Chapter 3

Skills in Latin America and the Caribbean amid shifting wealth

This chapter analyses the influence of shifting wealth on skills and production development in Latin America. It proposes that an inadequate supply of skills (in terms of quantity and quality) explains their limited role in the Latin American development model. This situation has left the vast majority of countries in the region caught in the middle-income trap, which is particularly difficult to escape in the current context, in which shifting wealth is making it difficult to identify and acquire the necessary skills. More than in any other emerging region, Latin American companies are not seeing their demand for skills being met. This contrasts with the drop in returns to education in the region, reflecting the complexity of acquiring the skills needed in such a dynamic economic environment. The chapter also analyses the distribution of workers according to their level of skills and highlights the potential role of technical and vocational training in increasing the impact of training on employment.

Shifting wealth[1] directly influences skills[2] and production development in Latin America. Skills play a limited role in Latin America's growth model, which is one of the reasons why Latin America remains in the so-called "middle income trap".[3] The shift in global wealth towards emerging countries is causing major changes in the supply and demand for skills, both worldwide and specifically in Latin America.

The first section of this chapter describes the relationship between skills and the middle-income trap, with a special focus on Latin America. The next section provides a detailed explanation of how shifting wealth affects that relationship through major changes in the supply and demand for skills. The third section explores the demand for skills in Latin America, and uses an empirical analysis to conclude that there is an unmet demand for skills, more so than in other emerging regions. Consequently, the fourth section examines how the relationship between supply and demand for skills has evolved, analysing the decisive factors behind the recent decline in the returns to education and the importance of technical and vocational education and training (TVET) in forging linkages between the education system and the production sector. The fifth and final section summarises the main conclusions drawn in the chapter and makes some policy recommendations.

The limited role of skills in Latin America explains why the region remains in the middle-income trap

Economic-development literature has recently suggested the existence of a "middle-income trap".[4] Its most obvious sign is a prolonged slowdown in economic growth after a country reaches the middle-income range. However, there are various methods for identifying the middle-income trap and different income ranges used to define when a country is in the trap.

A fundamental cause of the middle-income trap is the inability to move towards a more knowledge-based and skills-based economic model. Economic development in its early stages is marked by a reassignment of production factors among activities that generate major productivity gains (Kuznets, 1955). Because of the almost endless supply of labour, the additional productivity does not translate entirely into higher salaries, so the economy maintains its price competitiveness. This generates a favourable environment for a reallocation of factors accompanied by greater specialisation in cost-sensitive, unskilled activities, usually with strong support from foreign technology (Agénor, Canuto and Jelenic, 2012).

However, once a country reaches middle-income levels, the continuity of this development model is jeopardised. On the one hand, the first signs of pressure on the labour markets emerge. These pressures are countered with wage increases with no corresponding productivity gains, because the sectors that experienced productivity gains during the initial development phase tend to exhaust them (Agénor, Canuto and Jelenic, 2012). As labour costs increase and price competitiveness falls, new forms of competitiveness are required, with output that is of better quality or more suited to consumer preferences (Kharas and Kohli, 2011). The production structure must be geared towards more knowledge-intensive and technology-intensive sectors with higher value added (Spence, 2011; Foxley and Sossdorf, 2011; OECD, 2014). This transition is particularly difficult for middle-income economies, but is necessary to prevent the structural transformation from stagnating.

Skills are one of the main inputs for escaping the middle-income trap

A country's ability to steer its growth model towards high value-added, technology-intensive and knowledge-intensive activities depends on a broad set of complementary variables, ranging from a stable macroeconomic environment to an innovation-friendly business environment (World Bank, 2010).

Repeatedly, the literature that discusses these factors mentions skills among the most important requirements. In part, this is because skills are closely connected to the knowledge-intensive and innovation-intensive activities and industries (see Chapter 5), which drive economic development once middle-income levels have been reached. Furthermore, a larger stock of skills raises efficiency, which becomes the main driver of growth as other factors see their contribution to growth decrease (Kharas and Kohli, 2011). The quality and complexity of the skills must gradually increase and include both cognitive and social skills, especially those related to science and creativity in the production environment. In short, those countries that are able to accumulate a larger stock of high-quality human capital are more likely to avoid the middle-income trap (Eichengreen, Park and Shin, 2013).

