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Economic Criteria
for
Higher Education Finance

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Abstract:

Economic growth depends as much on factor productivity as it does on increases in the stock of resources. Investment in education is one key to improvement in total factor productivity. The choice of an optimal level of investment in higher education, and how such investment is to be financed, is thus a critical issue in achieving sustainable economic growth.

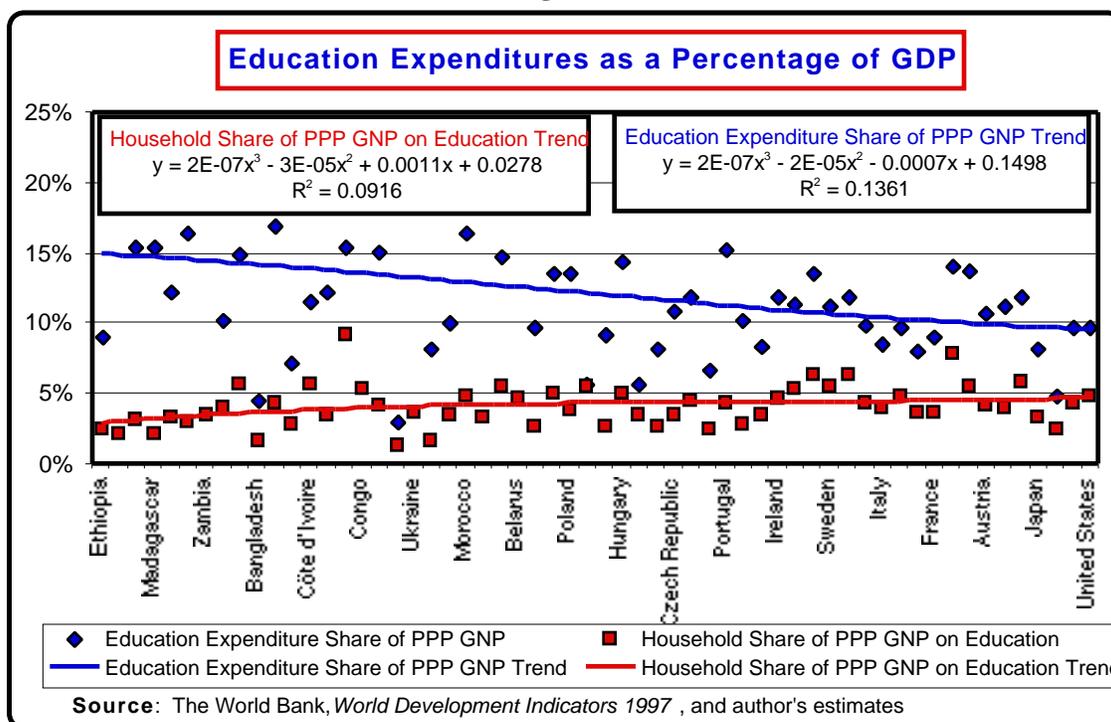
Selection of an optimal level of investment depends on the presence of efficient markets. In education, markets are incomplete not just in terms of the degree of competition, but also in terms of the level and distribution of information, and in terms of the presence of external benefits. While the presence of external benefits traditionally has been used to justify public sector support for education, subsidies by themselves produce varying effects on the underlying technical efficiency of institutions, depending on the specific mode of finance.

Although proposals for the reform of university finance may begin in the first instance as a response to political pressure, it is important to examine the economic impact of alternative financial incentives. In this paper, we outline how different financial incentives may produce alternative educational outcomes. Any proposal to alter the method of university finance thus should proceed in the first instance on a clear understanding of the effects of various economic incentives.

For most countries, university finance is often a major policy issue. Its importance derives not just because education contributes to an economy's stock of knowledge and to the productivity of its labor force, but also because universities represent a significant proportion of national income and claim an important share of public sector expenditures. In this paper, we review recent findings on university finance and examine how economic criteria can be applied to the implementation of university financial reforms.

To understand the importance of higher education in the economy, we look first at the relationship between educational expenditures and GDP for a sample of 64 countries for the period 1983 to 1993, as shown in Figure 1.

