Departamento de Economía
Facultad de Ciencias Sociales
Universidad de la República

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Rossana Patrón y Marcel Vaillant

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CAN EDUCATION POLICY ADDRESS THE WAGE GAP? A NOTE ON PUBLIC SKILL FORMATION IN DEVELOPING COUNTRIES

Rossana Patron

Marcel Vaillant

Departamento de Economía

Facultad de Ciencias Sociales

Universidad de la República

Resumen

Los efectos potenciales de la educación pública como productora de recursos humanos se discuten en este documento, teniendo en cuenta la presencia de ineficiencia sistémica en el sector, lo que es frecuente en los países en desarrollo. El análisis tiene implicancias para los hacedores de políticas ya que sugiere que: a) la falta de soluciones a los problemas de ineficiencia endémicos en la educación tiene un costo en términos de generación de desigualdad, y b) los efectos externos sobre la distribución del ingreso pueden ser mediados y aun revertidos por la orientación de la política educativa.

Palabras clave: educación pública, países en desarrollo, desigualdad salarial

Abstract

The potential distributional effects of public education as a producer of endowments are discussed, taking into consideration the presence of systemic inefficiency in the sector, which is typical in developing economies. The analysis has implications for policymakers, as it suggests the following: a) not addressing the inefficiency in educational systems has a cost in terms of wage inequality, and b) the effects of trade may be mediated or even reversed by the orientation of the education policy.

Key words: public education, developing countries, wage gap

JEL Classification: I28, F16

1 INTRODUCTION

From the Second World War until the present, the international economy has been characterized by the fact that the rate of growth of trade has been greater than that of the whole economic activity. Different periods may be identified according to which sector is the main engine of the dynamics of global exchanges. On the one hand, the last two decades of the 20th century show the greatest dynamism in the trade of manufacturing goods with a high level of technological complexity. During the period, the production processes were fragmented globally, with more specialization and trade in intermediate products. Also, the trade costs -the physical cost as well as those associated with trade policy- have followed a sustained decreasing trend favoring the growth of trade. On the other hand, in the present century the dynamic sector at the international level is the trade in commercial services. This globalization wave is characterized by the fact that traditionally non-tradable sectors became tradable, in particular a subset of some non-commercial services as business and financial services. These sectors require qualified employment, generating additional demand for other skill-intensive services such as telecommunications and information technologies.

From this, it may be suggested that one of the main challenges for developing countries is to increase the level of qualification of its populations to be capable of receiving benefits from the fresh opportunities that the new trends in globalization create. However, the poor performance of educational systems in developing countries has undermined the process of skills formation. In these countries, there are coverage problems at all levels, and many developing countries have yet to reach universal primary education, besides persistence of grade repetition, inequality in learning opportunities (across regions, gender, and socioeconomic groups), and poor quality of education. This is a problematic situation, as UNESCO (2008) states: "*As labour markets increasingly demand higher levels of skills, training and knowledge, access to secondary and tertiary education provides an important avenue for meeting the learning needs of young people and adults.*"

This paper focuses on the role played by the education sector, as producer of skills, in the wage gap issue, and the consequences of addressing or not addressing the inefficiency in the sector in developing countries. Several papers have discussed the role of demand and/or supply of skills in explaining the rise in the wage gap (Razzak and

Timmings, 2008; Avalos and Savvides, 2006; Sanchez and Schady, 2003; Birdsall et al., 1995) but have not addressed the role of the education provider. Some other authors, for instance, Jacobs (2004), Hanushek et al. (2003), Janeba (2000), and Turrini (1998), have focused on the role of the government in addressing the wage gap -such as the use of incentives to invest in human capital, for example, by tax exemptions or subsidies- but not on the improvement of the provision of public education. This paper uses a simple partial equilibrium model to discuss the role of education in the inequality puzzle; the model is also extended to an open economy context. The analysis highlights that underperforming education systems in developing countries have negative distributional effects, which may be addressed by suitable educational policies targeting inefficiency, such as enhancing basic education.

The rest of the paper is organized as follows: Section 2 describes the current situation of the public provision of education in developing countries and provides a simple model of education. Section 3 discusses the model properties and implications. Section 4 extends the discussion to an open economy context. Section 5 offers some concluding remarks.

