Policy Research Working Paper 8866

The Changing Pattern of Returns to Education

What Impact Will This Have on Inequality?

Harry Anthony Patrinos

WORLD BANK GROUP
Education Global Practice
May 2019

Policy Research Working Paper 8866

Abstract

The pattern of economic rates of return to investments in education can help us to understand the benefits of schooling. It was common knowledge that the returns to education were highest for the primary level of education and lower for subsequent levels. Recent evidence suggests that the pattern has changed. Since the 1980s, the returns to schooling overall have increased. The returns to higher education have increased the most. The fact that the more educated have improved their position, despite an increase in their numbers, must mean that the demand for more educated workers has increased more than supply over time, causing an increase in the overall returns to schooling. Possible reasons include technological change favoring higher-order skills, increased coverage at lower levels of schooling, and the quality of schooling.

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Produced by the Research Support Team

The Changing Pattern of Returns to Education: What Impact Will This Have on Inequality?

Harry Anthony Patrinos*

JEL: I20, I21, I24, I25, I26

Key words: Rates of return to education, labor markets, poverty alleviation

* Practice Manager, Education, World Bank. hpatrinos@worldbank.org. Views expressed here are those of the author and should not be attributed to the World Bank Group. This paper is dedicated to the memory of Christopher Colclough, supervisor, mentor, friend, and great development economist. I am forever grateful for the opportunity he gave me.

INTRODUCTION

While it is commonly believed that labor market returns to education are highest for the primary level of education and lower for subsequent levels, in Colclough, Kingdon and Patrinos (2010), we found evidence to suggest that the pattern is changing. The causes of such changes, and their implications for both education and labor market policy, are significant. The possible reasons put forward for this include: (1) technological change favoring higher order skills; (2) increasing coverage at lower levels of schooling; and (3) the quality of schooling. Of course, it could be a combination of all three factors. The issue is revisited here.

The pattern of economic rates of return to investments in education can help us to understand the benefits of schooling. The pattern of the returns to education are important for students and their families making important and costly schooling decisions. They are also important signals for policy makers. Since the 1980s, the returns to schooling overall have increased (Psacharopoulos and Patrinos 2018). More recently, the returns to higher education have increased the most (Montenegro and Patrinos 2014).

A review of current patterns of the returns to schooling by level and region is presented, along with a discussion of the possible causes of changes and the subsequent policy implications. Among other aspects, the education investment patterns over time are assessed. The analysis is based on estimates of the returns to schooling from more than 140 countries and more than 1,000 estimates from 1980 to 2014. The data come from countries all over the world, representing more than 90 percent of the world's population, and are disaggregated by gender.

The fact that the more educated have improved their position despite an increase in their numbers must mean that the demand for more educated workers has increased more than supply over time, causing an increase in the overall returns to schooling.

LINK BETWEEN EDUCATION AND EARNINGS

The origins of scientific interest in the contribution of schooling to development is attributed to Adam Smith, although classical philosophers in the East and the West promulgated education as

a characteristic of moral and personal development. In the modern era, education entered economics in the late 1950s.

The concept of the rate of return on investment in education is like that for any other investment. It is a summary of the costs and benefits of the investment incurred at different points in time, and it is expressed in an annual (percentage) yield, like that quoted for savings accounts or government bonds. Returns on investment in education have been estimated since the late 1950s. Investments in education increase future productivity. There have been thousands of estimates, from a wide variety of countries. Time and money spent on education builds human capital, hence one should be able to estimate the rate of return on such investment, in a way like investment in physical capital. The expected benefit derived from the output exceeds the cost. An individual invests in education with an expectation that the investment will provide a benefit in the form of higher earnings. While human capital is more than education – it has been defined as "the stock of knowledge, habits, social and personality attributes, including creativity, embodied in the ability to perform labor so as to produce economic value" (Goldin 2018) – nevertheless, most empirical work estimates the impact of schooling on earnings.

The rise in earnings inequality, and the subsequent increase in the returns on schooling, experienced during the 1980s and 1990s in many countries led to renewed interest in estimates of returns on educational investment (see, for example, Levy and Murnane 1992). The literature suggests that systematic changes in the production process brought about by changes in technology and the growth of the knowledge-based economy whereby product cycles become shorter and flexibility is needed, led to changes in the demand for skilled labor (Juhn, Murphy and Pierce 1993).

More generally, human capital theory assumes that individuals take actions that will likely increase their future earnings and overall well-being. Such investments are costly: they might involve direct costs such as tuition and fees for school, and indirect costs such as foregone earnings during the period spent in school. These investments result in some expected future benefits. The benefits might include a higher wage, but can also be anything that the individual values, for example, better working conditions or a longer life. Human capital theory typically

models investment decisions such as those resulting from an optimization process: an individual will invest in such activities in order to maximize well-being over the course of a lifetime. Observed outcomes in the marketplace will be the result of an equilibrium process where the demand for specific skills and abilities is balanced with its supply.