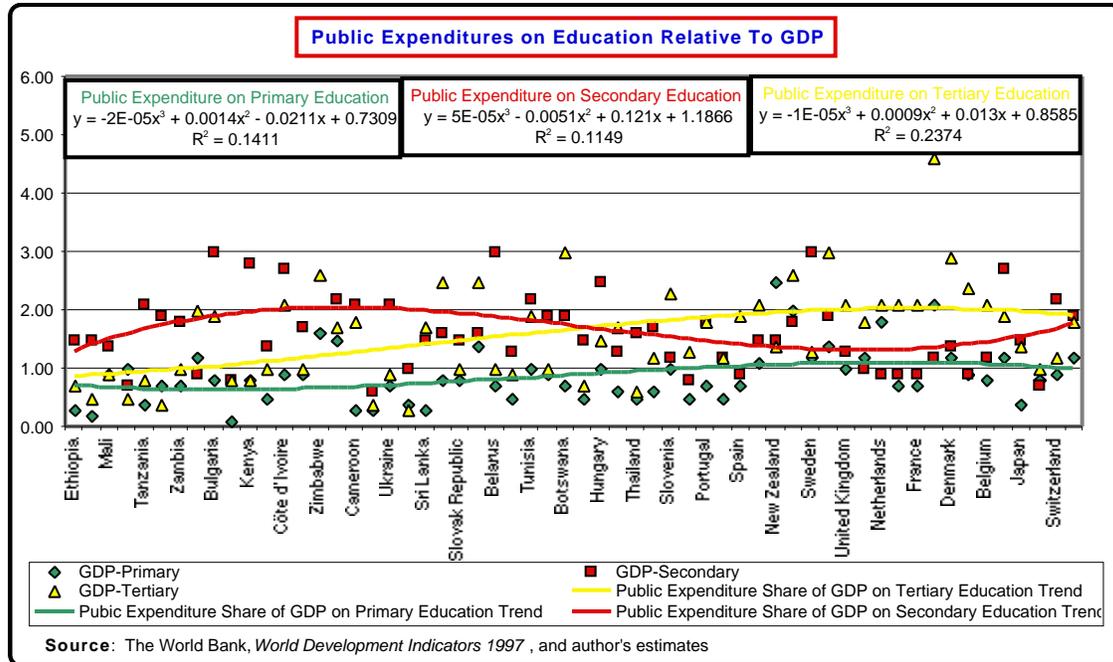
Figure 1



Countries typically devote between ten and fifteen percent of GDP to education at all levels and from all sources of finance. As the level of GDP increases, the share of expenditures devoted to education tends to fall, implying diminishing marginal productivity as enrollment ratios approach saturation and as education must compete with other sources of investment and consumption decisions. Figure 1 also shows that the public share of education expenditures, which ranges between 2 and 6 percent of GDP, tends to rise as the level of GDP increases. With the public share of education finance