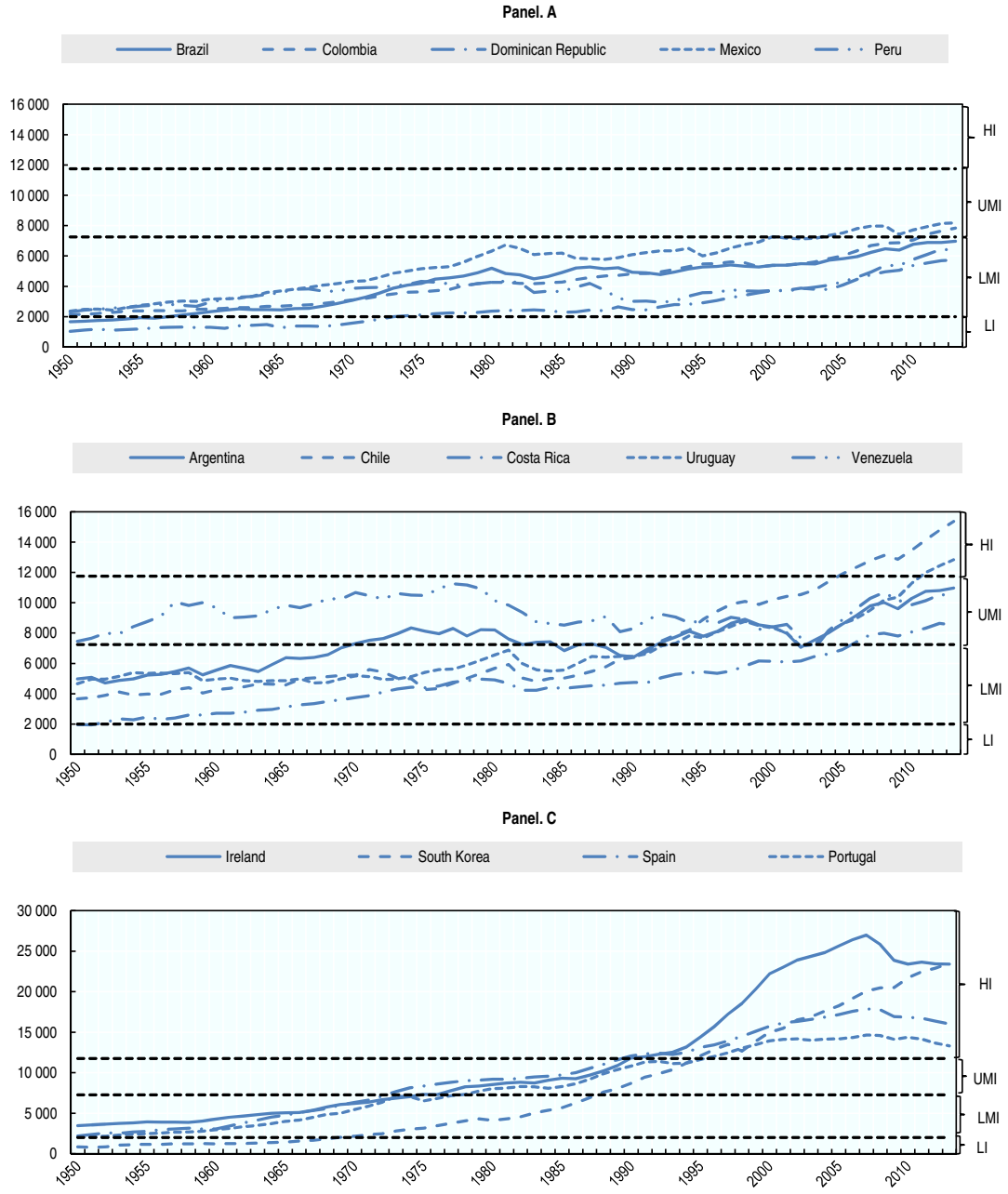
The middle-income trap is a persistent problem in Latin America and the Caribbean, which has been surpassed only by Trinidad and Tobago, and in more recent times Chile and Uruguay

Latin America and the Caribbean is particularly badly affected by the middle-income trap. Although income in the region was relatively high in the mid-20th century, the countries have made no considerable progress in closing the income gap with advanced economies. Over the last six decades most countries that have transitioned from middle-income to high-income levels have been in Europe and Asia. Only Chile, Uruguay, Trinidad and Tobago, and some other Caribbean economies are part of the group of high-income economies in the region (as classified by the World Bank for 2015).[5]

This middle-income trap is particularly persistent in the region. Some studies have found that Brazil, Colombia, Peru and the Bolivarian Republic of Venezuela (hereafter "Venezuela") have been caught in the trap for over 60 years (Felipe, Abdon and Kumar, 2012). Using the same series and the same levels to define income groups,[6] Figure 3.1 (Panels A and B) shows the middle-income trap's influence on Latin America over time.

In most countries the upward trend in per capita gross domestic product (GDP) ended in the late 1970s, when income levels in several countries became more erratic and began to stagnate or fall. This situation was exacerbated by the 1980s debt crisis and started to correct only with the expansionary phase of the 2000s. This pattern was most prominent in Argentina and Venezuela, both of which had a relatively high GDP per capita in 1950, but it also occurred in countries that initially were lower-middle income (Colombia, Mexico and Peru). The pattern is in sharp contrast to what happened in Asia and Europe, where some countries not only avoided the middle-income trap, but continued on a path of continuous growth for several decades (see Figure 3.1 Panel C for a selection of these countries).