Estimates of the returns to education are used to indicate the profitability of investing in a certain level of education, both from the individual's (private returns to education) and society's (social returns to education) points of view. The high rates of return to primary education, relative to secondary and higher education, has led to calls for increased investment in this level of education. One of the primary reasons for this is the positive contribution that expansion of primary education would have towards economic equality.

Education and Inequality

There is an expectation that education contributes to greater equality in society (Becker 1964). The idea that educational policy can be used to eradicate poverty and contribute to equality has been with us for some time. Such thinking led to rapid educational expansion during the 1950s and 1960s. Educational investment is still considered profitable and as contributing to economic equality (see, for example, Colclough 1982; World Bank 2018). Moreover, there is an explicit belief that educational policy is an exogenous policy instrument that the government can use to achieve such goals as a more equitable distribution of education and a more equitable distribution of income. The government's use of educational policy to pursue equity goals will not be easily opposed since the creation of human capital is the creation of new capital.

Increasing an individual's education makes that person more productive and able to gain a high-paying position. As the supply of highly-paid, skilled labor increases, and the supply of unskilled labor decreases, the differential in pay between the two groups of workers will diminish, due to the laws of supply and demand. This process eventually leads to a more equitable distribution of income.

The human capital approach predicts that additional schooling will lead to higher earnings at all levels due to individual productivity. The earnings advantage of the more educated relative to the

less educated is subject to the laws of supply and demand; as the number of the more educated increases, relative to the less educated, their earnings advantage declines and the minimum qualifications for given jobs rises in line with increased relative supplies.

It is expected that the returns to education should decline following an expansion of the supply of schooling (Psacharopoulos 1989). An increase in educational expansion that increases the ratio of the more to the less educated in the labor market should cause the wage differential between the two groups to fall. This, in turn, will lead to a decline in the returns to education. All this, of course, should lead to a decrease in income inequality, other things being equal. Most research has generally validated this hypothesis (see, for example, Mincer 1974; Marin and Psacharopoulos 1976).

Returns to Investments in Education

There is a sizeable literature on the returns to education. Recent reviews show that an additional year of schooling adds 8 to 9 percent a year to a person's earnings (Psacharopoulos and Patrinos 2018; Montenegro and Patrinos 2014; Patrinos 2016). What is more interesting is the variation in returns by level of education – primary, secondary and tertiary education.

Modern economists have been estimating the returns to schooling systematically since the late 1950s. For much of that time the evidence suggested that the returns in developing countries are higher at the primary level than at secondary and tertiary levels of education. If the returns to primary were high, then it could be safely assumed that parents would value education and ensure their children were enrolled. Growing enrollments would result in higher productivity of the poor and lead to lower inequality in the future.

The empirical evidence from the 1960s to the 1990s suggested that in most countries the relationship between education and earnings was concave (Psacharopoulos 1994; Psacharopoulos and Patrinos 2004). The slope is steep at low levels of education (i.e. the return to education is high) but becomes progressively flatter (i.e. the marginal returns fall) at higher levels (Colclough et al. 2010). If the shape of the education-earnings relationship is concave, then an extra year of education at low levels of education brings substantially greater increases in

earnings than it does at higher levels of education. Similarly, marginal increases in education at low levels of education (where the poor are typically concentrated) raise earnings substantially.

CHANGING PATTERNS OF RETURNS TO EDUCATION

Returns to investments in schooling are estimated by computing the difference in average earnings between those with a given level of schooling and those at the level below it. Typically, the earnings function elaborated by Mincer (1974) is most often used. This estimates an earnings function where the log of average wages is explained by years of education, years of relevant work experience and its square. The coefficient on education can be interpreted as the private (that is, what the individual expects to earn as a result of their investment) return to an additional year of education, and can be calculated, using dummy variables, for each relevant level of education (Patrinos 2016). That is, when one estimates the earnings function with "no education" as the base category and includes dummy variables for each level (primary, secondary and tertiary), then the estimated coefficient on the "primary schooling" variable shows the average earnings change received by those with primary schooling over those with no education. Similarly, the coefficient on the "secondary education" variable shows the earnings change received by those with secondary education over those with no education. The coefficient on the "tertiary education" variable shows the earnings change received by those with tertiary education compared with those with no education. The average return to, say, secondary education is calculated by subtracting the coefficient on the primary education variable from that on the secondary education variable and dividing the answer by the number of years of education in the secondary school cycle. The same procedure would be undertaken for those with tertiary education.