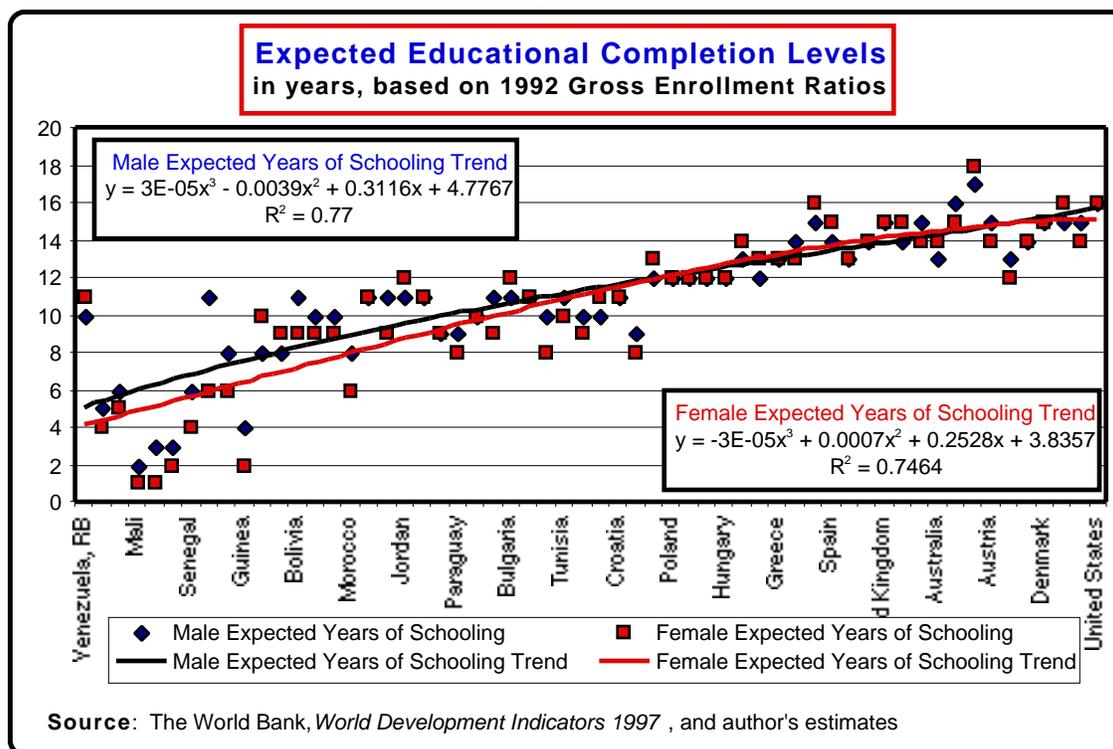
rising with the level of GDP, this presents a challenge in terms of the technical efficiency of educational institutions as well as in terms of maintaining competitive rates of return to investment in education.

Figure 2



Although there is an inverse relationship between the level of income and the share of GDP devoted to educational expenditures, it is the rising share of public finance that creates pressure for university financial reform. Figure 2 illustrates this pattern. As the level of GDP increases, the share of GDP devoted to publicly financed higher education tends to increase from just under 1 percent to just over 2 percent. While this may be consistent with increases in expected educational completion rates, as shown in Figure 3, because public sector intervention does not guarantee that there will be an increase in a country's rate of economic growth, pressure for public sector reform in general and university financial reform in particular increase accordingly.

Figure 3



The Allocation of Investment in Higher Education in a Perfect Capital Market

Let us now link these trends to the role of higher education as an investment in human capital. Consider a university, or university system, as an educational production function. Output, consisting of graduates, dropouts, and external knowledge, is a function of the level and efficiency of inputs. Inputs consist of land (the physical location of a university campus, along with energy, paper, and consumable material supplies), labor (student, teaching, administrative, and staff resources), capital (classrooms, laboratories, libraries, dormitories, dining facilities, computers, and other physical capital resources), along with any entrepreneurial resources its administration and faculty may possess. If the input to output proportions are relatively constant, one then can derive a predicted rate of output from the system for any given intake of students, along with the associated budget necessary to support any level of enrollments over a specified time horizon (LeBel, 1992)¹. Other things equal, changes in the quantity of finance without any change in its composition thus produce proportional changes in the level of output. We can think of this as the standard model.

¹ Phillip LeBel, "Economic Choices for Educational Policy in Africa", *Journal of African Finance and Economic Development* 1 (1) (Spring 1992): 135-164.

Beyond its forecasting role, the standard model also serves as a foundation for deriving the rate of return to investment in education. From the production function, one can derive the average number of periods required to produce a graduate or dropout from the system². In turn, with known input costs, one can then match the present value of these costs against the expected stream of returns, from which one can derive the corresponding rate of return, or associated net present value.

In a perfect market, the level of investment in higher education reflects the opportunity cost of capital. On a risk-adjusted basis, the quantity of this investment (and all others) continues up to a point where the rate of return is equal to the opportunity cost of capital for each and every moment in time. The amount of investment reflects society's rate of time preference between present and future consumption, and thus its overall rate of economic growth.

