that the field of the economics of education did not emerge until the middle of the twentieth century. For example, distinguished British scholar Mark Blaug prepared a bibliography of reports and publications in the economics of education in 1964.⁶ Education economist Mary Jean Bowman reviewed the entries to this bibliography and found that only fourteen of 420 items were published before 1955 and ninety-one percent of them were published in the period from 1955 to 1964.⁷ How can one explain the sudden explosion of the field?

I. ORIGINS OF THE ECONOMICS OF EDUCATION

Often such fields arise out of historical puzzles that are not readily answered by the current knowledge base. One of the major puzzles in the middle of the twentieth century was how quickly the devastated economies of Europe and Japan were recovering, despite having their productive capacities decimated by the bombings and dislocations of war. After World War II there was a deep concern by the western world that the Soviets would push communism on the weakened states impacted by the devastation.⁸ It was assumed that rapid reconstruction of their economies was considered the best bulwark against Communist influence. At the same time, there was concern by the West that the developing countries of the world would fall to Communist political and militarist groups unless their deep poverty was alleviated through economic growth.⁹ But, in an age where it was assumed that productivity was mainly determined by the quality

⁶ See generally M. BLAUG, A SELECTED ANNOTATED BIBLIOGRAPHY IN THE ECONOMICS OF EDUCATION iii (1964).

⁷ Mary Jean Bowman, *The Human Investment Revolution in Economic Thought*, 39 SOC. EDUC. 111, 111 (1966).

⁸ Barry Eichengreen & Marc Uzan, *The Marshall Plan: Economic Effects and Implications for Eastern Europe and the Former USSR*, 7 ECON. POL'Y 13, 15-16 (1992).

⁹ Catherine Gwin, *U.S. Relations with the World Bank, 1945-1992*, in 2 THE WORLD BANK: ITS FIRST HALF CENTURY 195, 204 (Devesh Kapur, John P. Lewis & Richard Webb eds., 1997) [hereinafter THE WORLD BANK: ITS FIRST HALF CENTURY].

and amount of physical capital per worker in the forms of plant, equipment, and infrastructure, the obvious solution was to buttress the physical, productive capacity of these nations. Exemplified by the Marshall Plan, massive loans of capital were transferred to Western Europe, with private investment also promoted by the U.S. in Japan and elsewhere, both unilaterally and through international organizations such as the World Bank.¹⁰

With the founding of the International Monetary Fund in 1947, there was an international effort to define and collect a uniform set of economic data for all IMF member countries. Given the availability of consistent data, economists began to assess the relationship between growth in the determinants of economic output and the growth in output itself.¹¹ More specifically, economists developed a statistical approach to economic growth accounting that would relate increases in the amount of physical capital and the labor force to increases in economic outcomes such as gross domestic product (GDP) or gross national output (GNP).¹² The initial research on this subject assumed that the relations between additional capital and labor inputs bore a constant relation to economic growth. However, when statistical equations with these inputs were used to predict changes in economic output, the measured growth in the inputs systematically understated the measured growth in output. The magnitude of understatement of economic growth was called the residual and became the subject of debate.¹³ To what degree was the residual due to a failure to account for improvements in the quality of the inputs over time, both capital and labor, or technological changes external to the two major classes of inputs? This debate was not easy to resolve, but it began to call attention to the fact that measuring labor inputs into production in terms of manpower units of employment ignored the fact that the quality of labor and

¹⁰ See generally *id.* at 204 (explaining the development of the World Bank and its approaches to economic growth and development); Eichengreen & Uzan, *supra* note 8, at 14.

¹¹ See, e.g., Robert M. Solow, *Growth Theory and After*, 78 AM. ECON. REV. 307 (1988) (featuring the lecture Robert M. Solow delivered in Stockholm, Sweden on December 8, 1987, when he received the Nobel Prize in Economic Science).

¹² See generally *id.* (summarizing the development and evolution of the economic growth theory).

¹³ *Id.* at 308, 314.

its productivity could improve through education, training, and health.¹⁴ Simply counting the number of persons employed was not adequate to measure changes in the qualitative capacities of the employed labor force at a time when education was rising and health was improving.

Indeed, not only could labor productivity improve over time, but it could be done deliberately through investments in education, training, and health. That is, society could invest in its human population to improve its productivity, much as it could invest in physical capital such as factories, tools, and productive infrastructure.¹⁵ This set of findings and insights became embodied into the theory of human capital of which education and training were the prime investment vehicles.¹⁶ And by making adjustment for the quality of human capital embodied in the population, one could account for the contribution of education to economic growth and even estimate rates of return on educational investments that could be compared with returns of comparable investments in physical capital.¹⁷ These new insights were used to calculate that portion of economic growth that was due to education in both the U.S. and in other industrialized countries.¹⁸ Both studies found that in the first half of the twentieth century a substantial portion of economic growth was attributable to investment in the rise in education of the U.S. labor force. And more recent analyses have suggested that an improvement in the output of educational systems in terms of educational attainments and test scores could add a large increment to national income.¹⁹

¹⁴ Gary S. Becker, *Investment in Human Capital: A Theoretical Analysis*, 70 J. POL. ECON. 9, 31 (1962) [hereinafter Becker, *Investment in Human Capital: Analysis*] (this work is featured in part two of this journal).

¹⁵ See *id.* at 31, 49.

¹⁶ See *id.* at 43.

¹⁷ See Becker, *Investment in Human Capital: Analysis*, *supra* note 14, at 43; Theodore W. Schultz, *Investment in Human Capital*, 51 AM. ECON. REV. 1, 10, 12 (1961) [hereinafter Schultz, *Investment in Human Capital*]; see generally GARY S. BECKER, HUMAN CAPITAL: A THEORETICAL AND EMPIRICAL ANALYSIS, WITH SPECIAL REFERENCE TO EDUCATION (1964) (discussing human capital).

¹⁸ See Edward F. Denison, *Education, Economic Growth, and Gaps in Information* (pt. 2), 70 J. POL. ECON. 124, 124 (1962); Theodore W. Schultz, *Capital Formation by Education*, 68 J. POL. ECON. 571, 571 (1960).

¹⁹ See ROBERT J. BARRO, DETERMINANTS OF ECONOMIC GROWTH: A CROSS-COUNTRY EMPIRICAL STUDY 19 (2d. prt. 1997) (discussing educational attainments); Eric A. Hanushek & Ludger Woessmann, *The Role of Cognitive*

II. RETURNS TO INVESTMENTS IN EDUCATION

As one might expect, the expansion of a field is often attributable to its potential responsiveness in addressing pressing questions. Given the prominence of education as an ingredient to attain both societal goals and personal goals, it is not surprising that the influence of the field and its activities grew. For example, with a framework for calculating how much should be invested in education based upon its costs and returns, a yardstick could be established for determining the desirable volume of educational investment and its distribution among types of education. Related questions could be addressed for individual and family decisions regarding the wisdom of the rather large investment required to obtain a college degree.

A. How Much Should Society and Families Invest in Education?

Although a considerable commitment is made to both government and family investment in education, the question arises as to whether it is too much or too little. The initial contribution of the development of human capital theory was based upon the fact that investments in human capital, generally, and in education, specifically, have both costs and benefits that can be compared in commensurate terms.²⁰ The economic benefits of more education are not only vested in higher productivity and earnings, but also in a wide variety of other benefits including health, mobility, improved child-rearing, family planning, and consumption decisions.²¹ Education also provides benefits to the larger society, so-called external benefits because they extend beyond the direct recipients of education in the form of more effective economic, political, and social interactions that benefit the entire population.²² This suggests

Skills Economic Development, 46 J. ECON. LIT. 607, 613 (2008) (discussing test scores).

²⁰ Schultz, *Investment in Human Capital*, *supra* note 17, at 10–11.

²¹ Robert H. Haveman & Barbara L. Wolfe, *Schooling and Economic Well-Being: The Role of Nonmarket Effects*, 19 J. HUM. RES. 377, 380–81 (1984) (summarizing the benefits of education on economic growth).

²² CLIVE R. BELFIELD & HENRY M. LEVIN, *THE PRICE WE PAY: ECONOMIC AND SOCIAL COSTS OF INADEQUATE EDUCATION* 101 (Clive R. Belfield & Henry M. Levin eds., 2007) [hereinafter *THE PRICE WE PAY*] (examining studies of public investments on behalf of those who are likely to be inadequately educated, and showing that the value of those investments to the taxpayer exceed considerably

that it is possible to estimate private rates of return for the investment that an individual makes in his or her education or social rates of return for the investment that a society makes in education.

