

**SHOULD EDUCATIONAL SPENDING BE REDISTRIBUTED
FROM HIGHER TO PRIMARY EDUCATION IN LDC'S?
-A NOTE WITH APPLICATION TO CHILE -**

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Abstract:

Chile lowered relative spending on education at a time when wage dispersion was growing rapidly due to skill-biased demand. This redistribution does not appear to have been justified on efficiency grounds. Furthermore, this redistribution exacerbated the rising relative wages, likely contributing to the rising inequality of earnings in this period, including composition effects. And this redistribution, in combination with the growth of private universities, may have worsened one dimension of intergenerational inequality.

I. Introduction

It is now common to argue that public spending on education should be redistributed from higher to primary education in less developed countries(LDC's) in order to improve the earnings distribution and resource allocation efficiency. Jimenez(1986) and Psacharopoulos(1988), hereafter J86 and P88, are representative papers that both reflect and contribute to this new consensus. Jimenez (1986) concludes:

Too much is spent on higher education in relation to primary levels.(J86,p.124)

Hereafter I will refer to the ratio of higher to primary *public* educational spending as "relative educational spending", and the corresponding ratios of wages, demand and supply as "relative" wages, demand and supply. Thus, the quote above asserts that "relative educational spending" is too high. J86 and P88 called attention to many critical considerations bearing on investment in education; and on average the appropriately helped redirect educational policy in LDC's. It appears that such statements were intended to summarize recommendations for average LDC's, or "the poorer countries"(P88). However, apparently categorical statements, such as the quote

above, have sometimes lent themselves to simplistic interpretations and doctrinaire policies.

This paper attempts to both restore and broaden the perspective on whether - or, rather, when - relative educational spending should be lowered in LDC's. I make two simple, though essential, points. First, we should remind ourselves that, according to standard reasoning and available evidence, shifting educational spending from higher to primary education is not appropriate for all LDC's. This is in part because, both *a priori* and empirically, relative labor demand shifts and the difference between relative demand and supply shifts do not follow simple trends. This makes it difficult to generalize concerning the rate of return to schooling across countries or through time.

Second, I argue that the standard arguments for lowering relative educational spending fail to recognize that lowering relative educational spending tends to lower the relative supply of educated workers, and thereby lead to rising relative wages [alternatively "compression" or "wage effects" as in Knight and Sabot(1983), and Park, Ross, Sabot(1993)] then examine these issues for Greater Santiago, Chile, arguing that lowering relative educational spending there was probably unwarranted on efficiency grounds; raised relative wages; and therefore likely exacerbated the trend towards rising inequality of earnings.

The discussion is organized as follows. Section I first discusses the conceptual and empirical requirements behind the conclusion that relative educational spending should be lowered. I emphasize the restrictive assumptions behind the typical arguments and raise additional, mitigating, concerns. Section II examines these issues for the Chilean case. Section III concludes, discussing lessons and unanswered questions regarding the appropriate level of relative distribution of educational spending.

II. Conceptual and empirical considerations

II.1 The Case for Lowering Relative Educational Spending

J86 and J88 put forth three central arguments, based on equity and efficiency considerations, to support the conclusion that educational spending would best be redistributed from higher to primary education. First, though educational spending is seen as an effective means of redistributing income, the actual structure of subsidies and taxes is highly regressive. This is because of the pattern of subsidies and taxation across social groups:

The distribution of government subsidies for ...education is strongly regressive. (J86,p.124) The children of white-collar families benefit disproportionately from education subsidies.... (J86, p.113)

And taxes may not be strongly progressive:

Although income taxes may be progressive, ...a large proportion of central government revenue is raised through indirect taxation. When both [income and indirect taxation] are taken in to account, the tax systems in many developing countries are not strongly progressive. (J86,p.113)]

Second, shifting spending from higher to primary education will increase efficiency because of the pattern of social rates of returns across educational groups in LDC's.