2 THE PROVISION OF EDUCATION

2.1 The current situation

The education sector has a central role in the process of human capital accumulation; however, in many developing countries, the sector reveals poor performance. In general, the situation of educational systems in developing countries is characterized by the presence of internal as well as external inefficiency problems. On the one hand, high rates of early dropouts imply low completion rates and thus low productivity (measured by graduates) of expenditure in education. On the other hand, the presence of early dropouts lowers the qualifications of the average individual joining the labor force relative to what is actually being demanded in the labor market.

The World Education Forum (Dakar, Senegal, April 2000) adopted the goal “Education For All (EFA) by 2015,” focusing on the expansion of early childhood education, the achievement of universal primary schooling, the development of learning

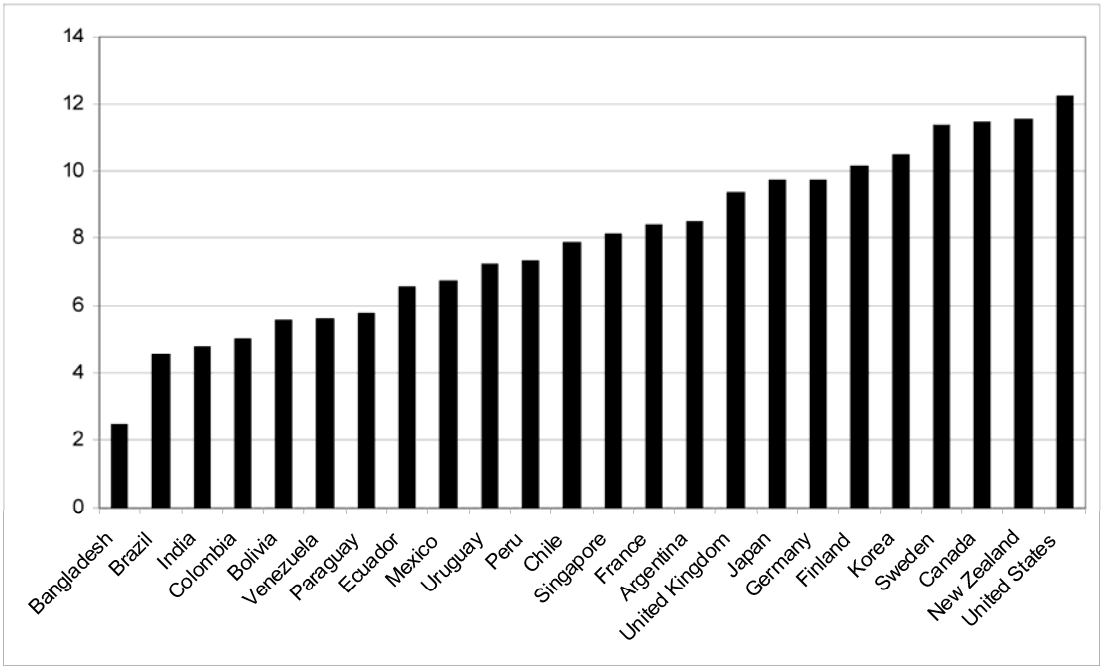
opportunities for youth and adults, the expansion of literacy, and the achievement of gender parity in education and improvements in the quality of education. We are more than halfway to 2015; although there have been significant achievements, progress has been uneven, and there is still a long way to go. At the primary level, the coverage has expanded, although it is not yet universal, and many countries are far from this goal: the rate of survival to the last grade of the primary level is lower than 87% in half of the countries with available data in 2004 (UNESCO, 2008). At the global level, the number of children who are out of school fell sharply during the period 1999–2006, but there are still approximately 75 million children out of the education system, of which 96% are in developing countries (UNESCO, 2009). At the secondary education level, there has been significant progress but with an uneven distribution. Although the enrolment rates at the secondary level rose during the same period, the coverage is still low in developing countries: the gross enrolment ratios are 60% and 101% in developing and developed countries, respectively, whereas the net enrolment rates are 53% and 91%, respectively (data for 2006). The EFA goals intend to close the gaps at the primary and secondary levels, as UNESCO (2009) states: "*Expanded access to both these levels is essential to equip young people with the skills, know-how and training they and their countries need to succeed in an increasingly integrated and knowledge-based global economy.*"

However, based on current trends, UNESCO estimates that by 2015 more than 700 million adults will still lack basic literary skills. Moreover, even at the primary level, only three of the seventeen countries with the highest records of out-of-school children, Brazil, India, and Bangladesh, are on track to achieve universal primary education by 2015. In the case of Brazil, the average period of schooling in 2000 (for the population aged 25 or older) was around 4.5 years, which is low compared with the neighboring Latin-American countries, and significant lower than the educational achievement in most developed countries, as shown in Graphic 1.