A review of current returns patterns by level and region is presented using two large, recent databases. The analysis is based on estimates of the returns to schooling from more than 140 countries and more than 1,000 estimates from 1950 to 2014. The data come from countries all over the world, representing more than 90 percent of the world's population, and are disaggregated by gender (Montenegro and Patrinos (2014) and Psacharopoulos and Patrinos (2018)). Montenegro and Patrinos (2014) present comparable estimates of the rate of return to investment in education in a database that uses the same specification, estimation procedure, and

similar data for 139 economies and 819 harmonized household surveys. They provide comparable estimates because they hold constant the definition of the dependent variable, the set of control variables, the sample definition, and the estimation method for all surveys in the sample. Psacharopoulos and Patrinos (2018) update their decennial review of the literature and review the latest trends and patterns based on 1,120 estimates in 139 countries.

Montenegro and Patrinos (2014) find that there is a decreasing pattern over time, but also that the returns to tertiary education are the highest. Psacharopoulos and Patrinos (2018) find that the private average global return to a year of schooling is 9 percent a year and that the private returns to higher education increased. Both find higher returns for women.

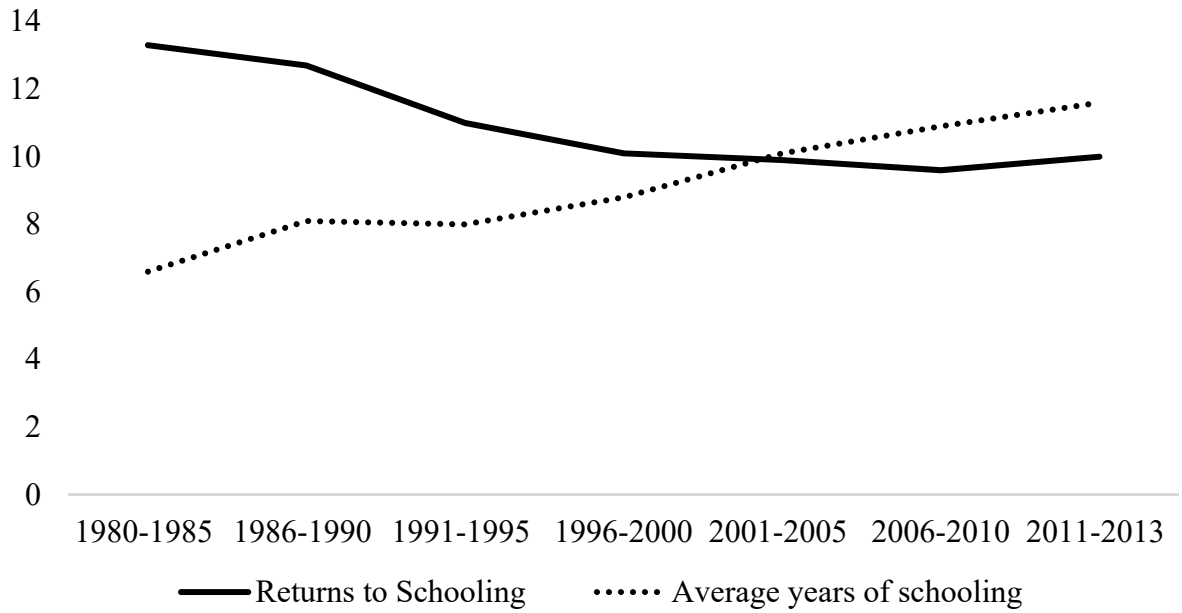
Figure 1: Years of schooling and returns over time

Source: Psacharopoulos and Patrinos 2018

The rapid expansion in schooling in terms of access, enrollment and total years of schooling is expected to reduce the earnings advantage, everything else being equal, of course. Average years of schooling worldwide were only one year in 1990, rising to 3.2 by 1950, to more than 8.5 by 2010 (Barro and Lee 2015). However, although the average schooling level of the working population increased in the early 2000s, the overall private rate of return to schooling also increased (Figure 1). Before 2000, average years of schooling were 7.8 and the returns to

schooling were 8.7. Post 2000, average schooling rose to 8.6 years and the returns edged up to 9.1 percent.