In developing countries, social rates of return are much higher for primary than for postprimary education.(J86, p.122)

Psacharopoulos makes this point, making it clear that it applies to poorer LDC's.

For the poorest countries...[increasing primary education coverage] has the highest social rate of return...(P88)

Third, positive externalities tend to be larger for primary education in poorer countries - a qualification on which both J86 and P88 clear:

... such [positive externalities] are likely to be larger at lower levels of education, at least among the poorest countries, at least for the poorest countries.... (J86, p.122)

And:

"Primary education is associated with larger externalities than any other social investment..."(P88).

II.2 How Solid is the Case for Lowering Relative Educational Spending?

I begin my discussion with the last argument. It is hard to assess the third argument that positive externalities are strongest for primary education. This is plausible, even likely. However, it is not true *a priori*, and no corroborating evidence is offered in J86 or P88 in its support. Substantiation of this claim, and understanding when it holds true would lend it greater credibility and usefulness.

Regarding the second argument for lowering relative educational spending, it is important to remind ourselves that social rates of returns are not always higher for primary than for higher education in LDC's. For example, the table below, drawn from Psacharopoulos and Ng (1992, p. 30) and Psacharopoulos (1993, p. 7), presents social and private rates of returns for selected Latin American countries. While the social rates of return are higher for primary education for countries in Group A, this is not true for the entire Latin American region. In Group B we see that for Argentina and Chile in 1989, the social and private rates of return to primary education were equal to or lower than the social rate of return to university education. Thus, redistribution of public educational spending from higher to primary education would not be justified on efficiency grounds. Yet Chile was subject to such a redistribution, to which I will return below.

II.3 Determinants of Returns to Schooling and Empirical Regularities

While some authors have suggested there are clear trends in the rate of return to schooling, this is unfounded *a priori* and empirically. As P88 points out, in the mid-1970's "some people expressed fears that the world may be overeducated..." And "such fears continue to be voiced today..." However, by the early 1990's the consensus concerning the U.S. was that, though relative supply had continued to expand rapidly, relative demand had grown faster, and led to rapidly rising relative wages after 1975.

TABLE I

PRIVATE AND SOCIAL RATES OF RETURN TO EDUCATION BY LEVEL OF EDUCATION (PERCENT) (PRIVATE RATES OF RETURN ARE IN PARENTHESES)

Country	Year	Primary	Secondary	University
GROUP A				
Brazil	1989	35.35 (36.61)	5.08 (5.13)	21.44 (28.17)
Dominican Republic	1989	n.a. (85.11)	n.a. (15.11)	n.a. (19.43)
El Salvador	1990	16.39 (18.90)	13.33 (14.51)	8.00 (9.50)
Guatemala	1989	n.a. (33.75)	n.a. (17.85)	n.a. (22.22)
Paraguay	1990	20.30 (23.74)	12.74 (14.64)	10.84 (13.73)
GROUP B				
Argentina	1989	8.44 (10.14)	7.06 (14.16)	7.55 (14.92)
Chile	1989	8.05 (9.70)	1.1.10 (12.91)	14.00 (20.69)
GROUP C				
Average for Region	1988- 1989	17.9 (26.2)	12.8 (16.8)	12.3 (19.7)

Source: Psacharopoulos and Ng (1992), p. 30; Psacharopoulos (1993), p. 7.

The pattern in the rate of return to schooling is important for policy because it affects the social profitability of education. While recognizing that relative wages depend on both relative supply and demand, P88 argues on the basis of "rare instances" of available calculations, that:

...the profitability of investment in education, like that for any other type of investment, declines over time as educational expansion takes place. (P88)

However, this characterization either ignores relative demand or implicitly assumes it changes slowly - while relative supply increases rapidly. In private investments, the returns on investments need not fall when demand is rising. The same holds true for the returns to education.