One of the main benefits is that of higher earnings for the individual as a result of higher productivity. In competitive labor markets, employers will only pay higher wages in the long run if workers have higher productivity. Workers with more education have consistent advantages in greater employment and earnings.²³ Economists have tested this relation in a number of ways to see if other factors such as ability and social connections can account for these earnings and employment advantages. Even the most sophisticated studies of “earnings functions” show that the differences associated with different educational levels are accounted for consistently by education rather than other explanatory factors associated with education.²⁴ The “additional” earnings from investing incrementally in further education and training are considered to be the benefits of the investment, and these can be compared with costs.²⁵

Costs include the provision of facilities, teachers, and other resources required to produce schooling and the costs that students and families bear to obtain education.²⁶ From the perspective of the individual there are even costs at the elementary and secondary levels in terms of private spending on instructional materials, tutoring or other private expenses beyond the government subsidization of most other direct educational

the costs of those investments).

²³ This interpretation is based upon neo-classical microeconomic theory of competitive labor markets.

²⁴ David Card, *The Causal Effect of Education on Earnings*, in 3 HANDBOOK OF LABOR ECONOMICS 1801, 1806 (O. Ashenfelter & D. Card eds., 1999), available at http://emlab.berkeley.edu/~card/papers/causal_educ_earnings.pdf (providing a concise and clear explanation of the challenges to straightforward interpretation of so-called earnings coefficients for education and the empirical tests).

²⁵ See Becker, *Investment in Human Capital: Analysis*, *supra* note 14, at 27–30 (Becker formulates the relationship between “additional” earnings and the costs associated with investment).

²⁶ Mun C. Tsang, *Cost Analysis for Educational Policymaking: A Review of Cost Studies in Education in Developing Countries*, 58 REV. EDUC. RESEARCH 181, 184 (1988) [hereinafter Tsang, *Review of Cost Studies*]. See Becker, *Investment in Human Capital: Analysis*, *supra* note 14, at 11.

costs.²⁷ In developing countries, even more of the direct costs of education are born by families as private costs.²⁸ But, in addition, to any direct costs, the individual pays an “opportunity cost” or indirect cost in foregoing productive employment during the time period required for classes and study, particularly after adolescence.²⁹ The opportunity costs become especially important at the secondary level and in higher education. For poor families these costs are relatively more burdensome, and especially in impoverished societies and communities, because family survival may depend upon child labor placing pressures on students to drop out of school or to compromise hours of study for devotion to work.³⁰

Given appropriate data, rates of return on educational investment can be established for typical individuals as well as for societies.³¹ Data needs include the expected pattern of earnings for both investing in a higher level of education as well as those associated with the existing level of education, the latter an indicator of opportunity cost for undertaking further study as well as representing the baseline from which additional earnings will be calculated. Because labor markets vary in returns and there are differences by gender and race, these calculations are carried out within specific geographic entities and within different gender and racial groups. The time pattern of investment is taken into account in these calculations which can be done using a short-cut method developed by renowned labor economist Jacob Mincer.³² So-called private rates of return include the direct costs and opportunity costs faced by the individual and are typically less than the full costs which are subsidized by government.³³ Earnings benefits are calculated

²⁷ Becker, *Investment in Human Capital: Analysis*, *supra* note 14, at 36–37.

²⁸ See Mun C. Tsang, *Cost Analysis for Improved Educational Policymaking and Evaluation*, 19 *EDUC. EVALUATION & POL'Y ANALYSIS* 318, 322–23 (1997); Tsang, *Review of Cost Studies*, *supra* note 26, at 189–90.

²⁹ Becker, *Investment in Human Capital: Analysis*, *supra* note 14, at 11.

³⁰ *Id.* at 42.

³¹ Martin Carnoy, *Rates of Return to Education*, in *INTERNATIONAL ENCYCLOPEDIA OF ECONOMICS OF EDUCATION* 364, 364 (Martin Carnoy ed., 2d ed. 1995).

³² JACOB MINCER, *SCHOOLING, EXPERIENCE, AND EARNINGS* 122–25 (1974). Mincer notes that women are less likely to invest than men. This is reflected in the calculated method in the comparative structure of full time earnings. For the exact formula, see *id.* at 123 Table 2.12.

³³ *Id.* at 7–9.

after tax payments to government. Compilations of private rates of return suggest that they are typically ten percent for each additional year of education and highest in low and middle income countries and often higher for females than males.³⁴ In most cases these exceed the return on investments in physical capital, suggesting underinvestment in education as a form of human capital.³⁵

Social rates of return are used to evaluate societal investments and are typically lower than private rates of return because they include the government subsidies and do not include the value of the non-pecuniary social benefits.³⁶ One useful application of social rates of return is that of comparing the value of investments at different levels and for different types of education. For example, countries may wish to compare whether to increase quality or expand the availability of higher education relative to doing so at other levels or investing in vocational education versus general education. Differences in rate of return can be used as guidelines for answering these questions.³⁷ They may also desire to use a comparison of rates of return on different types of investment options for society including education to ascertain priorities for investments of social resources.

III. IMPROVING THE QUALITY OF EDUCATION

Another broad set of questions towards which the economics of education can be addressed include the challenges of improving the quality of education through raising its effectiveness and

³⁴ George Psacharopoulos & Harry A. Patrinos, *Returns to Investment in Education: A Further Update*, 12 EDUC. ECON. 111, 112–13 (2004). Higher rates of return for a demographic group do not mean that absolute earnings are higher. The methodology only compares earnings for adjacent educational levels. All educational levels can be lower for females than males, but if high school graduate earnings are sixty percent of those of comparable males and college graduate earnings are seventy percent, the rate of return is higher for females. See Gary S. Becker & Barry R. Chiswick, *Education and the Distribution of Earnings*, 56 AM. ECON. REV. 358, 358 (1966).

³⁵ In an equilibrium economy, the rates of return on physical and human capital should be comparable, controlling for risk and non-pecuniary returns.

³⁶ MCMAHON, *supra* note 4, at 186.

³⁷ For general patterns by level of education see Psacharopoulos & Patrinos, *supra* note 34, at 112. For criteria and findings of vocational education, see generally George Psacharopoulos, *To Vocationalize or Not to Vocationalize? That is the Curriculum Question*, 33 INT'L REV. EDUC. 187 (1987).

reducing its costs. Virtually all nations wish to find ways to improve the quality and coverage of their educational systems as well as to raise their quality and outcomes. This is particularly true because of the high and rising costs of education.

A. Stagnation in Educational Productivity

Education is beset with rising costs in which costs rise faster than the increase in the general price level.³⁸ In fact, some influential economic analysis views education as an activity that is infected with the “cost disease.”³⁹ The cost disease refers to sectors of the economy that are considered to be technologically stagnant rather than progressive.⁴⁰ In a simplified sense, the economy can be divided into two sectors, one that is technologically progressive and the other, technologically dormant. In the progressive sector there are continuous improvements in technology that respond to rising costs of labor so that over time capital is substituted for labor and less-costly labor is substituted for more costly labor. This process raises the economic productivity of labor, resulting in higher pay per worker.⁴¹

But in the stagnant or non-progressive sectors there are rigidities in production. Because of continuing technological progress in the progressive sector, productivity and wages rise. To attract and retain comparable personnel, wages must also rise in the non-progressive sector. But, the non-progressive sector is unable to raise the productivity compatible with higher wages by shifting to labor-saving techniques such as substituting capital or cheaper labor. The result is that the cost increases for labor from higher labor productivity in the progressive sector must be absorbed by firms in the non-progressive sector, and overall costs

³⁸ See SNYDER & DILLOW, *supra* note 1, at 48 Table 27.

³⁹ William J. Baumol, *Children of Performing Arts, The Economic Dilemma: The Climbing Costs of Health Care and Education*, 20 J. CULTURAL ECON. 183, 183 (1996) [hereinafter Baumol, *Children of Performing Arts*]; William J. Baumol et al., *Unbalanced Growth Revisited: Asymptotic Stagnancy and New Evidence*, 75 AM. ECON. REV. 806, 807 (1985) [hereinafter Baumol et al., *Unbalanced Growth Revisited*].

⁴⁰ Baumol, *Children of Performing Arts, supra* note 39, at 195; Baumol et al., *Unbalanced Growth Revisited, supra* note 39, at 807.