Those who pursue further studies obtain a high reward: the returns of attaining tertiary education in Brazil are the highest in Latin America and higher than in the United States (Blom and Velez, 2007); on average the labor earnings of the population with tertiary education (aged 25-64) are 76% higher in Brazil than in the developed world (data for 2007), according to the OECD (2009) report. As claimed, for instance, by Blyde et al.

(2007), Blom and Velez (2007), and Menezes-Filho (2001), the lack of adequately qualified labor may explain the high returns of education in Brazil. Even when the increasing trend in the educational attainment of the Brazilian population has been accompanied by a decline in the economic returns of schooling, such progress in education has been slower than in countries at similar levels of development (Menezes-Filho, 2001).

Graphic 1: Average years of schooling [a)], selected countries, 2000.



Source: Own elaboration using Barro and Lee (2001) data set.
[a)] Population aged 25 or older

Thus, in the case of Brazil it seems clear that an increase in the supply of tertiary graduates would contribute to a reduction of wage inequality. However, considering the low educational attainment in Brazil, coupled with the fact that the participation in the labor force of workers with only primary education is near 40% (Menezes-Filho and Scorzafave, 2009), reducing the participation of early school dropouts in the labor market could also be a policy target in the same direction. The case of Brazil is an example; the poor situation of the education sectors in developing countries suggests that the effects of enhancing the generation of skills on the wage distribution are potentially vast in many countries.

2.2 The education model

Education is publicly provided, with a budget that is exogenously determined. At the entry point all individuals enroll; they are full-time students whose exit time is endogenous: if the education quality is low, the system expels students out of it (systemic failure). Having heterogeneous students does not ensure equal educational opportunities: differences in ability, socioeconomic background, or other factors (e.g., gender, region) may introduce a bias in the occurrence of early dropouts (and even in the opportunities for access at the entry level), which is not explicitly modeled here (for equity issues related on dropout rates, see, for instance, Patron, 2008).

A two-level education system is considered: the output of education activities is given as $Q_j = F_j(K_j, E_j)$, where K_j and E_j are resources and enrolment, respectively, and the sub-index $j = B, H$ represents basic and higher education, respectively. The function F_j is subject to constant returns to scale, so the output per student can be written as $q_j = Q_j / E_j = F_j(k_j)$, where k_j measures the resource intensity per student and $\partial q_j / \partial k_j > 0$. The variable q_j is the amount of knowledge embodied in successful students, and it is assumed to measure "school quality," following Hanushek (1979). As Heckman and Masterov (2005) suggest that previous achievement enables future success, output per student is taken as the determinant of early dropouts, that is, $\theta = \theta(q_B)$, where $\partial\theta / \partial q_B < 0$ and $\partial^2\theta / \partial^2 q_B > 0$. This typically replicates the observed differences in education systems between developed and developing countries: while in the former education quality is high and early dropout rates are low, in the latter education quality is low and early dropout rates are high.

Students who exit the system with basic education enter the market as unskilled labor, whereas those with higher education enter the market as skilled workers; therefore, early dropouts tend to lower the average qualifications of entrants to the labor market. The composition of the inflow of labor produced depends on the time of exit; thus, the accumulation process is driven by

$$\Delta L_U = \theta E_B$$

$$\Delta L_S = E_H = (1 - \theta) E_B$$

where θ is the early exit rate, and ΔL_U and ΔL_S are the inflows of unskilled and skilled labor, respectively. The ratio of skilled to unskilled labor in the economy is modified by a marginal ratio defined as $\Delta L_S / \Delta L_U$. When $\Delta L_S / \Delta L_U > L_S / L_U$, where L_S and L_U are the existing stocks of skilled and unskilled labor, respectively, the ratio of skilled to unskilled labor in the economy rises; it declines when $\Delta L_S / \Delta L_U < L_S / L_U$ and remains unchanged when the growth is balanced. Thus, as poor school quality leads to inefficiencies in the educational expenditure measured by completion rates, it will also lead to a relative excess of unskilled workers in the inflow of labor produced.