Market Failure and Government Failure in Higher Education Investment

As appealing as the standard model may be, there are well known reasons why education in general, and higher education in particular, may not achieve an optimal allocation of capital investment. The market for education is incomplete, and can fail for the following reasons: a. Asymmetric information between buyers and sellers; b. externalities; c. Imperfect competition³. In all cases, the net effect is that under purely private markets, there may be a socially sub-optimal level of investment, thus providing a *prima facie* case for public support of higher education, as Arcelus and Levine (1986) point out⁴.

Asymmetric Information

Asymmetric information can produce an under-investment in education in a variety of ways. First, while financial institutions may have sufficient information on parental assets to be able to develop secured lending options unless their rate of time preference is at least as low as that of their children, there will be an under-commitment of private

² Using a transitional probability matrix, one can derive the underlying pedagogical efficiency of an educational system, from which the average number of years required to produce a graduate can be determined. This methodology is spelled out in Phillip LeBel, *ibid.* See also, Keith G. Lumsden, editor, *Efficiency in Universities: The La Paz Papers* (New York: Elsevier Publishing Company, 1974).

³ On externalities and imperfect competition, see, for example, Spiegel, U., and J. Templeman, "'Bundling' in Learning", Bundling policies can be used as a profit maximizing strategy for universities with a degree of monopoly power. Strathman, James G., "Migration, Benefit Spillovers and State Support of Higher Education," *Urban Studies* 31(6) (June 1994): 913-20.

⁴ Arcelus, F.J., and A.L. Levine, "Merit Goods and Public Choice: The Case of Higher Education," *Public Finance* 41(3) (December 1986): 303-15.

investment to any level of education. Second, because education combines both consumption and investment benefits, unless these effects can be separated, private markets will tend to rely on higher rates of discount, and thus lending premia, than in the case of a pure capital good. Third, even where income-contingent loans have been explored, the results have been mixed because of the volatility of earnings over a given level of income⁵. To the extent that such information asymmetries are pervasive, one has a basis for considering government support of education.

Externalities from Quasi-Public Goods

The second source of prospective market failure is in terms of generalized externalities. Education typically is considered as a quasi-public good, thus meriting governmental subsidies. The private benefits of education comprise the stream of consumption and investment returns that an individual receives from completing a given level of education. At the same time, an educated individual produces a stream of benefits to society beyond those accruing to an individual alone. Such external benefits encompass the production of skills and knowledge that enhance the economic productivity of other members of society, but for which in purely private markets no price has been assigned⁶.

Taylor (1999) differentiates externalities into second and first-best effects⁷. Second best externalities encompass rising tax payments associated with rising levels of education, along with avoided public expenditures associated with society's stated standard of a social safety net. Educated individuals are less likely to be dependent on public assistance, have healthier children, and other behaviors that avoid public

⁵ Yale University recently chose to abandon its once widely heralded income-contingent loan plan due to a higher than predicted rate of default, much as this proposal was originally promising. See D. Bruce Johnstone, *New Patterns for College Lending: Income Contingent Loans* (New York: Columbia University Press, 1972).

⁶ This proposition has been noted as far back as Adam Smith(1723-1790). "The state, however, derives no inconsiderable advantage from their instruction. The more they are instructed, the less liable they are to the delusions of enthusiasm and superstition, which, among ignorant nations, frequently occasion the most dreadful disorders. An instructed and intelligent people besides, are always more decent and orderly than an ignorant and stupid one. They feel themselves, each individually more respectable, and more likely to obtain the respect of their lawful superiors, and the are therefore more disposed to respect those superiors. In free countries, where the safety of government depends very much upon the favourable judgment which the people may form of its conduct, it must surely be of the highest importance that they should not be disposed to judge rashly or capriciously concerning it." Adam Smith, *The Wealth of Nations* (New York: Random House Modern Library, 1937), p. 740.

⁷ Lori Taylor, "Government's Role in Primary and Secondary Education in the United States," *Federal Reserve Bank of Dallas Economic Review*, 1st quarter 1999, p. 16.

expenditures on their behalf. In turn, first-best externalities include benefits such as inventions and innovations not captured by the patent system, the public knowledge dimension of education. To the extent that markets do not price these first and second-best externalities, there will be an under-investment in education.