⁴¹ Baumol, *Children of Performing Arts, supra* note 39, at 195.

per unit of output rise rather than falling or remaining constant.⁴²

The classic example of a “non-progressive” activity is the string quartet where a rise in personnel costs cannot be resolved through substituting a machine or a less-skilled musician for one of the four maestros without sacrificing performance and quality. To a large degree education has similar features where the classroom educational process headed by a teacher has been the mode for at least a century.⁴³ Even as the costs of teachers rise, there has been no overall substitution of other inputs for teachers or non-teaching personnel such as counselors. Although such educational technologies as computers, the internet, and classroom aides or assistants have been added over time, they supplement the work of the teacher and classroom activity, but do not replace it.⁴⁴ The effectiveness of more recent strategies such as virtual learning or e-learning has not been widespread, in part, because there is no rigorous evidence that instructional quality can be maintained at a lower cost.⁴⁵ The consequence of this rigidity is that with a fairly fixed approach to educational production and organization, the higher costs of personnel that are bid up in the productive sector are imported into the non-productive one. This problem is exacerbated by the fact that personnel costs represent most of the costs of education.⁴⁶ As a

⁴² *Id.*

⁴³ See LARRY CUBAN, *HOW TEACHERS TAUGHT: CONSTANCY AND CHANGE IN AMERICAN CLASSROOMS 1880–1890* (2d ed. 1993).

⁴⁴ See LARRY CUBAN, *TEACHERS AND MACHINES: THE CLASSROOM USE OF TECHNOLOGY SINCE 1920*, at 2 (1986); LARRY CUBAN, *OVERSOLD AND UNDERUSED: COMPUTERS IN THE CLASSROOM* 14 (2001) (internal citation omitted).

⁴⁵ U.S. DEP’T OF EDUC.: OFF. OF PLANNING, EVALUATION & POL’Y DEV., *EVALUATION OF EVIDENCE-BASED PRACTICES IN ONLINE LEARNING: A META-ANALYSIS AND REVIEW OF ONLINE LEARNING STUDIES* xi-xii (2009), *available at* <http://ctl.sri.com/publications/downloads/EvaluationEvidenceBasedPracticeOnlineLearning.pdf>.

⁴⁶ Surprisingly, there is no authoritative breakdown or source of how much is spent on personnel in education relative to total expenditures. The most recent expenditure breakdowns of the U.S. Department of Education show expenditures by function of which one can surmise what are costs of personnel versus costs of equipment, capital facilities, and other costs. A rough picture emerges from these classifications of personnel costs (teachers, other professional staff, support staff, administrators, and building staff) of about eighty-five percent of total expenditures. See U. S. DEP’T OF EDUC., NAT’L CTR. FOR EDUC. STATISTICS, *REVENUES AND EXPENDITURES FOR PUBLIC ELEMENTARY AND SECONDARY EDUCATION* Table 8 (2008), *available at* <http://nces.ed.gov/pubs2008/expenditures/tables.asp> (providing total expenditures for fiscal year

result, costs in the non-productive sector rise inexorably and without limit and productivity does not budge.

One response to this phenomenon has been to reject the inevitability prescription of the “cost disease” as being inherent to education and to seek ways to make the education sector progressive by raising its productivity. This view is premised on the assumption that the rigidity of the educational production process may be due more to such traditional influences as school culture, collective bargaining, and a lack of information on the productive implications of new approaches rather than the impossibility of substitution of inputs or the absence of more productive approaches.⁴⁷ That is, schools can become more efficient by using teachers, teaching approaches, instructional organization, and technology in more productive ways if such changes can be identified reliably and gain political acceptance by politicians, teachers, parents, and students.⁴⁸ The quest to identify these possibilities has stimulated considerable activity in the economics of education largely through the study of educational production and cost-effectiveness analysis.

The most fundamental approach has been to estimate educational production functions. Just as other goods and services are produced by combining a variety of inputs using a specific technology, educational production can be modeled in this way. Typical school outputs include graduation rates or educational attainments and educational achievement, where the latter is measured by test scores. Since the classic attempt to measure the effectiveness of different school characteristics on achievement in the Coleman Report, economists have added the

2006 for public elementary and secondary education and other related programs). A prominent book on human resources administration in education premises its importance on the assumption that eighty to ninety percent of educational costs are due to personnel, see L. DEAN WEBB & M. SCOTT NORTON, *HUMAN RESOURCES ADMINISTRATION: PERSONNEL ISSUES AND NEED IN EDUCATION* 12 (3d ed. Prentice Hall 1999) (1994).

⁴⁷ See generally J. Stephen Ferris & Edwin G. West, *The Cost Disease and Government Growth: Qualifications to Baumol*, 89 *PUB. CHOICE* 35, 35–52 (1996).

⁴⁸ Some have urged the rise of a culture of entrepreneurship throughout the education industry, but it appears that even new suppliers show little evidence of “breakthroughs” in raising productivity and reducing costs. See *EDUCATIONAL ENTREPRENEURSHIP: REALITIES, CHALLENGES, POSSIBILITIES* 2–3, 244–45 (Frederick M. Hess ed., 2006) (noting different perspectives on this issue).

educational production function to their repertoire.⁴⁹ A general expression for an educational production function is:

$$\text{Achievement} = f(\text{student characteristics, teacher characteristics, school and program characteristics, and peer characteristics}).^{50}$$

Achievement was usually measured by student test scores, but as data has become available on longitudinal gains in student achievement, the achievement variable is based upon changes in achievement for each student over a period of time, so-called value-added measures.⁵¹ Student characteristics refer primarily to family demographic and socio-economic variables such as parental education, occupation, and income which affect educational preparation and progress.⁵² Teacher characteristics usually include teacher certification, educational attainment or degree, and experience, but may include such dimensions as teacher's field of study, selectivity of the teacher's undergraduate institution, and teacher test scores.⁵³ School resources refer to such facilities as libraries, laboratories and computers, class size or pupil/teacher ratio, and curriculum or program of study.⁵⁴ Peers refer to the educational performance, socioeconomic status, and educational preparation of other students in the school.⁵⁵ Recent studies have focused on the demographic and educational characteristics of school enrollments as both an educational influence on individual students as well as a school feature that attracts better teachers and administrators.⁵⁶ Data is collected on

⁴⁹ See JAMES S. COLEMAN ET AL., U.S. DEP'T OF HEALTH, EDUC. AND WELFARE, EQUALITY OF EDUCATIONAL OPPORTUNITY 3, 21–22 (1966) (finding that, despite the wide disparity in public education between races and continuing segregation, differences in school characteristics have an overall small impact on student achievement, but affect minority students more than white students).

⁵⁰ See *id.* at 21–22 (providing a discussion of the above characteristics).

⁵¹ See Eric A. Hanushek, *Education Production Functions: Evidence from Developed Countries*, in ECONOMICS OF EDUCATION 132 (Dominic J. Brewer & Patrick J. McEwan eds., 2010) [hereinafter ECONOMICS OF EDUCATION].

⁵² See *id.* The profound impact of socioeconomic background is emphasized in RICHARD ROTHSTEIN, CLASS AND SCHOOLS: USING SOCIAL, ECONOMIC, AND EDUCATIONAL REFORM TO CLOSE THE ACHIEVEMENT GAP (2004). See also Henry M. Levin & Clive R. Belfield, *Families as Contractual Partners in Education*, 49 UCLA L. REV. 1799–1824 (2002).

⁵³ See Hanushek, *Education Production Functions*, *supra* note 51, at 132.

⁵⁴ *Id.*

⁵⁵ *Id.*

⁵⁶ See generally Charles Clotfelter et al., *High-Poverty Schools and the*

each of these inputs and used to estimate statistically their apparent impacts on educational outcomes. Presumably this information can be used to guide school policy to shift to more effective inputs, practices, and programs, those that have larger impacts on educational achievement relative to their costs.

Education expert Eric Hanushek has published summaries of the findings of these studies to learn if there are consistent patterns among the results.⁵⁷ He concluded that the patterns are not consistent and that the allocation of funding to most of the standard inputs (particularly conventional teacher qualifications and reductions in class size) is unlikely to improve educational outcomes.⁵⁸ More specifically his research concludes that additional dollars allocated to education will be ineffective in raising educational achievement, and particularly the economically disadvantaged, a group that has particularly low educational achievement. These findings of alleged wasteful spending have been used as evidence to counter the legal challenge that states need to spend more to meet their responsibilities to provide the “adequate education” guaranteed by their constitutional language.⁵⁹

Other researchers have analyzed the same studies and found that the statistical patterns support a positive relation between resources and spending, on the one hand, and educational achievement, on the other. They also point out that consistent patterns of results should only be expected in repeated

Distribution of Teachers and Principals, 85 N.C. L. REV. 1345, 1356–57, 1361–62 (2007) (showing evidence on the relation between demographics of students, teachers, and principal qualifications); Eric A. Hanushek et al., *Does Peer Ability Affect Student Achievement?*, 18 J. APPLIED ECONOMETRICS 527, 527–28 (2003) (providing a sophisticated study of the impact of peers on student achievement).