3 PROPERTIES AND IMPLICATIONS

Property 1: *The composition of the inflow of labor produced depends on the systemic performance of the education sector; an inefficient sector (low completion rates) produces an inflow of labor units with a disproportionate share of unskilled workers.*

This means that the higher the θ (low completion rates), the higher the participation of unskilled workers in the inflow of labor produced; thus, the lower the marginal ratio $\Delta L_S / \Delta L_U$.

Implication 1: Education policy targeted at improving systemic efficiency changes the composition of newcomers to the labor market and leads to a higher participation of skilled workers.

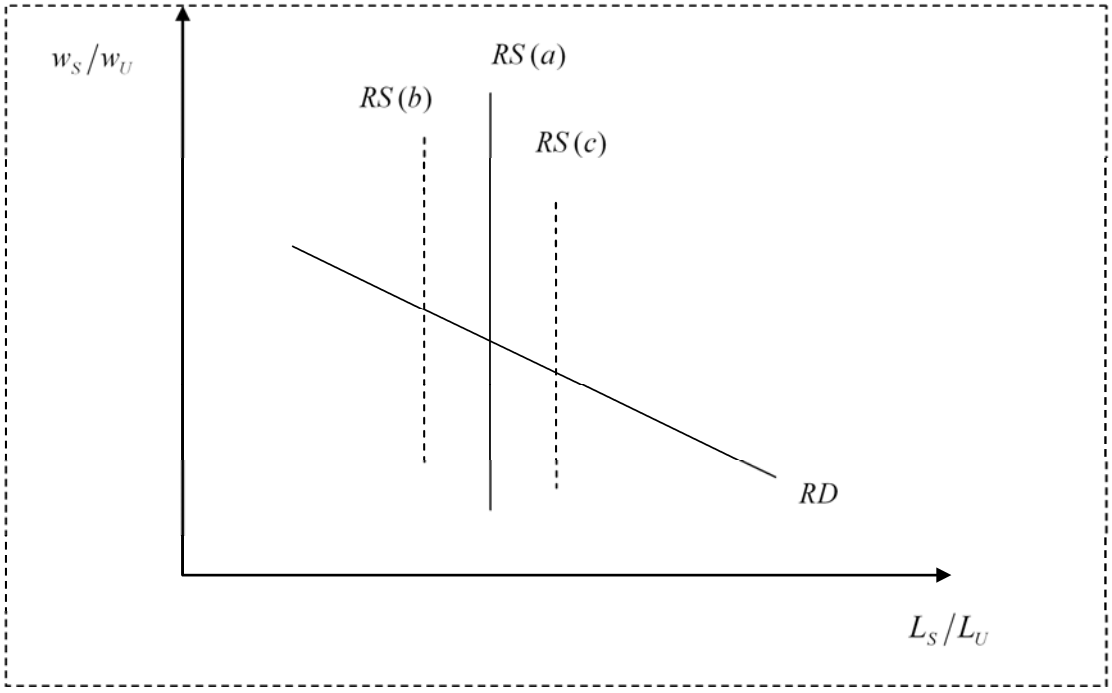
Property 2: *For poorly performing education systems (i.e., early dropouts, low quality), the production of skilled labor is favored by increasing the quality of basic education.*

The marginal ratio of skilled to unskilled labor depends on the resource intensity, defined as $\xi(k_B, k_H) = \Delta L_S / \Delta L_U = (1-\theta)/\theta$. The impact on the marginal ratio of an increase in the resource intensity at the basic education level is positive, shown as $\partial \xi / \partial k_B > 0$. Thus, the production of skills is improved by enhanced internal efficiency in the sector, as this allows more students to reach higher levels of studies.

Property 3: *Education production and educational policies, by determining the pattern of skills formation, have distributional effects.*

Alternative patterns of endowment growth are explained by the different levels of efficiency in the education sector. These patterns could be: balanced growth (case a), unskilled-biased growth (case b), and skilled-biased growth (case c). In Figure 1, the relative supply (RS) of and relative demand (RD) for skilled to unskilled labor determine the relative wages in the labor market; the figure shows that a balanced growth leaves relative wages unchanged (case a), whereas unskilled-biased growth (case b) increases the wage gap and skilled-biased growth (case c) reduces it.

Figure 1 Relative wages with alternative growth patterns



Implication 2: Inefficient educational systems have a cost in terms of inequality.

As seen in the figure, underperforming public education systems (low quality, low completion rates) tend to worsen wage inequality, as they produce relatively excessive unskilled labor. Thus, educational policies aimed at reducing systemic inefficiency, by upgrading the mix of labor produced, have positive distributional effects.