The relative supply and demand of more to less educated workers determines relative wages - which are monotonically related to the returns to schooling before

netting-out costs. For simplicity, I abstract from other worker characteristics, such as gender and experience. The basic laws of motion for relative wages can be expressed in terms of the relationship between relative wages, demand, and supply - or "w", "d", "s". For a simple CES production function the log of relative wages can be expressed as the log of relative demand minus the log of relative supply, times the inverse of the elasticity of substitution across labor types, σ , [e.g. Freeman (1975, 1979); Katz-Murphy (1992), or KM92]:

$$(1) \ln(w) = (1/\sigma) [\ln(d) - \ln(s)]$$

Thus, if relative demand grows faster (slower) than relative supply, relative wages rise(fall), as long as the elasticity of substitution across labor types is less than infinity.

Additional conditions could hold that would lead to clear patterns and trends in the rate of return to schooling through time and over countries. For instance, there might be a long-run dynamic general-equilibrium relationship where the changes of relative demand minus supply converge to a constant. Alternatively, it is possible that the growth rates of relative supply and relative demand were exogenous and constant, so that relative wages and the rate of return to schooling followed a simple trend, say across countries by income level, or within countries over time. However, currently neither theory nor empirical evidence point to such additional constraints on relative demand and supply. In addition, the determinants of relative supply (or demand for education) are not fully understood. For example, following Becker, the demand for education may be affected by per capita family income (education being a superior good), so that relative demand for education could rise even with falling private returns to education. The pattern of relative educational supply changes is also hard to predict because the relative supply of educated workers is affected by government policies and those policies need not obey market forces or simple patterns over countries or through time. Also contributing to actual and potential changing patterns of rates of return to education is that relative demand shifts are both changeable and little understood. For example, in the literature on relative wages in the U.S., a consensus is emerging that relative demand shifts and technical change have been increasingly skill-biased [e.g. Berman, Bound and Griliches (1994); Katz and Murphy (1992), Lawrence and Slaughter (1993), Sachs and Shatz (1994)]; Yet the pace and nature of technical change remains little understood. And, the link between technical change and skill bias is variable. For example, Goldin and Katz (1995) show for the U.S. that technical change in the early part of the twentieth century displaced skilled office workers, leading to a negative relative demand shift for education.

Furthermore, relative demand shifts in LDC's depend on largely exogenous and variable policy shifts. For example, trade liberalization and integration - which have waxed and waned historically - are often argued to cause negative relative demand shifts in LDC's. However, recent evidence and theory question this [See Robbins (1994, various) and particularly Robbins (1995)], and establish that relative demand shifts in LDC's can both be skill-biased and outpace relative supply shifts.

In sum, the patterns of private and social rates of return to education are variable and depend on factors that vary over time and are still poorly understood. While meriting further research, at this time any characterization regarding rates of return to education should emphasize the temporal and regional specificity of apparent patterns and trends. Similarly, recommendations to shift relative educational spending based on educational rates of return need be circumspect, and specific to place and time.

education, would exacerbate the rise in relative wages. With skill-biased demand, simply holding relative wages constant requires rising relative spending on education, that spurs the formation of more educated relative to less educated human capital.

II.6 The Impact upon the Earnings Distribution

We now apply this above framework to examine the variance of earnings. Applying the well-known variance formulae [Robinson(1976), Knight and Sabot (1983)], the variance of earnings, $V(W)$ or σ^2 , can be expressed in terms of W_1 and p_1 , the wages for group 1, and the percent of workers in group 1:

$$(7) \quad \sigma^2 = p_1(1-p_1)(W_1 - W_2).$$

The equation can be re-written in terms of s and w , the relative supplies and relative wages, since $p_1 = [s/(1+s)]$, and $(W_1 - W_2) \equiv (w-1)W_2$, we have:

$$(8) \quad \sigma^2 = \frac{s}{(1+s)^2} \cdot (w-1)W_2.$$

An increase in relative supply, s , increases the variance of earnings, for constant relative wages, w :

$$(+/-) (+) (+)$$

$$(9) \quad \frac{\partial \sigma^2}{\partial s} = \frac{(1-s)(w-1)W_2}{(1+s)^3} \geq 0 \quad \text{as } s \geq 1.$$