Figure 2: Returns to Schooling and Average Years of Schooling by Period

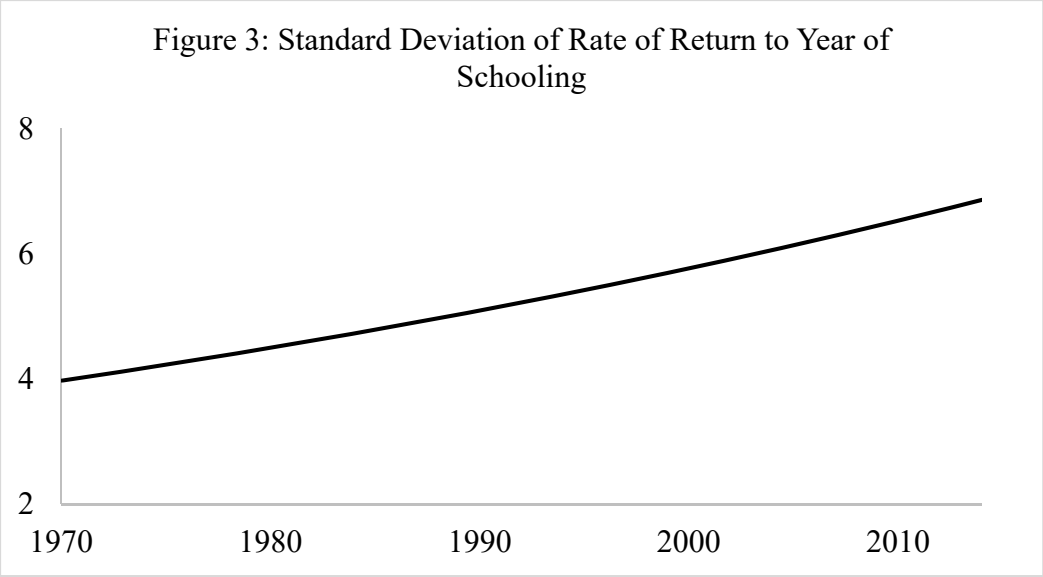


Source: Montenegro and Patrinos 2014

In fact, the returns to schooling were decreasing over time as the level of education rose (Figure 2). From 1980 to 2010, the returns to schooling declined significantly while schooling levels increased. While schooling levels increased on average almost 11 percent every five years, the returns to schooling fell by 6 percent. This would be in line with the laws of supply and demand. But between 2011 and 2013, schooling levels went up by 6 percent, and the returns to schooling increased by more than 4 percent. This is based on a significant number of economies (149) undertaken with a consistent methodology (Montenegro and Patrinos 2014).

Rising or stagnant returns, or even slowly declining returns, while schooling levels are rising goes against theory. The evidence from estimated returns gives us a hint of possible growing inequality (Figure 3). The variance in the returns to schooling is increasing. Just as the returns to schooling are increasing, so is the variance. We see this in the standard deviation of the returns to schooling, which is increasing over time. Since the standard deviation is a measure of the

dispersion of the returns from their mean, then the higher deviation signals that the returns are becoming more dispersed. In this sense, the returns to schooling are becoming more volatile. This sense of volatility or uncertainty means that people about to invest in their schooling are less sure about the expected returns to that investment.



Source: Calculated from Montenegro and Patrinos 2014

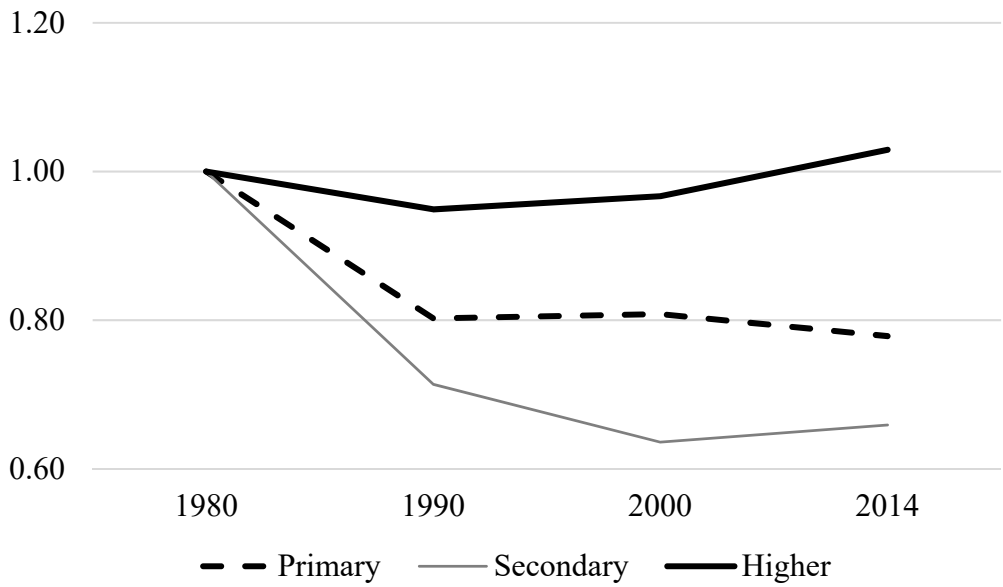
The empirical evidence from the 1960s to the 1990s suggested that in most countries the relationship between education and earnings was concave (Psacharopoulos 1972, 1981, 1985, 1994; Psacharopoulos and Patrinos 2004). In the 1970s the private rate of return was higher at the primary school level than at the secondary level or higher (Psacharopoulos 1981). The same pattern was evident by the early 1980s (Psacharopoulos 1985). Similar evidence was produced for the 1980s and 1990s, but already the pattern was shifting (Colclough et al. 2010). In fact, by the early 1990s, the returns to primary schooling were decreasing, while the returns to higher education were rising (Psacharopoulos 1994).