Implication 3: Education policy could mediate the effects of external shocks (e.g., globalization) on wage inequality.

What if the globalization wave makes previously non-traded services in developing countries tradable? This shock would push up the relative demand for skilled labor and the skill premium, but educational policies may mediate the resulting effects by raising the skill-to-unskilled ratio in the production of labor. A partial equilibrium exercise using Figure 1 can illustrate the case: an external shock that pushes up the relative demand for skilled labor would shift the RD curve upwards, widening the wage gap. However, this is not a necessary result. A skilled-biased growth would shift the RS curve to the right: a mildly skilled-biased growth could ameliorate the effect on wage inequality, whereas a strongly skilled-biased growth could even reduce wage inequality. Thus, educational policies may mediate the effects of trade policy or external shocks.

4 TRADE AND EDUCATION

In the context of an open economy, the debate around the wage gap issue confronts the roles played by education (as supplier of skills), trade, and technological change in its determination (see, for instance, Leamer, 1995; Krugman 1996, 2008; Acemoglu, 2003). The increasing trend in the skill premium in industrial countries is well documented; however, contrary to standard trade theory predictions, recent studies, for instance, Mamoon and Mansoob Murshed (2008), Atolia (2007), Behrman et al. (2007), Perry and Olarreaga (2006), Arbache et al. (2004), and Goldberg and Pavcnik (2004), have also drawn attention to the increase in the skill premium in developing countries after substantial trade opening. This section extends the partial equilibrium analysis to the open economy context to address this issue.

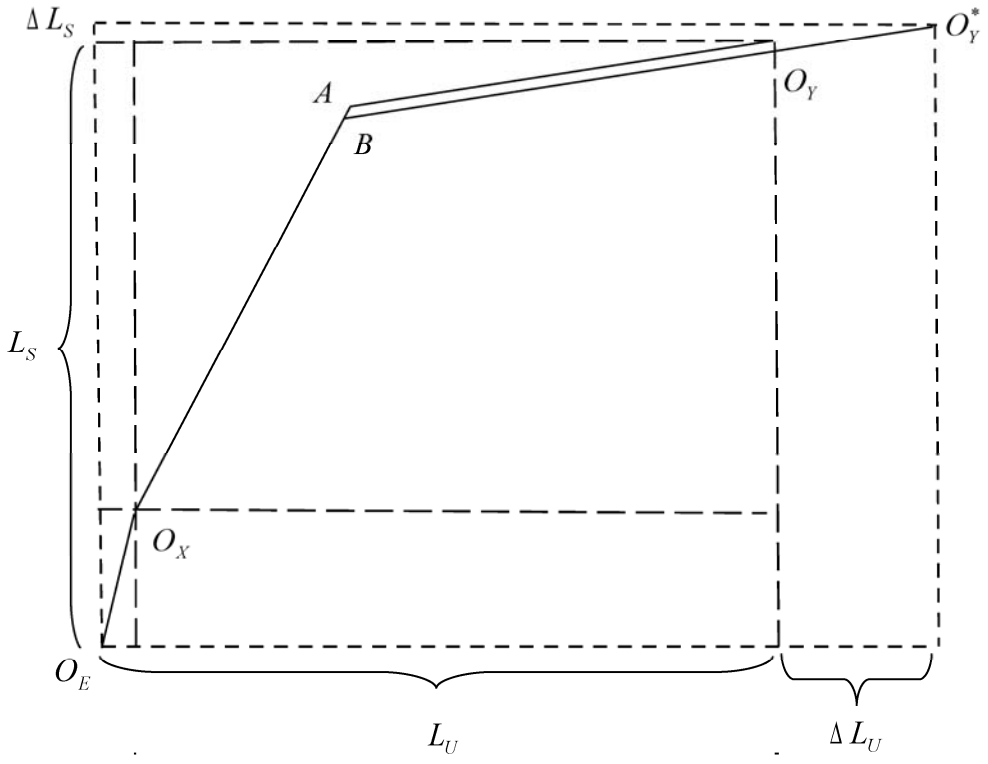
The model used here follows a modeling approach similar to that in Abrego and Whalley (2003): It considers product differentiation by country, so, in contrast to the standard approach, changes in local conditions (e.g., in the domestic supply of and demand for skills) also affect product and factor prices. The general equilibrium settings for a developing economy are as follows: there are two types of labor (unskilled and skilled), two tradable sectors (X and Y), and a public education sector. The export sector is unskilled intensive, the import-competing sector is skill intensive, and education activities are skill intensive. Education is the only activity of the public sector, and its budget is tax financed and exogenously determined; its systemic performance is poor (high rates of early dropouts). The trading sectors charge different prices in domestic and foreign markets. All

production functions are subject to constant returns to scale. There are competitive markets for all goods and factors. Households supply their endowment of labor units (skilled and unskilled) and spend all their (post-tax) income in consumption goods. Under these settings, the model has the following property.