⁵⁷ Eric A. Hanushek, *The Economics of Schooling: Production and Efficiency in Public Schools*, 24 J. ECON. LITERATURE 1141, 1142 (1986); see Hanushek, *Education Production Functions*, *supra* note 51, at 132–34. For developing countries, see P. Glewwe & S. Lambert, *Education Production Functions: Evidence from Developing Countries*, in *ECONOMICS OF EDUCATION*, *supra* note 51, at 137, 146.

⁵⁸ Eric A. Hanushek, *The Failure of Input-Based Schooling Policies*, 113 ECON. J. F64, F66–67 (2003); see Hanushek, *The Economics of Schooling*, *supra* note 57, at 1141–42.

⁵⁹ Compare Michael A. Rebell, *Poverty, “Meaningful” Educational Opportunity, and the Necessary Role of the Courts*, 85 N.C. L. REV. 1467, 1479–81, 84–85 (2007), with ERIC A. HANUSHEK & ALFRED A. LINDSETH, *SCHOOLHOUSES, COURTHOUSES, AND STATEHOUSES: SOLVING THE FUNDING-ACHIEVEMENT PUZZLE IN AMERICA’S PUBLIC SCHOOLS* 82, 95 (2009).

replications of the same study. The potpourri of studies summarized by Hanushek are highly diverse in terms of geographical context, political entity, student population, grade level, subject, input variables and their measures, and time period and are far from replications of the same study.⁶⁰ For example, Greenwald, Hedges, and Laine suggest that these differences should be respected in guiding educational policy rather than seeking a “universal” set of policies.⁶¹ In analyzing the same set of studies, they conclude that a statistically significant finding of important magnitude is that expenditures are found to make a positive difference and that different schools use their funding in different ways to improve achievement.⁶²

B. Teacher Effectiveness

One of the most puzzling findings of the educational production function studies has been the absence of evidence that the specific characteristics of teachers that are used for licensure, hiring, and salary increases bear close relations to student achievement.⁶³ This finding is particularly salient because teacher quality is presumably the most important input for student learning, and teacher quality has been measured traditionally in terms of certification, education and experience.⁶⁴ Of these measures, only teacher experience is found to be statistically important in educational production functions, and generally only during the first five years of teaching.⁶⁵ The lack of findings on what makes teachers effective is even more puzzling, given the ostensibly large differences in student performance associated with individual teachers.⁶⁶ While more effective teachers can be

⁶⁰ Compare Eric A. Hanushek, *The Impact of Differential Expenditures on School Performance*, 18 EDUC. RESEARCHER 45, 45–46 (1989), with Rob Greenwald, Larry V. Hedges & Richard D. Laine, *The Effect of School Resources on Student Achievement*, 66 REV. EDUC. RES. 361, 361–62 (1996).

⁶¹ Greenwald, Hedges & Laine, *supra* note 60, at 362, 385–86.

⁶² *Id.* at 384.

⁶³ See Eric A. Hanushek & Steven G. Rivkin, *How to Improve the Supply of High-Quality Teachers*, 7 BROOKINGS PAPERS ON EDUC. POL'Y 7 (2004).

⁶⁴ Hanushek, *The Impact of Differential Expenditures on School Performance*, *supra* note 60, at 46–47.

⁶⁵ See Tara Bételle & Susanna Loeb, *Teacher Quality and Teacher Labor Markets*, in HANDBOOK OF EDUCATION POLICY RESEARCH 596, 597 (Gary Sykes et al. eds., 2009).

⁶⁶ See Steven G. Rivkin, Eric A. Hanushek & John F. Kain, *Teachers*,

identified by their student test score gains, their effectiveness seems unrelated or little related to the traditional measures of teacher “qualifications.”⁶⁷ At most we know teacher effectiveness was found to be statistically related to the early years of experience, a major in mathematics for mathematics teachers, quality of the undergraduate institution attended, and teacher test scores.⁶⁸ But, even these taken together have little predictive value in terms of student achievement.

The result is that economics of education research has concluded that it is best to evaluate and reward teachers by measuring their performance directly rather than assuming that licensure, experience, and educational degree will predict performance.⁶⁹ One approach is to set out initial salaries that will attract a large pool of applicants and to choose those who are most promising on the basis of field of study, quality of undergraduate institution, recommendations, pertinence of previous experiences, and preparation and delivery of a sample lesson. New teachers would be observed, mentored and coached, and provided with opportunities to improve their effectiveness. They would be evaluated periodically and over several years on both their classroom and school activities (e.g. curriculum preparation) as well as the “value-added” in achievement among their students. Based upon these results their salaries would be adjusted to correspond with their proficiencies, and longer run contracts or career tenure would be established for them. Periodically, their salaries would be adjusted based upon their performance with the provision of continuing opportunities to more fully develop their professional capacities and effectiveness. Salaries, benefits, and responsibilities would become largely performance-based rather than resting upon traditional qualifications. And, incentive-based pay could also be used to reward principals and individual schools on their academic success, although the early experimental studies with such incentives have shown inconclusive results.⁷⁰

Schools, and Academic Achievement, 73 *ECONOMETRICA* 417, 419, 421 (2005).

⁶⁷ Andrew J. Wayne & Peter Youngs, *Teacher Characteristics and Student Achievement Gains: A Review*, 73 *REV. EDUC. RES.* 89, 107–08 (2003).

⁶⁸ *Id.* at 107.

⁶⁹ *See id.*

⁷⁰ The specific design of such incentives and the parameters of their evaluation must be taken into account in evaluating such incentives. *See* Mathew G. Springer, *Rethinking Teacher Compensation Policies: Why Now, Why*

However, it is important to point out that direct measures of teacher performance are not fully straightforward. The most common such measures are principal's or supervisor's (e.g. department heads) evaluations based upon classroom observations and evaluations of teachers' contributions to curriculum development, school leadership, or achievement gains in student test scores.⁷¹ Both measures have challenges. Some principals and supervisors are more skilled and conscientious than others as evaluators and their performance criteria may differ according to their expertise and subjective judgments, resulting in potentially widespread variance in ratings of the same teacher. At the same time the matter of using only "value-added" in student achievement as a measure has its own statistical risks and is often based upon very limited achievement measures in terms of the subjects tested and what is measured by the test instruments.⁷² A careful study of principals' evaluations of teachers finds that they are able to identify high and low performers in terms of student value-added, but show much less ability to discriminate among those teachers in the middle of the value-added distribution.⁷³

C. Teacher Labor Markets

The importance of teachers in determining educational results has stimulated studies of teacher labor markets.⁷⁴ In particular, there has been interest in who becomes a teacher and what kinds of salaries and benefits are necessary to obtain adequate numbers of teachers with appropriate backgrounds. Historically, teachers

Again?, in PERFORMANCE INCENTIVES: THEIR GROWING IMPACT ON AMERICAN K-12 EDUCATION 1, 1 (Matthew G. Springer ed., 2009).

⁷¹ See Brian A. Jacobs & Lars Lefgren, *Can Principals Identify Effective Teachers? Evidence on Subjective Performance Evaluation in Education*, 26 J. LAB. ECON. 101, 105 (2008).

⁷² See generally Sean P. Corcoran, *Can Teachers Be Evaluated by Their Students' Test Scores? Should They Be? The Use of Value-Added Measures of Teacher Effectiveness in Policy and Practice*, in EDUCATION CHALLENGES FACING NEW YORK CITY 21–23 (2010); Douglas N. Harris, *Would Accountability Based on Teacher Value Added Be Smart Policy? An Examination of the Statistical Properties and Policy Alternatives*, 4 EDUC. FIN. & POL'Y 319, 333–35 (2009), available at <http://www.mitpressjournals.org/doi/abs/10.1162/edfp.2009.4.4.319>.

⁷³ Jacobs & Lefgren, *supra* note 71, at 101.

⁷⁴ See generally Hamilton Lankford & James Wyckoff, *Teacher Labor Markets: An Overview*, in ECONOMICS OF EDUCATION, *supra* note 51, at 235.

have been paid according to their certification, degree, and experience, but differences in field of study, difficulty of school assignment, and teacher performance have not been rewarded.⁷⁵ Economists have noted that persistent teacher shortages by subject specialty, particularly in mathematics and the physical sciences are associated with the higher salaries and benefits that attract such specialists outside of teaching.⁷⁶ The higher the “opportunity cost” of entering teaching, the more that an individual must receive in teaching to overcome that cost. Studies of the relative salaries of persons who have specialized in scientific subjects and mathematics confirm the relationship between teacher shortages in these subjects and the need for higher salaries for such specialists.⁷⁷ Today this insight has been extended to teacher hiring policies in many school districts as well as the practice of providing bonuses to teachers who take positions in “hard to staff” schools, such as those in dangerous neighborhoods.⁷⁸ In the last decade the considerable availability of detailed data on teachers and the use of sophisticated statistical economic analysis of teacher labor markets have provided a plethora of new insights on teacher policy.⁷⁹

D. Cost-Effectiveness Analysis

In addition to exploring the effectiveness of different educational inputs, the economics of education has also utilized other types of studies to understand the impacts of different resources and programs. For example, economists have drawn upon experimental studies of reductions in class size and the use of computers in instruction.⁸⁰ Educational researchers have

⁷⁵ See generally Springer, *supra* note 70, at 1.