Imperfectly Competitive Markets in Higher Education

The third domain of market failure is imperfect competition in education. To the extent that private markets for education, particularly higher education, are segmented, then the socially optimal level of investment may not be achieved⁸. This can occur within a domestically restricted market, as well as on a global scale where labor factor mobility may be constrained by immigration laws. Public intervention to create more accessible institutions can reduce the degree of market segmentation practiced in some higher education markets, as examples of elite publicly funded universities throughout the world attest. However, it should be noted that public funding may reduce the role of private elite segmented institutions, but may not resolve the problem insofar as rules permit a select number of public institutions to practice what private institutions may have done in their absence, as has been noted by Arrow (1993)⁹.

Moral Hazard in Higher Education

While markets may fail to deliver a socially optimal level of investment in higher education, it does not follow that government intervention in the form of subsidies will necessarily produce a superior allocation of resources. The principal reason why government intervention may be inefficient is the potential for moral hazard. When government intervenes to increase the supply of a resource, the underlying technical efficiency in production of the resource may decline, i.e., unit costs will rise¹⁰. In some cases, subsidies have created a near-permanent student sub-class, with the result that graduation rates have declined accordingly, thereby undermining the level of net social benefits. In a study of education in Hungary in the early 1990s, Horvath (1993) noted that if labor markets are imperfectly competitive and if there is excess supply from the education system, then the problem of technical efficiency in educational production may

⁸ The U.S. Department of Justice undertook an investigation in the early 1990's to determine the extent of tacit collusion among a group of selected highly competitive U.S. Colleges and Universities. The suit alleged price fixing in the setting of tuition and student assistance program levels and under a consent decree the associated institutions promised to provide more competitive practices.

⁹ Arrow, Kenneth, "Excellence and Equity in Higher Education", *Education Economics* 1(1) (1993): 5-12.

¹⁰ Again, Adam Smith provides useful insight on this issue: "Those parts of education, it is to be observed, for the teaching of which there are no public institutions, are generally the best taught." *The Wealth of Nations* (New York: Random House Modern Library, 1937), p. 721. 1

become worse¹¹. Thus, education reform by itself may not be sufficient to increase the performance of an economy's overall investment, and educational reform should be linked to complementary reforms elsewhere in the economy.

The choice of an optimal subsidy depends on the net effects of the market imperfections noted above against the degree of moral hazard. While no one should doubt the problem of moral hazard, even those who have argued in favor of market solutions have stopped short of suggesting that government play no role in the provision of educational services¹². What this leaves is the question of not whether government support of higher education should be provided, but rather which form represents the optimal form of intervention.

Empirical Findings on Higher Education Finance

In many countries, while elementary and secondary education finance has been based on a significant share of private sector finance, the standard model of financing university education has been largely on public sector expenditures, along with smaller proportions provided by tuition and fees, loans, grants, auxiliary services, and donations by corporations and alumni. In the past decade, it has become increasingly clear that achieving sustainable growth requires a rethinking of public sector intervention to those activities most conducive to producing competitive economic returns. In most cases, this has meant a paring back of public sector intervention overall to those activities most conducive to an efficient allocation of resources.

With rising pressure on the public sector, education institutions have been forced to look at ways of maintaining or improving quality at constant or lower economic costs. As this process has occurred, there has been a gradual shift in the financing of education, particularly higher education, from public sector support to increasing private sector finance, despite the historical patterns illustrated in Figures 1 and 2. Tuition and fees have risen faster than the rate of inflation in most countries, and universities have struggled to find sustainable models of support from new partnerships with the private sector, be they alumni, corporate sponsors, or private sector benefactors. In so doing, this

¹¹ Horvath, Tamas D., "Transition of Education and the Economy in Hungary in the Early 1990s," *Education Economics* 1 (2) (1993): 165-83.

¹² See, for example, Milton Friedman and Rose Friedman, *Free to Choose: A Personal Statement* (San Diego, California: Harcourt Brace Jovanovich, 1990). The Friedmans' statement largely echoes the position put forth by Adam Smith in *The Wealth of Nations*, which is the classic statement in defense of free private markets.

transition affects not only the production of skills and knowledge for society, but also the underlying technical efficiency of production embodied in the standard model.