Equation (9) translates the result discussed in Robinson(1976) and Knight and Sabot(1983) -where the variance of income rises as population shifts from low to high wage employment, until the populations are evenly distributed ($p_1 = .5$), into relative supplies and wages. It measures the "composition" effects from educational expansion in a two group case, holding relative wages constant. Similarly, holding the distribution of education constant, an increase in relative wages increases the variance of earnings, corresponding to what are called "compression" or "wage" effects in the literature on educational expansion:

$$(10) \quad \frac{\partial \sigma^2}{\partial w} = \frac{\begin{matrix} (+) (+) \\ s \cdot W_2 \end{matrix}}{\begin{matrix} (+) \\ (1+s) \end{matrix}} > 0$$

By looking at the total differential of the variance of earnings, we can examine the effect of changing relative government expenditures upon the variance of wages. The total differential of the variance of wages is:

$$(11) \quad d\sigma^2 = \frac{\partial \sigma^2}{\partial s} ds + \frac{\partial \sigma^2}{\partial w} dw.$$

Re-expressing (11) and using equations (4) and (4') yields:

$$(12) \quad ds^2 = \frac{\partial \sigma^2}{\partial s} \frac{ds}{dg} + \frac{\partial \sigma^2}{\partial w} \frac{dw}{dg} \geq 0 \quad \text{as } A \geq 0$$

A	B
$\frac{\partial \sigma^2}{\partial s} \frac{ds}{dg}$	$\frac{\partial \sigma^2}{\partial w} \frac{dw}{dg}$
(+)	(+)
(+)	(-)

For a redistribution of government spending away from higher education, $dg < 0$, the first term on the right in (12) will be negative and the second term will be positive. Thus, redistribution of government expenditures to basic education generates two opposite effects, corresponding to "composition" and "wage" effects. It decreases the variance of education (which reduces inequality) and increases the returns to schooling or relative wages (which raises inequality). If the wage effects from lowering g are large then in addition to relative wages rising, the overall earnings inequality can rise. If demand is skill-biased, this will further exacerbate the unequalizing effects of wages on the earnings distribution.

III. The Chilean Case

This section briefly discusses changes in the distribution of public educational spending and their consequences in Chile, particularly 1975. This discussion illustrates points discussed in Section II, though it is by no means intended as an exhaustive treatment of these issues.

Relative educational spending in Chile fell rapidly over 1975-1990. Figure 1, below, plots the ratio of public spending on higher education to total public spending and public spending on higher education. After 1975 both curves follow a downward trend, where the trends are interrupted by a collapse in higher educational spending during the 1981-82 depression. Between 1975 and 1990 the ratio of spending on university to primary education fell nearly three times, from 1.03 to .37, while the share of public spending on higher education fell by one half, from .42 to .2. [MIDEPLAN].

At the same time, as we saw in Table I, above, by 1989 the social rate of return to university education was almost twice as large as the social rate of return to primary education (1.75 times larger, to be precise: 14 versus 8.05 for university versus primary, respectively). This suggests that the lowering of relative educational expenditures was not merited on the basis of efficiency, at the very least in the years proximate to 1989.

III.1 Relative Wages, Supply and Demand?