⁷⁶ Russell W. Rumberger, *The Impact of Salary Differentials on Teacher Shortages and Turnover: The Case of Mathematics and Science Teachers*, 6 ECON. EDUC. REV. 389, 389–90 (1987).

⁷⁷ *Id.* at 398.

⁷⁸ CYNTHIA D. PRINCE, HIGHER PAY IN HARD TO STAFF SCHOOLS: THE CASE FOR FINANCIAL INCENTIVES 36, 38–39 (2003).

⁷⁹ See generally Bêteille & Loeb, *supra* note 65 (discussing the research and evidence on teacher labor markets).

⁸⁰ See Alan B. Krueger, *Economic Considerations and Class Size*, 113 ECON. J. F-34, F-34–F-36 (2003); Lisa Barrow et al., *Technology’s Edge: The Educational Benefits of Computer-Aided Instruction*, 1 AM. ECON. J.: ECON. POLY 52, 52, 73 (2009). See generally WILLAM R. SHADISH ET AL., EXPERIMENTAL AND QUASI-EXPERIMENTAL DESIGNS FOR GENERALIZED CAUSAL INFERENCE (2002)

provided useful findings from experimental or quasi-experimental studies designed to ascertain the effects of interventions such as different curricula, computer software, teacher professional development, after-school programs, tutoring, and a variety of different approaches to school improvement. These results have been reviewed for their rigor and summarized by the National Center for Educational Statistics of the U.S. Department of Education under its "What Works Clearinghouse," an attempt to summarize and compare the effectiveness of different educational strategies.⁸¹

Somewhat surprisingly, this major effort to uncover effectiveness of different educational policies and actions is not matched by a careful attempt to determine their cost-effectiveness. Different approaches are associated not only with different impacts on outcomes such as educational achievement or graduation rates, two typical educational outcomes, but they also have different costs. It may be far superior to adopt a strategy for school improvement that has moderate effects and low cost over a strategy that shows larger effectiveness, but, proportionately higher costs. Cost-effectiveness analysis represents an attempt to choose approaches to educational improvement that allow the largest educational result for any resource constraint. By identifying those interventions that have the largest educational effectiveness per dollar, it is possible to maximize the impact of a given budget.

Obtaining accurate and comparable measures of the costs of educational strategies to combine with their effectiveness allows cost-effectiveness assessments to be made.⁸² But, cost analysis must be done as carefully as effectiveness analysis. Accurate costs require the use of a systematic cost methodology, which identifies the specific resources or ingredients for each intervention under scrutiny.⁸³ This approach has been used to compare alternatives such as longer school days, smaller classes, computer-assisted instruction, and peer tutoring.⁸⁴ But in most

(discussing the design and interpretation of these types of studies).

⁸¹ U.S. DEPT OF EDUC.: INST. OF EDUC. SCI., WHAT WORKS CLEARINGHOUSE, <http://ies.ed.gov/ncee/wwc/> (last visited May 6, 2011).

⁸² See HENRY M. LEVIN & PATRICK J. MCEWAN, COST-EFFECTIVENESS ANALYSIS: METHODS AND APPLICATIONS 10 (2d ed. 2001).

⁸³ *Id.* at 47.

⁸⁴ Henry M. Levin et al., *Cost-Effectiveness of Computer-Assisted Instruction*, 11 EVAL. REV. 50, 50–51 (1987).

cases only the effectiveness of educational alternatives are estimated without consideration of costs or with costs based upon haphazard procedures or indeterminate methods. The neglect of costs in such analyses has limited the presence of cost-effectiveness comparisons in the literature and left a wide chasm to be filled.⁸⁵ It is particularly ironic that at a time of severe cuts in budgets because of economic crisis and accompanying pressures to vastly improve education that there are not greater demands for cost-effectiveness analysis of options.

E. Cost-Benefit Analysis

A related form of analysis for comparing investments in education is that of cost-benefit analysis.⁸⁶ Often the question for public policy is whether a particular program is worth the investment, that is, do the benefits justify the costs? And, among those alternatives where benefits exceed costs, which option has the highest benefits relative to costs? This latter question can guide spending priorities. Cost-effectiveness analysis only compares the cost of educational alternatives for reaching particular educational goals such as raising graduation rates or student achievement. But, cost-benefit analysis carries this one step farther by comparing the monetary benefits of the results of an investment directly with the costs.⁸⁷

Rate of return analysis on investments in human capital and education, the initial application for evaluating human capital investment, represents one form of benefit-cost analysis. As noted earlier, both the direct costs of providing education and the foregone earnings or opportunity costs of the student are taken into account and compared with the additional earnings generated by the educational resources to calculate rates of return. Benefits and costs can also be compared by obtaining their "present values" at the time of the proposed investment.⁸⁸ Both costs are committed and benefits are yielded over time, so present-value analysis refers to discounting future costs and benefits at a rate of interest that reduces the value of future

⁸⁵ Henry M. Levin, *Waiting for Godot: Cost-Effectiveness Analysis in Education*, 90 *NEW DIRECTIONS FOR EVALUATION* 55, 57 (2001).

⁸⁶ Henry M. Levin & Clive Belfield, *Cost-Benefit Analysis and Cost-Effectiveness Analysis*, in *ECONOMICS OF EDUCATION*, *supra* note 51, at 197.

⁸⁷ *Id.*

⁸⁸ *Id.*

disbursements and payments relative to ones that occur nearer to the present.⁸⁹ One can take the present value of the benefits and compare them with the present value of costs to see if benefits exceed costs and by how much. Either rate of return on educational investment or net present value can be compared with the comparable measures of profitability for investments in physical capital to see which is likely to yield a higher return.⁹⁰

But, benefit-cost analysis can also be used to evaluate specific social investments to see if their benefits exceed costs. One of the most prominent areas of study has been that of preschools, especially for children from low-income households. Presumably, good early childhood education will not only improve the foundation for later learning, but the educational gains will also reduce grade repetition, special educational placements, and juvenile crime, and may later improve high school graduation and post-secondary participation, as well as contributing to higher incomes, fewer teen pregnancies, and lower public assistance.⁹¹ All of these outcomes provide benefits to society and/or the individual who receives quality preschooling.

To the degree that one can put monetary values on the benefits, they can be compared with the costs of preschool. Researchers have carried out experimental and quasi-experimental research and followed up with the children over two decades periods or more to ascertain the consequences of a quality preschool education to weigh the results in a benefit-cost framework.⁹² One of the most extensive of these studies was the evaluation of the Perry Preschool,⁹³ an important model for preparing students from low-income families for school success. In 1963 and 1964, three and four-year-old children were randomly assigned to either the treatment group of preschool intervention or a control group that did not receive the intervention in an inner-city.⁹⁴ Students were surveyed periodically during their school careers and into adulthood, and

⁸⁹ Carnoy, *supra* note 31, at 364.

⁹⁰ LEVIN & MCEWAN, *supra* note 82, at 175–76, 178–79.

⁹¹ Milagros Nores, *The Economics of Early Childhood Interventions*, in ECONOMICS OF EDUCATION, *supra* note 51, at 191, 193, 195.

⁹² *Id.*

⁹³ Clive R. Belfield et al., *The High/Scope Perry Preschool Program: Cost-Benefit Analysis Using Data from the Age-40 Followup*, 41 J. HUM. RESOURCES 162, 164 (2006).

⁹⁴ *Id.*

subsequent evaluations were done of the educational and life outcomes of both groups to age forty. The students in the Perry Preschool program required fewer later educational interventions such as repeating grades or special education, they were less likely to be engaged in crime or receive public assistance, they had better adolescent test results and were more likely to graduate from high school and go to post-secondary education, and they had higher earnings and paid more taxes.⁹⁵ For every one dollar invested, the investment paid almost thirteen dollars, a benefit-cost ratio of 13 to 1.⁹⁶ And most of the benefits went to the taxpayer in the form of higher tax revenues and lower publicly-supported costs associated with the group that had received the intervention.⁹⁷

The benefit-cost method has also been applied to increasing high school graduation rates in the United States. A search for rigorous evaluations of educational interventions that reduced dropouts identified five interventions that showed evidence of increasing high school graduation. These included two early childhood or preschool interventions, class size reduction in the early grades, a high school educational reform, and increased teacher salaries (to obtain a higher quality teaching force). Associated with each reform was a cost for each additional graduate obtained, allowing for cost-effectiveness comparisons of the five interventions. But the analysis was extended to comparing the fiscal costs of each intervention as a public sector investment to the fiscal benefits that were expected to be returned to the taxpayer from the additional high school completions.