In its 1995 study on education, the World Bank recommended six reforms to improve educational performance in developing countries¹³. Among them was a recommendation for shifting higher education finance more to families and individuals to permit greater resource allocation to primary education. As Psacharopoulos (1994) has found in numerous studies, the social rate of return to elementary and secondary education is higher than for university education, and thus such a re-allocation is warranted¹⁴. This recommendation is consistent with capital market theory, and also may make sense from a distributive equity perspective as well¹⁵.

If investment in higher education is to be optimal, it must occur in the presence of complementary capital flows. Gradstein and Justman (1995) find that while externalities and other forms of market failure may justify subsidies to higher education, unless the supply of capital is elastic, such subsidies may reduce the productivity of aggregate capital investment¹⁶. This finding reinforces the economic reform proposals of the World Bank, particularly in emphasizing the importance of improving capital flows to developing countries to maximize the returns to subsidized educational output. This point also is developed in Ranis (1993)¹⁷. In addition, Strathman (1994) notes that state support

¹³ The World Bank, *Priorities and Strategies for Education: A World Bank Review* (Washington, D.C.: The World Bank, 1995).

¹⁴ George Psacharopoulos, "Returns to Investment in Education: A Global Update", *World Development* 22(9) (September 1994): 1325-43.

¹⁵ To the extent that higher education individuals are the principal beneficiaries of higher education, policies that favor higher education as the expense of primary education may increase the prevailing degree of income inequality. Unless there is compelling evidence that economic growth is reduced significantly by a shift in emphasis toward primary education, then the World Bank's recommendation becomes more compelling, particularly where public sector finance becomes a binding constraint on overall education finance. One counter-proposition, based on the incentive effects of wage taxes is provided in Karla Hoff and Andrew B. Lyon, "Non-Leaky Buckets: Optimal Redistributive Taxation and Agency Costs," *Journal of Public Economics* 58(3) (November 1995): 365-90. The question is whether wage taxes are representative forms of finance, particularly in developing countries, where wage taxation may not represent a significant source of public tax revenues.

¹⁶ Gradstein, Mark and Moshe Justman, "Competitive Investment in Higher Education: The Need for Policy Coordination," *Economics Letters* 47(3-4) (March 1995): 393-400.

¹⁷ Gustav Ranis, "Labor Markets, Human Capital, and Development Performance in East Asia," *Yale Economic Growth Center Discussion Paper*: 697 (September 1993).

of higher education may produce out-migration, thus reinforcing the conclusions of Gradstein and Justman¹⁸.

In light of the pressure to shift higher education financing from the public sector toward greater reliance on private sector sources, there will be effects on the demand for higher education as well as on how colleges and universities choose to price and place their services. Chang and Hsing(1996), in a study of enrollment responses to tuition changes at private sector U.S. colleges and universities, note that the tuition elasticities have risen from -0.261 to -0.557 , even as income elasticities of demand have increased from 0.493 to 1.093 ¹⁹. Thus, the short-run effect of shifts in finance from the public to the private sector in which tuition increases make up public sector shortfalls are likely to reduce enrollments by growing rates of decline. Even as rising incomes increase the income elasticity of demand, Chang and Hsing's study suggests that any shift to private sector funding should proceed only gradually.

Within the framework of shifting higher education costs from the public to the private sectors, there are at least two models under consideration. One is to provide some form of lending, either through parental or proxy graduate collateral, as in income-contingent loans, and the other is through the role of a graduate tax. Mingat and Tan (1992) outline the case for greater use of loans to finance higher education in developing countries, drawing partly on findings by the World bank regarding the impact of standard model subsidies on higher education technical efficiency, and on the opportunity cost of higher education relative to returns at the primary and secondary levels²⁰. Income contingent lending has worked poorly in many cases, largely because of the variance in future earnings against which lending decisions must be made, and largely because interest rates have not reflected the level of risk premia.