Robbins(1994b) and Robbins(1995a), using data from the University of Chile's household survey for Greater Santiago, show that over 1975-1990 when relative

FIGURE 1
 Rel Edu. Spending (Univ/Pr-1m) Rel Edu. Spending (Univ/Total)

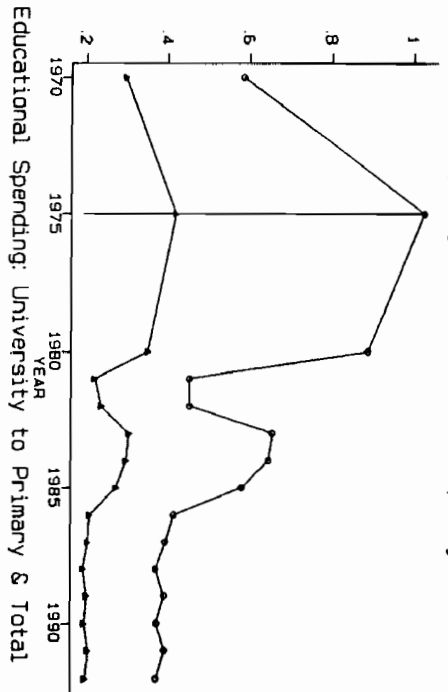
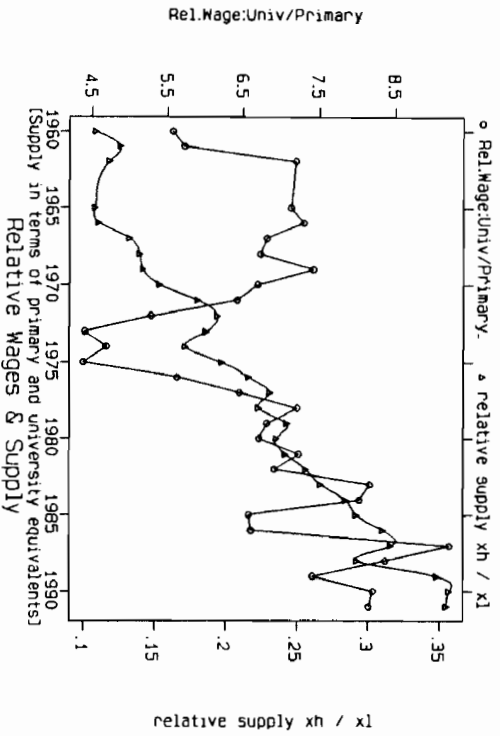


FIGURE 2



educational spending was falling rapidly, relative supply and relative wages rose quickly. These findings are summarized in Figure 2, below, that plots relative wages and supply over the 1960-1990 period. For consistency of comparison across time, the relative wage calculations reported are for employed workers fifteen years old or older. Relative supply includes employees, self-employed and unpaid family workers. Using

broader supply definitions including unemployed, discouraged and persons out of the labor force actually lead to even more rapidly rising relative supply after 1975².

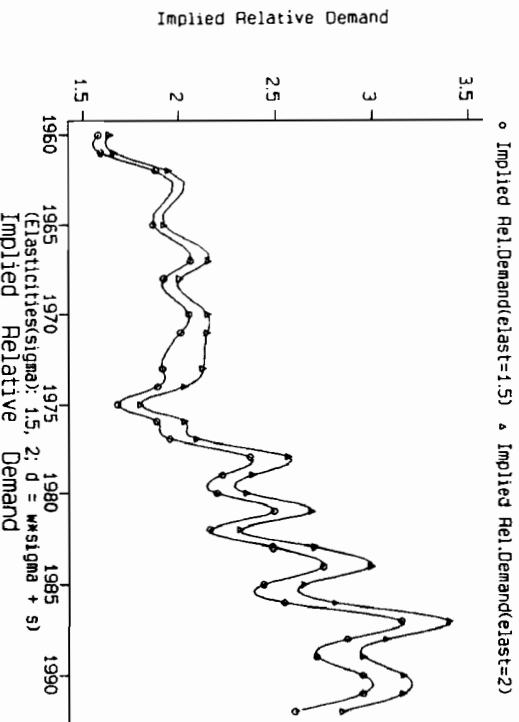
Since after 1975 relative wages rose despite rapidly rising relative supply, relative demand must have been skill-biased. Figure 3, below, plots the imputed relative demand shifts implied by the relative wage and supply data. The general approach is to estimate the equation $\ln(w) = \sigma[\text{time} - \ln(s)]$, where 'time' relative demand shifts are approximated as a linear trend. This estimation is used to provide a rough estimate for σ . For Chile estimates for σ were near (1.2). Relative demand is not directly observed, and this is only approximate. We then calculate imputed relative demand, assuming various values for σ around the estimated value, and calculate relative demand as: $\ln(w) * \sigma + \ln(s)$. In Figure 3 we see that relative demand rose somewhat in the 1960's, was flat through 1974, and fell in 1975. From 1975 on, we see that relative demand grew very rapidly [For a discussion of the likely causes of this relative demand shift, see Robbins(1994b) and Robbins(1995a)].