Estimates were made of higher earnings and resultant increases in tax revenues and the lower public costs of health, public assistance, and the criminal justice system. In each case an attempt was made to establish unique and causal relations between high school completion and the outcomes, taking account of other factors that can influence high school graduation rates.⁹⁸

⁹⁵ *Id.* at 164, 166, 169, 174.

⁹⁶ *Id.* at 179.

⁹⁷ *Id.* at 166, 169, 174.

⁹⁸ The impacts of high school graduation on labor markets, health status and costs, criminal justice and costs and public assistance and costs are discussed in Cecilia Elena Rouse, *Consequences for the Labor Market*, in *THE PRICE WE PAY*, *supra* note 22, at 99; Peter Muennig, *Consequences in Health Status and Costs*, in *THE PRICE WE PAY*, *supra* note 22, at 125; Enrico Moretti, *Crime and the Costs*

The overall result was that all five interventions showed benefit gains to the taxpayer that exceeded the costs of the investments, benefits as much as 3.5 times the costs.⁹⁹ When the present values of investment costs at age twenty for each additional graduate were subtracted from the present values of the costs of each intervention, the net benefits were found to be substantial.¹⁰⁰ For example, the median net value per additional graduate was estimated to be about \$127,000, the equivalent of each new graduate providing a repayment of the original investment as well as an additional payment of \$127,000 as a return on that investment to the taxpayers.¹⁰¹ Improving the education of students who have not traditionally obtained an adequate education not only improves educational equity, but it is also a highly profitable investment for society.

IV. FINANCING EDUCATION

Financing education is a particularly thorny issue at all levels and in most societies. Economics of Education responds to three policy questions typically raised about educational finance: adequacy, efficiency, and equity. Adequacy refers to the level of investment that is required to meet a standard, especially state constitutional standards that are specified at the elementary and secondary levels.¹⁰² Efficiency refers to the most efficient use of social and taxpayer resources, that the ability to attain a given level of educational effectiveness at the least sacrifice in terms of the value of resources required.¹⁰³ The educational production function and cost-effectiveness/cost-benefit studies in education are devoted towards this goal. Equity refers to fairness or justice

of Criminal Justice, in *THE PRICE WE PAY*, *supra* note 22, at 142; Jane Waldfogel et al., *Welfare and the Costs of Public Assistance*, in *THE PRICE WE PAY*, *supra* note 22, at 160.

⁹⁹ See Rouse, *supra* note 98, at 119; Muennig, *supra* note 98, at 136; Moretti, *supra* note 98, at 157–58; Waldfogel et al., *supra* note 98, at 173; Henry M. Levin & Clive Belfield, *Educational Interventions to Raise High School Graduation Rates*, in *THE PRICE WE PAY*, *supra* note 22, at 195 Table 9-6.

¹⁰⁰ See Levin & Belfield, *supra* note 99, at 194.

¹⁰¹ *Id.* at 195 Table 9-6. For results regarding black males, see Henry M. Levin et al., *The Public Returns to Public Educational Investments in African-American Males*, 26 *ECON. EDUC. REV.* 700, 703 Table 2 (2007).

¹⁰² See J.K. Rice et al., *Economic Approaches to Adequacy*, in *ECONOMICS OF EDUCATION*, *supra* note 51, at 215, 217–18.

¹⁰³ See *id.*

in the distribution of educational access, resources, and outcomes.¹⁰⁴ Who receives access to educational opportunities and quality educational resources and results? All three of these are related in the sense that any educational finance system that is selected has direct consequences for each and can be evaluated according to the criteria of adequacy, efficiency, and equity. In recent years, much activity in the economics of education has been devoted to consideration of new methods of financing education using the adequacy, equity, and efficiency criteria.

A. *Financing Educational Adequacy*

Most states have constitutions that call not just for a general system of schools, but also a declaration of the purpose and goals of the schooling system. Typically this is charged to the state legislatures. State legislation, then, translates the constitutional language into school operations, all states but Hawaii setting out decentralized strategies and local educational agencies that actually operate the schools according to the laws and regulatory apparatus set out by the states.¹⁰⁵ Monitoring of school operations is typically carried out by a state administrative body such as a state department of education, to make sure that local educational agencies or school districts are in compliance with the law. Of course, schools must be funded. Although states differ in the specifics, the funding of education typically combines sources from both state and local levels in addition to revenues received from the federal government that are targeted to specific activities underwritten by that level of government.¹⁰⁶

Since many local governments show vast differences in property tax wealth, the present funding designs typically

¹⁰⁴ *See id.*

¹⁰⁵ Henry M. Levin, *On the Relationship Between Poverty and Curriculum*, 85 N.C. L. REV. 1381, 1390 (2007); Stephen B. Lawton, *States and Education—State Administrative Services in Education*, EDUC. ENCYCLOPEDIA—STATEUNIVERSITY.COM, <http://education.stateuniversity.com/pages/2449/States-Education-STATE-ADMINISTRATIVE-SERVICES-IN-EDUCATION.html> (last visited May 6, 2011).

¹⁰⁶ In Fiscal Year 2006, about 44.4 percent of elementary-secondary revenues came from local sources, mainly property taxes; 46.5 percent came from state sources; and less than ten percent came from federal sources. *See* NAT'L CENTER FOR EDUC. STATS., DIGEST OF EDUCATION STATISTICS: 2008 Table 1, *available at* http://nces.ed.gov/pubs2008/expenditures/tables/table_01.asp (last visited May 6, 2011).

produce less revenue per child in poorer entities than in richer ones. States supplement these differences with “equalization” grants, but there is still an ongoing debate in many states on how much funding is needed to meet the adequacy requirements of state constitutions.¹⁰⁷ It is well known that even equal spending will not provide the same educational outcomes or appropriate learning conditions for students from minority, immigrant, and low socioeconomic backgrounds as for other students.¹⁰⁸ But, the question is what level of spending would meet the constitutional requirements of adequacy for all students and different groups of students?

To answer those questions, a number of different types of studies have been undertaken by economists including professional judgment panels of experts specifying educational programs with economists determining their costs; economic studies of the costs of exemplary programs that seem to be meeting adequate standards; and cost studies that attempt to link educational outcomes more generally to costs.¹⁰⁹ Such cost-quality studies provide a guideline for the courts and legislatures on determining the financial arrangements for reaching adequacy levels of education for specific demographic groups.¹¹⁰

B. Financing an Educational Marketplace for Efficiency

The high and rising costs of education and poor educational results for some populations and some schools has led to a quest for alternative forms of educational financing that might increase both the efficiency and equity of the educational system.

¹⁰⁷ See Robert Berne & Leanna Stiefel, *Concepts of School Finance Equity: 1970 to the Present*, in *EQUITY AND ADEQUACY IN EDUCATION FINANCE: ISSUES AND PERSPECTIVES* 7, 17 (Helen F. Ladd, Rosemary Chalk & Janet S. Hansen eds., 1999).

¹⁰⁸ See Levin, *On the Relationship Between Poverty and Curriculum*, *supra* note 105, at 1384.

¹⁰⁹ See Bruce D. Baker, *The Emerging Shape of Educational Adequacy: From Theoretical Assumptions to Empirical Evidence*, 30 *J. EDUC. FIN.* 259, 259 (2005); William Duncombe & John Yinger, *How Much More Does a Disadvantaged Student Cost?*, 24 *ECON. EDUC. REV.* 513, 513 (2005).

¹¹⁰ A summary of the larger picture of school finance reform is found in T. Downes, *School Finance Reform*, in *ECONOMICS OF EDUCATION*, *supra* note 51, at 221. For an overview of economics research on adequacy, see Jennifer Imazeki, *Economic Approaches to Adequacy*, in *ECONOMICS OF EDUCATION*, *supra* note 51, at 202.

Foremost among these is the proposal of Milton Friedman (another Nobel prizewinner) in his 1962 article on *The Role of Government in Education*.¹¹¹ Friedman asks two basic questions about educational finance. First, who should pay for education? Second, who should provide education?