Graduate taxation is a proposal that remains largely untested. As put forth in Lincoln and Walter (1993), a graduate tax would offer a non-means tested grant for students combined with an obligation to pay an additional low rate of tax throughout their working

¹⁸ Strathman, James G., "Migration, Benefit Spillovers and State Support of Higher Education," *Urban Studies* 31(6) (June 1994): 913-20. Strathman's study, focusing on U.S. state-level financing, indicates that for each percentage point increase in out-migration of graduates, state appropriations per student decline by \$100.

¹⁹ Chang, Hui S., and Yu Hsing, "Study of Demand for Higher Education at Private Institutions in the U.S.: A Dynamic and General specification", *Education Economics* 4(3) (December 1996): 267-78.

²⁰ Alain Mingat and Jee Peng Tan, "Financing Public Higher Education in Developing Countries: The Potential Role of Loan Schemes," in Mark Blaug, editor, *The Economic Value of Education: Studies in the Economics of Education* (Brookfield, Vermont: Edward Elgar Publishing Company, 1992): 440-54.

life²¹. This would reduce the dependence of higher education on general taxation, and it also would reduce the pressure to develop alternative income-contingent lending. Variants of this proposal include means-tested grants, as outlined in Creedy (1995)²².

A third alternative is the creation of an educational voucher system. Vouchers were first proposed by Friedman (1962), and have since become a tool for achieving greater choice in educational institutions in the United States at the elementary and secondary levels²³. Applied to universities, vouchers would embody an element of public financial support for education, but they would create a more competitive dimension that addresses the degree of imperfect competition in institutions already noted. Thus far, vouchers have not been considered as an option for university financial reform in the United States, let alone in other parts of the world. However, to the extent that experiments with vouchers at the elementary and secondary levels produce graduation rates at competitive cost levels, and at competitive private and social rates of return, they are likely to be viewed more closely as an alternative to income-contingent lending and graduate tax models.

Public Support of Research and Development

Historically, universities have been a significant source of research and development expenditures. Because research and development expenditures produce quasi-public and pure public good outcomes, this has served to justify continuing public sector support of higher education. However, as private sector firms take on a larger share of applied research, this leaves universities as institutions producing much basic research of a pure public good nature²⁴. As such, this justifies some degree of public sector support, but should not be confused with public sector support for the production of educated labor.

²¹ Lincoln, Ian, and Arthur Walker, "Increasing Investment in Higher Education: The Role of a Graduate Tax," *Education Economics* 1(3) (1993): 211-226.

²² Creedy, John, *The Economics of Higher Education: An Analysis of Taxes versus Fees*. (Brookfield, Vermont: Edward Elgar Publishing Company, 1995).

²³ Milton Friedman, *Capitalism and Freedom* (Chicago: University of Chicago Press, 1962, 1970), in particular, chapter VI, "The Role of Government in Education", 85-107. See also, Gabriel Roth, "Education", in *The Private Provision of Public Services in Developing Countries* (New York: Oxford University Press for the Economic Development Institute of the World Bank, 1987): 15-67.

²⁴ Sheila H. Lin and Yao Yu Tsai, in "Optimal Educational Expenditure: Information, Externality, and Budget", in *Academia Economic Papers* 22(1) (March 1994): 47-80, argue the basic proposition that the principal basis for subsidies to higher education is the level of external benefits.

Optimal Choices for the Reform of University Finance

To the extent that external benefits from higher education are minimal, there is a case for a greater proportion of university finance to be borne by users, be they students, or by proxy, their parents, or other sources of private financing. Using public subsidies to university education as a means of achieving equity in income distribution is more likely to be inefficient, not just in terms of the net transactions costs, but also in terms of the moral hazard consequences on higher education graduation rates²⁵. Although it may be politically expedient to justify public sector subsidies to higher education on equity grounds, this often is far less efficient than direct taxes and lump sum transfers. Public sector subsidies to higher education also may provide fiscal returns to the state which may be compared to alternative capital investments. Perrot (1991) finds that rates of return to public finance of French higher education vary from 7.5 to 10.5 percent, which compare favorably with the state's central bank discount rate²⁶.