The Chilean experience after 1975 corresponds closely to the case discussed in Section II where relative demand was skill biased its growth rate exceeded that of relative supply. We saw that under those conditions, for relative wages to even remain constant, relative educational spending needed to rise. If as was the case for Chile, relative spending fell, this would exacerbate the rising relative wages. And, this likely contributed to the rising inequality of earnings as measured by the Gini or variance of $\log(\text{wages})$ documented for Chile over this period [e.g. Robbins(1995a)].

III.2 Further Consequences of Lowering Relative Educational Spending

While it is sometimes argued that lowering relative educational spending improves access to education, this is not obvious. For Chile the data on this are skil limited, but we

FIGURE 3



do know that after 1982 increase in higher education was in private institutions, for which grants or loans are unavailable. Because private universities in Chile offer no loans or scholarships, the growth in the private provision of higher education implies a declining equality of access to higher education in Chile. An examination of who goes to private universities confirms this. For all universities, the socioeconomic representation is skewed to the wealthier income quintile. However, for private universities this bias is far more pronounced. In 1990 students from the top income quintile occupied forty percent of all traditional university enrollments. In private universities the top quintile occupied nearly three quarters (72 percent) of total enrollments. Similarly, the bottom 40 percent constituted 18 percent of enrollments at traditional universities, while they occupied only 4.2 percent of enrollments in private universities [Source: Larrañaga (1992), p. 451, compiled from 1990 CASEN]. Figure 4, below, plots the distribution of private and public university enrollments, respectively, by quintile of parental income.

This evidence suggests that lowering relative educational spending in Chile lowered access to higher education at a time when skill-biased demand shifts were raising relative wages. Thus, the children of wealthier families may have increasingly become the beneficiaries of increasingly higher returns to university education. If so, this would raise one dimension of intergenerational earnings inequality. A fuller analysis, however, would account for the total impact on access to education across all schooling levels.

Inequality of access to public universities may have been further limited by the structure of educational loans for higher education. Such loans are applicable to public universities. The table below summarizes the distribution of educational loans by quintile of parental income. We see no evidence of progressiveness in those loans. However, this is inconclusive, since this data reports the outcome of supply and demand for loans, while the issue is whether the supply of loans was progressive.

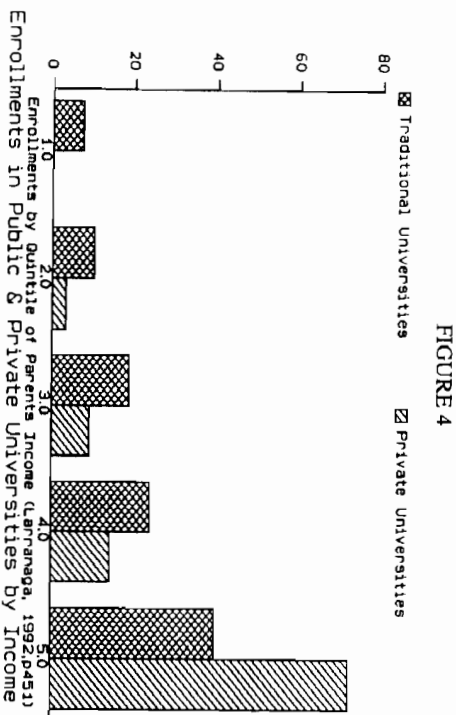


TABLE 2
DISTRIBUTION OF EDUCATION LOANS FOR UNIVERSITY STUDY

	Income Quintile (lowest to highest)				
	I	II	III	IV	V
Number of Students	17.6	18.5	17.8	22.9	23.2
Amount	25.4	18.2	20.2	18.4	17.8