More recent evidence suggests that the rate of return to primary education is lower than that to higher levels of education. Many studies using cross-section data from the 1990s and early 2000s find that the return to primary education in wage employment is significantly lower than that to higher education (Psacharopoulos and Patrinos 2018). But analyses of current rates and levels

may be problematic because of assumptions about foregone earnings, costs, assumptions, comparators – like university versus secondary. What might be more telling are the trends. This includes the trends on the returns on years of schooling and returns by level.

Primary school enrollment has gone up from 72 percent in 1970 to 90 percent in 2017 (according to UNESCO and listed on the World Bank's EdStats website: https://data.worldbank.org/indicator/se.prm.nenr), and from 41 percent to 77 percent at the secondary level (according to UNESCO and listed on the World Bank's EdStats website: https://data.worldbank.org/indicator/se.sec.enrr). The returns to schooling follow a predictable pattern at those levels: they decreased, based on evidence from 746 observations between 1970 and 2014 (Montenegro and Patrinos 2014; Psacharopoulos and Patrinos 2018) from 116 economies, representing more than 98 percent of the world's population. The returns to primary education have decreased by 21 percent and the returns to secondary have decreased by one-third (Figure 4).

Figure 4: Changes in retuns to education since 1980

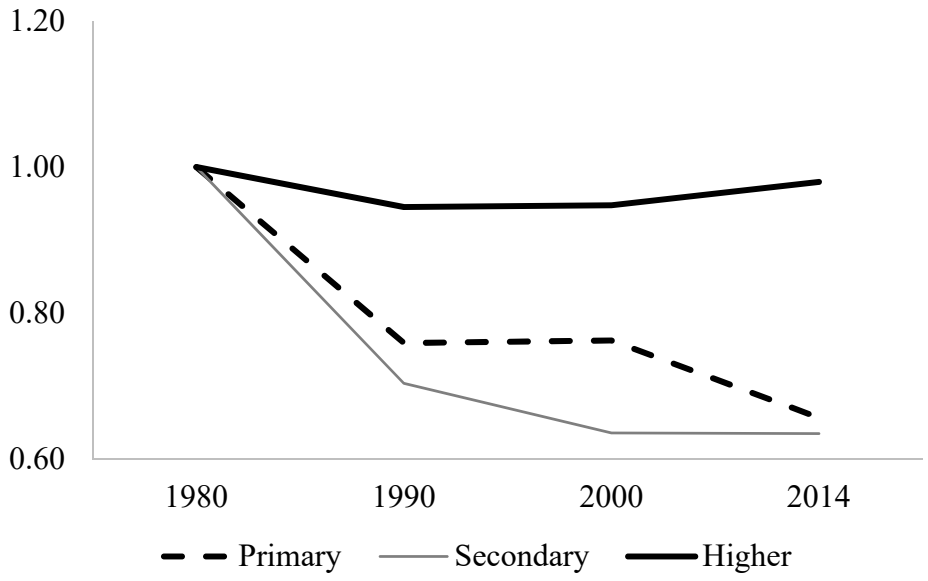


Source: Montenegro and Patrinos 2014

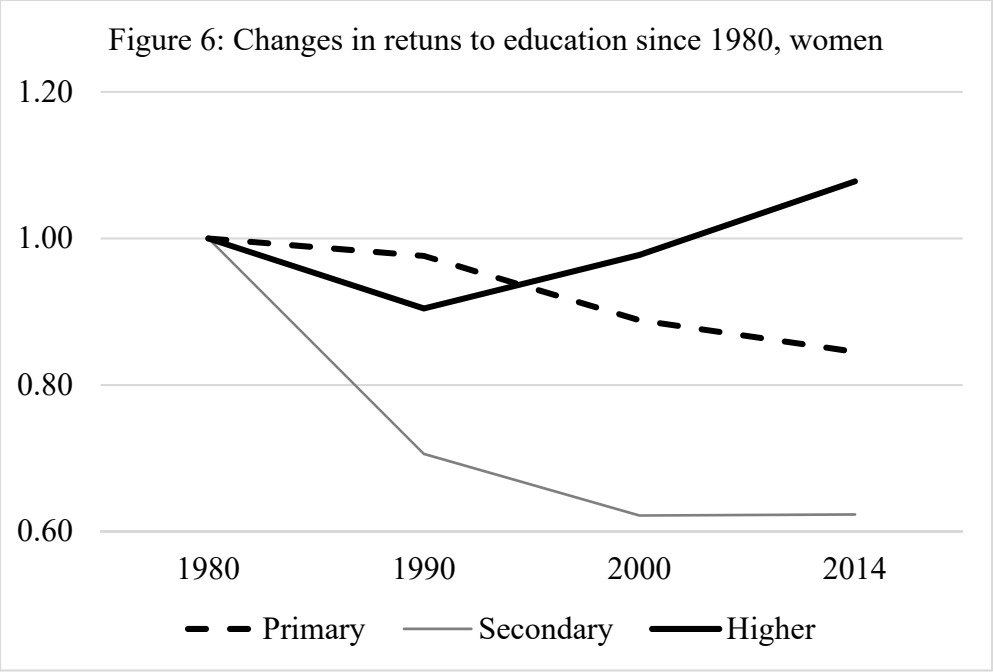
The situation is much different at the tertiary education level. Tertiary level enrollments have tripled since the 1970s (according to UNESCO as listed on the World Bank's EdStats website: https://data.worldbank.org/indicator/SE.TER.ENRR), from 10 percent in 1970 to 38 percent in 2017. At the same time, the returns to tertiary education have increased by almost 3 percent.

The situation for men and women is similar at the primary and secondary levels. The returns to schooling at the primary and secondary levels for men decreased by one-third (Figure 5). The returns to higher education stayed roughly the same between 1980 and 2014. For women, the returns to primary only decreased by 15 percent. The returns to higher education increased by 8 percent (Figure 6).

Figure 5: Changes in retuns to education since 1980, men



Source: Montenegro and Patrinos 2014



Source: Montenegro and Patrinos 2014