Shifting the burden of higher education finance from the public to the private sector also places pressures on universities to improve their underlying performance. As students confront more directly a higher share of higher education costs, this will have some effect on reducing the amount of time needed to complete a degree, even if there is a short-run effect on reduced educational enrollments. At the same time, universities also will find ways to better manage their expenditures, through a more prudent selection of capital products, better containment of operating costs, and shifts in faculty personnel policy, including movement from reliance on tenure-based systems to long-term renewable contracts based on performance outcomes.

While the case for higher education subsidies may rest largely on the case for externalities, there still is an argument for shifting some of the burden to private sector alternatives, be they greater private sector lending, to some form of graduate taxation. At the same time, the limit to such shifting depends on the extent to which reduced flows of higher education outputs produces declines in the rate of economic growth. Ryan (1992)

²⁵ Massy, William F. "Productivity Issues in Higher Education", in William F. Massy, editor. *Resource Allocation in Higher Education*. (Ann Arbor, Michigan: University of Michigan Press, 1996): 49-86. See also McPherson, Michael S., Morton Owen Schapiro, and Gordon C. Winston. *Paying the Piper: Productivity, Incentives, and Financing in U.S. Higher Education*. (Ann Arbor: University of Michigan Press, 1993).

²⁶ Perrot, Jean, "Les dépenses publiques pour l'enseignement universitaire et le taux de rendement fiscal: le cas de la France (Public Expenditures for Higher Education and Fiscal Rates of Return: The French Case), *Revue Economique* 42(2) (January 1991): 111-32.

finds that fiscal rules for Denmark, the U.K., and New Zealand produce significant effects on reduced rates of economic growth²⁷.

Where, then, does this leave the debate on the reform of university finance? First, to the extent that universities produce outputs characterized by asymmetric information, external benefits in an imperfectly competitive structure, there will be a role for public sector intervention. Second, even as the demand for higher education expands, given the pressure for public sector reform, universities will need to develop new partnerships with the private sector if enrollment growth is to be sustained. Some of this will come from shifting part of the burden of finance from the public sector to individual students and their caregivers, while some will come from new partnerships with private sector firms that have a demand for a stream of university educated graduates. Third, as pressures arise for shifting university finance from the public to the private sector, questions of equity and access will become more acute. Inasmuch as universities may produce effects on the distribution of income, the most efficient way to address the question of equity is through lump sum transfers rather than through dedicated choices that may not correspond to individual and social preferences.

As universities anticipate shifts in funding from the public to the private sector, the human capital investment model should be used to assign the optimal funding proportions. If fifty percent of the benefits of a first level university degree are private, then this represents the funding proportion that should derive from direct tuition and fees for students, with the remaining fifty percent coming from external sources. If employers derive the remaining fifty percent, then they represent the funding source for the balance. In turn, if the public at large derives the remaining percent, then the balance should be funded by government subsidies. Separating the proportion of public from private sector benefits requires ongoing studies of the private and social rates of return to education. Since there is an ongoing process of conducting such studies, for any individual country, obtaining ongoing results should be done on a regular basis to guide the allocation of public and private sector funding. In all instances, one should never use the results from just one study, but rather the product of several studies that can enable one to separate the macro-economic effects on returns from the micro-economic effects of individual human capital investment decisions.

²⁷ Paul Ryan, "Unbalanced Growth and Fiscal Restriction: Public Spending on Higher Education in Advanced Economies Since 1970", *Structural Change and Economic Dynamics* 3(2) (December 1992): 261-88.

Where private sector funding is justified, adopting the appropriate mix between tuition and fee charges versus loans depends on the consumption and investment proportions of the benefits derived from a given level of education. If ninety percent of the benefits of a first-level university degree are investment in nature, then it is reasonable to provide up to ninety percent of the funding charges through lending. Again, rates of return to education provide some guidance as to how to arrive at these proportions, with non-pecuniary returns representing the consumption aspects of education and pecuniary returns accounting for the balance.

While incomplete information provides a standard justification for public support for research and development expenditures, this leaves open the question of what is the optimal degree of public support for such initiatives. Ultimately, the degree of public support for research and development expenditures must be viewed in terms of the adverse effects of the public tax and borrowing that must be undertaken in comparison to the positive effects that research and development expenditures produce on a country's rate of economic growth and development.

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