Property 4: *Educational policies, by determining the production of skills, affect the country's pattern of trade.*

The composition of the output of education determines the pattern of factor growth, which depends on the efficiency of the sector. The standard Rybczynski effect (Rybczynski, 1955) applies, with a shift in the production possibility frontier biased toward the sector intensive in the factor that grows relatively, holding constant prices and technology. This can be analyzed in Figure 2 using the Edgeworth box.

Figure 2 Rybczynski effect



. It is assumed that education employs a fixed amount of resources measured from origin O_E. For the productive sectors X and Y, allocation is measured from origins O_X and O_Y, respectively. Point A is the initial equilibrium for the factor allocation to sectors

X and Y, defined by the intersection of the rays O_X and O_Y, where the gradients of the rays are given by the skill intensity in each sector (i.e., sector X is more skill intensive than Y, but education is the most skill intensive). The comparative static exercise consists of an unskilled-biased growth in endowments, denoted in the figure by ΔL_U and ΔL_S, which shifts the origin to O_Y^*. The new equilibrium shifts to B, where the output of the skill-intensive sector is reduced and that of the unskilled-intensive sector expands. Thus, the composition of the output of education determines endowment growth and consequently affects trade patterns.

In practice, the typical pattern of endowment growth in developing economies tends to be dominated by unskilled labor because of high rates of early dropouts, as in the case shown in Figure 2. Under the settings of this section, this pattern of pattern of endowment growth also leads to a relative decline in the return to unskilled labor. However, alternative patterns of growth in endowments would have different effects on trade and wage inequality. Thus, the consideration of the efficiency of actual educational systems (completion rates) may help to improve the predictive power of the traditional trade approach. In particular, it may explain why two countries with educational systems delivering different mixes of workers could be differently affected by trade shocks.

5 CONCLUSIONS

The performance of education systems in most developing countries is poor and improves sluggishly. Increases in skill demand not met by increases in supply are often cited as the cause of the increase in the skill premium; so, does education policy have a role in the inequality puzzle in developing countries?

This paper focuses on the inequality effects of underperforming public education systems and the potential of educational policies to produce economy-wide effects. It shows that the efficiency level in the education sector affects the wage distribution: more inefficiency leads to more inequality. This is so because inefficient education systems tend to produce a relative excess of unskilled labor, leading to a reduction in the relative wage of this type of workers; on the contrary, education policy targeted at improving systemic efficiency could improve completion rates, upgrading the composition of the labor

produced, with positive effects on wage inequality. The argument can be extended to an open economy context: the impact of globalization (skill-biased labor demand) on the wage gap in developing countries could be moderated or even reversed by policies targeted at improving the efficiency of the education system, raising the skill-to-unskilled ratio in the production of labor.

Education policy may enhance the generation of skills by ensuring the broadest access to education at all levels. The best-suited policies to reduce systemic inefficiency are not evident, but this study shows that for poorly performing education systems, the production of skills could be favored by increasing the quality of education at the basic level. Any education policy targeted at improving systemic efficiency such as improving the organization of schools, the teaching approach, or the relevance of the curriculum, may produce similar effects; however, the evaluation of the cost-effectiveness of alternative policies is beyond the scope of this paper.

The analysis shows that there is a significant scope for educational policies to address the wage gap in countries with poorly performing education sectors. The situation of the education sectors in many developing countries suggests that the effects of enhancing the generation of skills on the wage distribution are potentially vast. The analysis in this paper does not intend to allocate the responsibility of the increase/reduction of wage inequality in developing countries to the education sector, but it does try to draw attention to the role played by the performance of the sector in the inequality puzzle, both in closed and open economies. In particular, the analysis has implications for policymakers, as it suggests the following: a) not addressing the inefficiency in educational systems has a cost in terms of wage inequality, and b) the effects of trade and trade policy on inequality may be mediated or even reversed by the orientation of education policy.

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