Friedman concluded that basic education preparing students for literacy and democracy should be paid for by the government because of its external benefits to all of society in inculcating in students a common set of values and behaviors that are necessary for a well-functioning democratic society.¹¹² Externalities, or what Friedman called “neighborhood benefits,” are those received by the broader population from preparing a well-educated populace that improves more generally the political, economic, and social life of a society and its major institutions.¹¹³

But, Friedman concluded that government should not operate schools, but rather relegate the production and distribution of education to an educational marketplace in which schools compete for students and parents choose schools for their offspring rather than students being rigidly assigned to schools in their neighborhoods or attendance zones.¹¹⁴ His view was that the marketplace would create incentives to better meet parental values and concerns about the education of their children than what he referred to as the “government monopoly.”¹¹⁵ He also believed that this approach would advance overall efficiency in education as schools had incentives to discover ways to improve education using technology and other approaches. Further, he concluded that educational equity would improve through choice, since families could choose schools outside of their neighborhoods, and new schools would enter the marketplace within their present communities.¹¹⁶

The mechanism for accomplishing this was the educational voucher. Schools would no longer receive direct subsidies, but parents would be given a voucher that could be redeemed at any “approved” school, one that had met curriculum and other potential criteria for teaching the values required in a democracy.

¹¹¹ Milton Friedman, *The Role of Government in Education*, in CAPITALISM AND FREEDOM 85, 89 (Milton Friedman & Rose D. Friedman eds., 1962).

¹¹² *Id.* at 86.

¹¹³ *Id.*

¹¹⁴ *Id.* at 89, 93.

¹¹⁵ *Id.* at 93.

¹¹⁶ *Id.* at 91.

For-profit and not-for-profit schools could compete for student enrollments and vouchers. For schools charging tuition that is higher than the voucher, parents could supplement the voucher out of their own resources, and schools would be able to choose the students whom they wished to admit. Presumably, the government role would be minimal, setting approval standards and certifying schools for approval and funding the vouchers, but not managing and operating schools or regulating them beyond the approval standards.

In more recent years, a number of states have sponsored educational voucher plans, generally limited to low-income students or to students with disabilities.¹¹⁷ Chile has adopted a nation-wide voucher system for financing its schools, and Sweden has a voucher-like system.¹¹⁸ Economists have attempted to evaluate both the arguments supporting educational vouchers and the empirical evidence on their effectiveness. On the first of these there is concern that with parents able to spend more than the voucher and schools able to choose their own students that the separation and stratification of students by income will increase, even relative to the present neighborhood school stratification.¹¹⁹ But, educational voucher plans can also be constructed that are limited to the poor or provide larger vouchers for the poor and that establish regulations on curriculum, personnel, admissions, and testing in the name of equity and that provide information and transportation, provisions that were not part of the Friedman plan. At this point the evaluations of educational voucher programs have not shown strong differential outcomes in their favor, but they may still be preferred strongly by those who favor freedom of choice, as did

¹¹⁷ For a recent summary, see Ron Zimmer & Eric Bettinger, *The Efficacy of Educational Vouchers*, in *ECONOMICS OF EDUCATION*, *supra* note 51, at 343, 344, 346.

¹¹⁸ For Sweden, see Anders Böhlmark & Mikael Lindahl, *Does School Privatization Improve Educational Achievement? Evidence from Sweden's Voucher Reform 4* (INST. FOR THE STUDY OF LABOR (IZA), IZA DISCUSSION PAPER NO. 3691, 2008), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1267832. For Chile, see Chang-Tai Hsieh & Miguel Urquiola, *The Effects of Generalized School Choice on Achievement and Stratification: Evidence from Chile's Voucher Program*, 90 *J. PUB. ECON.* 1477, 1478 (2006), available at [http://www.columbia.edu/~msu2101/HsiehUrquiola\(2006\).pdf](http://www.columbia.edu/~msu2101/HsiehUrquiola(2006).pdf).

¹¹⁹ Henry M. Levin, *Educational Vouchers: Effectiveness, Choice, and Costs*, 17 *J. POL'Y ANALYSIS & MGMT.* 373, 380 (1998).

Friedman.¹²⁰

The debate surrounding market competition has certainly influenced the expansion of other forms of school choice such as charter schools, for which the first legislation was passed in 1991, and the movement has expanded to more than 4,000 of these schools in forty states, Puerto Rico, and the District of Columbia.¹²¹ Although charter schools are public schools, they are permitted to compete for students and operate in a relatively autonomous manner under their own governing boards.¹²² This freedom is given in exchange for the school committing itself to a set of goals on which it will be evaluated periodically for renewal of the charter; in exchange, state and local governments waive regulations, and the schools are provided with public funding to compete for students. Clearly the availability of charter schools has expanded freedom of choice for parents and students, but the evidence on their effectiveness appears to be mixed.¹²³

¹²⁰ Cecilia Elena Rouse & Lisa Barrow, *School Vouchers and Student Achievement: Recent Evidence and Remaining Questions*, 1 ANN. REV. ECON. 17, 19, 38 (2009); Zimmer & Bettinger, *supra* note 117, at 348. For an evaluation framework that includes freedom of choice as a separate criterion along with efficiency, equity, and social cohesion, see Henry M. Levin, *A Comprehensive Framework for Evaluating Educational Vouchers*, 24 EDUC. EVALUATION & POL'Y ANALYSIS 159, 162–63 (2002).

¹²¹ See JOHN E. CHUBB & TERRY M. MOE, POLITICS, MARKETS, AND AMERICAN SCHOOLS 181–82 (1990). Certainly, the publication had a wide readership that contributed to the expansion of charter schools, although Chubb and Moe called for “scholarships” or vouchers. *Id.* at 217.

¹²² See generally THE CHARTER SCHOOL EXPERIMENT: EXPECTATIONS, EVIDENCE, AND IMPLICATIONS (Christopher A. Lubienski & Peter C. Weitzel eds., 2010) (providing a good recent summary of charter schools and the overall charter school experience).

¹²³ See Ronald Zimmer & Richard Buddin, *The Economics of Charter Schools*, in ECONOMICS OF EDUCATION, *supra* note 51, at 329; Clive Belfield & Henry M. Levin, *The Effects of Competition Between Schools on Educational Outcomes: A Review for the United States*, 72 REV. EDUC. RES. 279, 283 (2002) (providing studies of public school competition that show small gains in student achievement). The existence and magnitude of competitive gains is not without controversy. Compare Caroline M. Hoxby, *Does Competition Among Public Schools Benefit Students and Taxpayers?*, 90 AM. ECON. REV. 209, 209 (2002), with Jesse Rothstein, *Does Competition Among Public Schools Benefit Students and Taxpayers? Comment*, 97 AM. ECON. REV. 2026, 2026 (2007), and Caroline M. Hoxby, *Does Competition Among Public Schools Benefit Students and Taxpayers? Reply*, 97 AM. ECON. REV. 2038, 2039 (2007).

C. Financing Higher Education

With respect to productivity and cost, most nations face the same challenges in higher education that they face at the elementary and secondary levels. Although rate of return analysis suggests that higher education is an excellent investment for both families and society, the increasing costs and lack of access to means of financing it have reduced both equity in participation and created an underinvestment in higher education by the families without resources.¹²⁴ The overall rise in the costs of higher education are blamed on the cost disease in which there are few options to substitute capital or lower-cost labor for instructional inputs.¹²⁵ Although online learning or virtual learning by internet has certainly been envisioned as a cost-reducing solution, there is little evidence available that student success is comparable to more conventional instruction or that such strategies show greater cost-effectiveness for equal effectiveness.¹²⁶ In the U.S. there is a particular issue of low college completion, which is assumed to be partially attributable to high costs.¹²⁷ We must bear in mind that the opportunity cost of studying, the value of foregone earning, is much higher at the

¹²⁴ See MCMAHON, *supra* note 4, at 329. See generally RONALD G. EHRENBURG, TUITION RISING: WHY COLLEGE COSTS SO MUCH (2002) (providing an analysis of rising tuition and costs); Bridget Terry Long, *What is Known About the Impact of Financial Aid? Implications for Policy 2-3* (Nat'l Ctr. for Postsecondary Res., Working Paper, 2008), available at <http://ccrc.tc.columbia.edu/Publication.asp?UID=645> (providing a description and evaluation of present approaches to financial aid in education).

¹²⁵ MCMAHON, *supra* note 4, at 63.

¹²⁶ See generally U.S. DEPT OF EDUC., OFF. OF PLANNING, EVALUATION, & POL'Y DEV., *supra* note 45, at ix (providing that a review of more than 1,000 studies at all levels of education found very few rigorous comparisons of online and face-to-face instruction; although they found some evidence that when both strategies are used together, so-called blended or hybrid instruction, there is an achievement advantage over face-to-face instruction, they devalue this finding because the blended situations had "additional learning time and instructional elements" not received by the face-to-face students in control conditions); U.S. DEPT OF EDUC., OFF. OF PLANNING, EVALUATION, & POL'Y DEV., EVALUATION OF EVIDENCE-BASED PRACTICES IN ONLINE LEARNING: A META-ANALYSIS AND REVIEW OF ONLINE LEARNING STUDIES (2010), available at http://ctl.sri.com/publications/downloads/EvaluationEvidenceBasedPracticeOnline_Learning.pdf (providing that no solid cost-effectiveness studies were found).