Standardized data across countries and over a long period of time reveal a compelling picture of a steep decline in the wage returns to primary schooling across the developing world over the past half-century. The evidence also shows an increasing rate of return to higher education, especially for women. While the returns to primary schooling have decreased less for females than for men, the returns to schooling for secondary have decreased much more for females. Since secondary is required for access to higher education, this could be a deterrent to enrolling in secondary schooling or might become one (Kingdon 1998). This is important since investment in schooling by women tends to decrease the proportion of earnings differential with men that is attributable to factors such as discrimination (Dougherty 2005). It is also possible that academically able women are accessing higher education. Nevertheless, this justifies investment in girls' schooling and compels us to ensure high levels of schooling through to higher education to reap the significant wage returns.

Over time comparisons using the same method and the same definitions of education levels across the countries show that, in general, the returns to education increase as the level of education rises in 41 of 49, or 84 percent, cases in developing economies with over time data. In all cases latest year data show higher returns to higher education than to secondary schooling.

Overall, based on 596 observations or data points, the returns to higher education are greater than the returns to primary education in 83 percent of cases. The returns to higher education are greater than the returns to secondary education in 97 percent of cases. And, in terms of latest year data for 104 economies, the returns to higher education are greater than the returns to primary education in 73 percent of cases, and the returns to higher education are greater than the returns to secondary education in 95 percent of cases. However, the returns to secondary schooling are greater than the returns to primary schooling only 33 percent of the time. While in some countries the pattern of increase is not monotonic with the level of education, a generally *mixed* pattern of returns is observed across most countries (Table 1).

Table 1: Education-Earnings Relationship

	% of countries
Higher > Primary	73.3
Higher > Secondary	95.2
Secondary > Primary	32.7

Computed from Montenegro and Patrinos (2014)

The very sharp declines, and low overall rate, for secondary education are a bit misleading. There is an *option value* to completing secondary education – and primary as well. The *option value* is the value of obtaining further education and the rewards accompanying it (Weisbrod 1962). It is distinct from the conventionally accepted educational benefit of standard expected wage gain. In the case of secondary education, there is option value arising from the fact that completion of secondary education provides a benefit other than wage returns: the option to invest in post-secondary levels of education, which are not available to those who do not complete secondary education. Estimates from Bangladesh suggest significant returns to the option value (Shafiq 2007). Thus, we must keep that in mind. Focus should be on the returns to higher education.