Source: O. Larrañaga 91992), p. 458, from CASEN, 1990.

IV. Conclusion - Lessons and Questions

Whether redistributing educational spending from higher to primary education in LDC's is socially efficient depends on the particular circumstances of the particular country, and these are not *ex ante* obvious. Social efficiency depends on social rates of return inclusive of externalities that are hard to measure. Measured social returns depend on relative supply and demand patterns, which in turn depend only on partially understood factors of behavior, technology and the relationship between technology and the demand for skill. Neither *a priori* nor empirically do social rates of return follow simple, stable patterns across countries or through time. Educational externalities are likely very large, but their magnitude and structure is poorly understood, making empirical social return calculations as much an art as science. Apart from externalities, ignoring the variability of measured social returns for the particular country in question can lead to redistribution of educational expenditures that lower the social inefficiency of resource allocation.

While shifting educational expenditures from higher to primary education may often redress the unequal impact of distribution of educational expenditures across income groups, they also engender unequalizing effects. They do so by raising relative wages and the return to education, before netting out costs. Thus, the immediate fiscal impact may to equalize family income across income groups. However, future income may become less equal. And if these reforms limit access of the children from families with less income, the children of currently well-off families may earn more.

The impact of lowering relative educational spending may also have complex and countervailing effects on access to education and intergenerational inequality. While likely increasing access to primary education, this may lower access to higher education, at the same time the lower relative educational spending widens wage dispersion.

Questions and Further Research

The foregoing highlights some key areas for research. Finding ways to analyze and estimate the pattern and size of educational externalities is greatly needed, if difficult. Predicting the structure of relative wages and returns to schooling is also only partially understood. There is evidence that the elasticity of relative wages to relative supply is

at least one for the U.S. and many LCD's³ [see Hamermesh(1993), KM92, Robbins(1994, 1995 - various)]. However, we do not know the size or time-structure of the elasticity of relative supply to relative educational spending. Nor do we understand well how other factors, such as family income, affect personal investments in education, and thus, relative supply. Similarly, we do not yet understand the determinants of relative demand through time or over countries. Technology is a key player here. But technological change itself is still poorly understood. And we understand even less regarding the relation between technological change and skill bias. Good dynamic general equilibrium models of educational supply, demand and relative wages are also wanting.

Our understanding of the impact of relative educational supply upon: the ability of countries to adapt, to growth, to successful trade liberalization and economic integration, etc., is of fundamental importance, but this understanding is in its infancy. Recent growth and trade literature has emphasized the importance of human capital accumulation in growth, explored the possibility of increasing returns to human capital, and rising returns to human capital with trade. However we know little regarding what country factors condition these effects, regarding their size, and we know almost nothing regarding how the distribution of human capital - or the relative supply of educated workers - affects and responds to these factors.

Notes

- 1 In that case we have purely homogeneous human capital, and relative wages are constant and equal the ratio of human capital possessed by different workers.
- 2 See Robbinst(1994b) and Robbinst(1995a) for a complete discussion of these results, and the underlying methodology.
- 3 The construction of relative supply here is based on Welch(1979)'s Linear Skills Synthesis, as recently applied by Katz and Murphy(1992). See the latter or Robbins(1995a) for an exposition of this methodology. More simple techniques lead to similar relative supply measures.
- 4 This is equal to the inverse of the elasticity of substitution, or σ discussed above.

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