¹²⁷ See Susan M. Dynarski, *Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion*, 93 AM. ECON. REV. 279, 285-86 (2003).

post-secondary level. When added to the direct costs of tuition and other fees and instructional materials, the cost is so substantial that even tuition subsidies, grants, and loans might not be adequate to provide access and retention for many students.

In Friedman's classic article in which he proposes educational vouchers, he also proposes a method based upon human capital theory for financing post-secondary education in an efficient and equitable manner.¹²⁸ His proposal is based upon several premises. The first is that most higher education is undertaken for vocational and professional reasons as a private investment for increasing income rather than as an activity that has external benefits for the larger society. If it is viewed strictly as a private investment for improving individual productivity and earnings in the labor market, he argues that it should not be subsidized.¹²⁹ His second key assumption is that because of the riskiness of the investment and the fact that human capital cannot be used as collateral, conventional lenders will be reluctant to lend the funding needed to make this investment. This means that families without access to capital will be at a particular disadvantage in investing in higher education.¹³⁰ As a consequence, there will be underinvestment in higher education, a conclusion supported by the high rate of return that would be reduced to a level more nearly comparable with other investments if more potential students were to take advantage of the high returns. Accordingly, the main goal is to provide access to loan capital and to do it in a way that there will be wider participation among lower income groups.

To accomplish this Friedman would establish an income-contingent loan fund which individuals would repay according to

¹²⁸ See Friedman, *supra* note 111, at 105. Providing two innovative proposals, educational vouchers and income-contingent loans, both which were viewed as ideological exercises and largely ignored after initial publication, but which have wide currency today. *Id.* at 96–98.

¹²⁹ This is a controversial assumption where many advocate for higher education on the basis of what they consider benefits conferred upon society beyond those received by the students. For example, see MCMAHON, *supra* note 4, at 286. For a sophisticated empirical study identifying spillover benefits of higher education into the labor market and imparting increases in wages to persons with lower educational levels, see Enrico Moretti, *Estimating the Social Return to Higher Education: Evidence from Longitudinal and Repeated Cross-Sectional Data*, 121 J. ECONOMETRICS 175, 175–76 (2004).

¹³⁰ Friedman, *supra* note 111, at 107.

a percentage of their future income for each \$1,000 borrowed, less a base amount which would approximate the income that they would expect to receive in the absence of the investment.¹³¹ The rates would be calculated actuarially on the amount with interest that would need to be raised to repay the overall borrowing of each educated cohort, thus sharing the risk among those who ultimately will vary in their incomes and their repayments. The accessibility of the loans for any capable student and the risk sharing of the investment would induce increased participation in higher education and reduce the underinvestment as well as improving equity by opening the investment to those who previously could not finance it.

Higher education institutions would no longer receive direct subsidies, but would have to compete in the marketplace on the basis of cost and quality, therefore improving the efficiency of the higher education industry and putting downward pressure on costs. Prospective students who have the capacity to benefit would search out the best programs and institutions for meeting their needs and would be assured of the necessary financing to cover the costs. When they enter the labor market, they would pay a portion of the additional income generated beyond the excluded base as repayment of the loan. Friedman suggests the possibility of a government or quasi-government revolving fund by which payment would be made through the income tax system, as an efficient method of record-keeping and collection.¹³²

Although the pure form of the Friedman plan for income contingent loans has not been adopted, there are many versions of it that have been implemented around the world.¹³³ Most notably, Australia has had such a system termed the Higher Education Cost Scheme (HECS) since 1989, which covered about forty percent of the institutional cost of higher education in 2006.¹³⁴ This is sometimes called a graduate tax because when the graduate's earnings reach above the Australian average earnings, the tax kicks in with a low initial rate of two percent

¹³¹ *Id.* at 105.

¹³² *Id.*

¹³³ Bruce Chapman, *Income Contingent Loans for Higher Education: International Reforms*, in 2 HANDBOOK OF THE ECONOMICS OF EDUCATION 1435–95 (Eric A. Hanushek & Finis Welch eds., 2006) (the most comprehensive source on income contingent loans).

¹³⁴ *Id.* at 1464, 1485.

and an increasingly graduated rate at higher incomes.¹³⁵ Unfortunately, there is little evidence that the HECS increased participation of the poor as Friedman argued, although it can be argued that this is a design issue in which the incentives were not sufficient for populations that have not participated traditionally in higher education.¹³⁶ In the future we can expect more countries and a higher proportion of the costs of higher education to be financed through such approaches.

V. ECONOMICS OF EDUCATION TODAY

In 2011 the economics of education appears to be one of the most prominent fields of applied economics and empirical studies. There are three journals devoted exclusively to the field: *Economics of Education Review*, *Educational Economics*, and *Journal of Educational Finance and Policy* with considerable representation in the *Journal of Labor Economics* and the *Journal of Human Resources*. Articles on the economics of education are also well-represented throughout the general journals in the field such as those of the American Economic Association. Empirical work and breakthroughs in the field have become so important that entire econometrics books and technical papers on empirical economics are devoted to applications in the field.¹³⁷ Comprehensive summaries of the field are also found in the increasing number of textbooks devoted to the subject.¹³⁸

As issues of educational policy are raised, the economic

¹³⁵ *Id.* at 1485.

¹³⁶ *Id.* at 1494.

¹³⁷ See generally JOSHUA D. ANGRIST & JÖRN-STEFFEN PISCHKE, MOSTLY HARMLESS ECONOMETRICS: AN EMPIRICIST'S COMPANION (2009); Richard Blundell & Monica Costa Dias, *Alternative Approaches to Evaluation in Empirical Microeconomics* (Inst. for the Study of Labor Discussion Paper No. 3800, 2008), available at <http://www.econstor.eu/dspace/bitstream/10419/35767/1/584692269.pdf>.

¹³⁸ The ground-breaking textbooks of Mark Blaug and Elchanan Cohn, whose first edition of *The Economics of Education* goes back four decades with a highly utilized update some two decades ago, pioneered the analysis of educational data using econometrics. See generally MARK BLAUG, AN INTRODUCTION TO THE ECONOMICS OF EDUCATION (1970); ELCHANAN COHN, THE ECONOMICS OF EDUCATION (1979); ELCHANAN COHN & TERRY G. GESKE, THE ECONOMICS OF EDUCATION (3d ed. 1990). See CLIVE R. BELFIELD, ECONOMIC PRINCIPLES FOR EDUCATION: THEORY AND EVIDENCE (2000) (for more recent contributions); DANIELE CHECCHI, THE ECONOMICS OF EDUCATION: HUMAN CAPITAL, FAMILY BACKGROUND AND INEQUALITY (2006).

components are identified and researched, stimulated also by the increasing availability of data and numbers of economists who have taken up the field, especially labor economists. Further, the province of social and educational experimentation that was once left to psychologists has gradually been accepted, adopted, and promoted by economists for evaluating the impact of different interventions designed to improve educational productivity and outcomes.¹³⁹ In addition to the topics reviewed in this article, there are major bodies of work on education and health, education and civic engagement, education and crime, education and race, and educational accountability systems.¹⁴⁰ Using the tools of economic analysis, the field of economics of education has extended its work to most facets of education in a vigorous and, hopefully, productive manner.

¹³⁹ The most prominent example of this is the work of the Poverty Action Lab at the Massachusetts Institute of Technology. For example, among their many experimental studies is a very insightful intervention and an experimental evaluation of reducing teacher absenteeism in India where such absenteeism is very common and costly. See Abhijit V. Banerji & Esther Duflo, *The Experimental Approach to Development Economics*, 1 ANN. REV. ECON. 151, 152 (2009) (for an overview); Esther Duflo & Rema Hanna, *Monitoring Works: Getting Teachers to Come to School* (Nat'l Bureau of Econ. Research, Working Paper No. 11880, 2005) (for an educational application).

¹⁴⁰ Summaries of these fields and others are found in Peter Muennig, *Education and Health*, in ECONOMICS OF EDUCATION, *supra* note 51, at 80–88; Thomas S. Dee, *Education and Civic Engagement*, in ECONOMICS OF EDUCATION, *supra* note 51, at 89–92; Lance Lochner, *Education and Crime*, in ECONOMICS OF EDUCATION, *supra* note 51, at 93–98; Martin Carnoy, *Race Earnings Differentials*, in ECONOMICS OF EDUCATION, *supra* note 51, at 109–18; David N. Figlio & Helen F. Ladd, *The Economics of School Accountability*, in ECONOMICS OF EDUCATION, *supra* note 51, at 351–56.