Causes of the changed pattern

The returns to schooling have not declined very much over time, while the supply of schooling has increased. This suggests that the supply of schooling is not keeping up with demand. There

could be several reasons for this. We explore three possible explanations: technological change favoring higher-order skills; increasing coverage at lower levels of schooling; and the quality of schooling.

The higher returns to tertiary education seem to suggest that the education supply curve has been shifting more to the right relative to the demand curve (Tinbergen 1975; Psacharopoulos 1989; Psacharopoulos and Patrinos 2018; Goldin and Katz 2010). This is most evident in the returns to higher education. While enrollment in higher education has gone up three-fold since 1970, the returns have not changed overall, or increased for women. The increased share of the labor force with higher education should have reduced the rate of return on the investment. Yet, the rates of return over time do not fluctuate much because as the supply of educated labor increases, so does the demand for higher skills, hence, not depressing the returns to education. As discussed by Goldin and Katz (2010), skill-biased technological progress is producing consequences for income inequality. Increased global trade and open economies is leading to changes in skilled/unskilled wage ratios (Colclough et al. 2010). But increased openness has not reduced skill differentials but widened them, with increased global demand for higher skills (Colclough et al. 2010; Patrinos, Thang and Thanh 2018). Education systems do not seem to able to mediate this relation. While higher education increased substantially, the premium on high skills continued to increase. This suggests that educational advancements were insufficient to countervail demand due to technological progress.

The evidence on the skill-biased technological change came from more developed countries (see, for example, Acemoglu 2002). Yet we have seen that recent evidence on returns to education suggests that similar tendencies exist in a good number of low-income as well as middle-income countries. That we are seeing the same thing happen in developing countries is interesting. It suggests a global market for skills. But what is different in developing countries is the low quality of education (World Bank 2018).

In principle, the relative decline in the wage returns to primary education over time may be due to both supply-side and demand-side factors (Colclough et al. 2010). The main causes are likely to be supply-side rather than demand-side pressures. The last few decades have seen significantly

increasing coverage at lower levels of schooling. The supply of primary and secondary school completers has greatly increased over the past 15 years. The out of school secondary school rate also fell rapidly during this time. As education systems expand, the qualifications required for jobs rise (Colclough et al. 2010). The reduced access to jobs provided by primary and secondary schooling will be associated with downward pressure on wage returns at these levels.

The quality of schooling may be suffering because of the rapid expansion of school systems in developing countries. The expansion of primary school enrollments seems to be accompanied by lower test scores (Angrist et al. 2019), either by selectivity as poor and less well-prepared students enter the system, or unprepared teaching staff. As Colclough et al. (2010) state: "Recent students may generally have been less well-prepared for school than earlier cohorts: they may have come from homes where parents were less educated than the average, and/or where informal home-based learning was more constrained." This would help explain the decrease in the returns to primary schooling. Educational expansion can reduce income inequality but only if the quality of schooling is improving (Coady and Dizioli 2018).

CONCLUSION

The fact that the more educated have improved their position, despite an increase in their numbers, must mean that the demand for more educated workers has increased more than supply over time, causing an increase in the overall returns to schooling. While schooling and earnings inequality are related, the returns to schooling may increase despite an increase in the average level of schooling (or a decrease in the variance of schooling) if the demand for schooling has also increased. When there are no changes in the demand for educated labor, an increase in the supply of educated workers leads to a decrease in the earnings premium they have over less educated workers and the returns to schooling decrease. The technological revolution and prospects of automation and artificial intelligence put added strain on skills (Frey and Osborne 2017). It becomes more difficult to predict job changes and therefore schooling policy. If schools are unable to meet the demand for skills in the future, then the premium on high-order skills and competencies will rise, further raising the returns to schooling, and increasing income inequality (Tinbergen 1975; Goldin and Katz 2009). When technological or other developments occur that lead to an increase in the demand for educated labor substantially large enough to overcome

increases in the supply of educated labor, however, then the returns to schooling will increase (Psacharopoulos 1989).

The continued decline in the relative returns to primary schooling could be expected to cause the demand for primary education to fall. But since we are trending towards universal primary schooling in most parts of the world, then the demand for primary schooling may be safe. Given the sequential nature of the schooling system, one needs to invest in primary before secondary, and secondary before higher education. Therefore, high enrollment and completion rates will drive the demand for secondary school places. However, the plummeting returns to secondary puts further gains in doubt. The extent to which the option value of secondary schooling investments is uncertain but likely positive in terms of demand. The fact that the returns to higher education have been increasing gives one hope.

But the demand for post-primary schooling also depends on affordability. Secondary education is more expensive than primary education and in shorter supply. Further expansion will strain government coffers or lead to expansion without quality. The extent to which primary school returns have declined due to falls in quality would require further attention. Decreasing quality affects not only the labor market opportunities of those with only primary schooling but limits their ability to access high-quality secondary school opportunities.

Secondary school expansion is expensive. It will be even more expensive if the quality of primary schooling does not improve. Nevertheless, there is increased pressure to expand the system at secondary and higher levels. If not, then income inequality will rise. The high and rising returns justify cost-recovery at the higher education level. However, to avoid growing inequity, then innovative forms of financing are needed to allow worthy but credit-constrained students to attend.

References

Acemoglu, D. 2002. "Technical change, inequality, and the labor market." *Journal of Economic Literature* 40(1): 7-72.

Angrist, N., S. Djankov, P.K. Goldberg and H.A. Patrinos. 2019. "Measuring Human Capital." World Bank Policy Research Working Paper No. 8742.

Becker, G.S. 1964. *Human Capital Theory*. New York: Columbia.

Barro, R.J. and J.W. Lee. 2015. *Education matters. Global schooling gains from the 19th to the 21st century*. Oxford: Oxford University Press.

Coady, D. and A. Dizioli. 2018. "Income inequality and education revisited: persistence, endogeneity and heterogeneity." *Applied Economics* 50 (25): 2747-2761.

Colclough, C. 1982. "The impact of primary schooling on economic development: a review of the evidence." *World Development* 10 (3): 167-185.

Colclough, C., G. Kingdon and H. Patrinos. 2010. "The changing pattern of wage returns to education and its implications." *Development Policy Review* 28 (6): 733-747.

Dougherty, C. 2005. "Why Are the Returns to Schooling Higher for Women than for Men?" *The Journal of Human Resources* 40 (4): 969-988.

Frey, C.B. and M.A. Osborne. 2017. "The future of employment: how susceptible are jobs to computerisation?" *Technological forecasting and social change* 114: 254-280.

Goldin, C. 2018. "Human Capital." In C. Diebolt and M. Haupert, eds., *Handbook of Cliometrics*. Springer, pages 55-86.

Goldin, C.D. and L.F. Katz. 2009. *The race between education and technology*. Harvard University Press.

Juhn, C., K.M. Murphy and B. Pierce. 1993. "Wage inequality and the rise in returns to skill." *Journal of political Economy* 101 (3): 410-442.

Kingdon, G.G. 1998. "Does the labour market explain lower female schooling in India?" *The Journal of Development Studies* 35 (1): 39-65.

Levy, F. and R.J. Murnane. 1992. "US earnings levels and earnings inequality: A review of recent trends and proposed explanations." *Journal of economic literature* 30 (3): 1333-1381.

Marin, A. and G. Psacharopoulos. 1976. "Schooling and income distribution." *The Review of Economics and Statistics* 332-338.

Mincer, J. 1974. *Schooling, Experience and Earnings*. Cambridge, MA: National Bureau of Economic Research.

Montenegro, C.E. and H.A. Patrinos. 2014. "Comparable estimates of returns to schooling around the world." World Bank Policy Research working Paper No. 7020.

Patrinos, H. 2016. "Estimating the return to schooling using the Mincer equation." *IZA World of Labor 2016*: 278 (doi: 10.15185/izawol.278).

Patrinos, H. A. and P. V. Thang and N. D. Thanh. 2018. "The Economic Case for Education in Vietnam." World Bank Policy Research Working Paper No. 8679.

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

Psacharopoulos, G. 1989. "Time trends of the returns to education: Cross-national evidence." *Economics of Education Review* 8 (3): 225-231.

Psacharopoulos, G. 1985. "Returns to Education: A Further International Update and Implications." *Journal of Human Resources* 20 (4): 583-604.

Psacharopoulos, G. 1981. "Returns to Education: an updated international comparison." *Comparative Education* 17 (3): 321-341.

Psacharopoulos, G. 1972. "Rates of Return to Investment in Education around the World." *Comparative Education Review* 16 (1): 281-302.

Psacharopoulos, G. and H.A. Patrinos. 2018. "Returns to investment in education: a decennial review of the global literature." *Education Economics* 26 (5): 445-458.

Psacharopoulos, G. and H.A. Patrinos. 2004. "Returns to Investment in Education: A Further Update." *Education Economics* 12 (2): 111-34.

Shafiq, M.N. 2007. "Household rates of return to education in rural Bangladesh: Accounting for direct costs, child labour, and option value." *Education Economics* 15 (3): 343-358.

Tinbergen, J. 1975. *Income Distribution: Analysis and Policies*. Elsevier.

Weisbrod, B. 1962. "Education and investment in human capital." *Journal of Political Economy* 70 (5): 106-123.

World Bank. 2018. *World Development Report: Education*. Washington DC: World Bank.