Figure 3.1. **Middle-income trap in selected Latin American and OECD countries**
(constant 1990 USD, PPP, 1950-2012)



Note: The horizontal lines mark the thresholds between the low-income (LI), lower-middle income (LMI), upper-middle income (UMI) and high-income (HI) groups.

Source: Authors' work based on the Conference Board Total Economy Database™, accessed in January, www.conference-board.org/data/economydatabase/.

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Countries in the middle-income trap struggle to redirect their growth strategy once they reach middle-income levels (Kharas and Kohli, 2011). In Latin America, structural transformation has not been directed towards knowledge-intensive activities. This is related to education indicators, which, as shown in this chapter and in Chapter 4, reveal a substantial, persistent gap with countries that were able to escape the middle-income trap, particularly in the area of quality of education. This gap is compounded

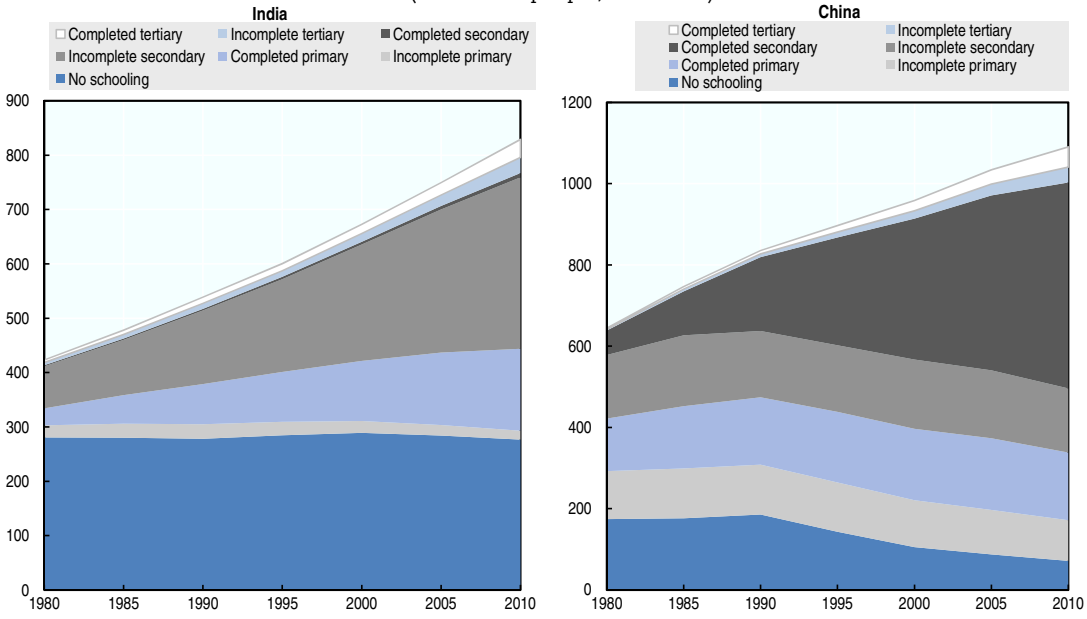
by an inefficient allocation of resources, resulting in much lower productivity than in advanced economies (Busso, Madrigal and Pagés, 2013; Loser, 2013). This productivity gap is one of the main symptoms of the middle-income trap in the region (OECD, 2014).

Shifting wealth impacts supply and demand for skills in various ways

The shift in global wealth towards emerging countries vastly transforms the stock and make-up of production skills. One of the most significant changes is the positive supply shock generated by the large emerging countries' entry into the global economy. China and India brought 1.2 billion new workers into the global economy, most of whom had only basic skills (OECD, 2010a).

Over time, some of these emerging economies have begun to steadily increase their stock of skills. There is a growing consensus that they need to improve the skills of their workforce to meet the needs of the new global economy and to deepen structural transformation. According to some estimates, the number of university graduates in emerging countries has more than doubled since 1980 (McKinsey Global Institute, 2012). A major factor that shaped changes in the distribution of skills in Asia's two largest developing economies, People's Republic of China (hereafter China) and India, is the large upsurge in the number of people with secondary education qualifications. A relatively similar upsurge has been seen in the number of people who have complete or incomplete tertiary education, albeit from a much lower starting point (Figure 3.2).

Figure 3.2. **Population by education level**
(millions of people, 1980-2010)



Source: World Bank (2014), *World Development Indicators*, World Bank, Washington, DC.
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Latin America too has increased its supply of skills, especially the percentage of the population with secondary or tertiary education (see Chapter 4). As a result, the region has considerably narrowed the gap in education coverage with the OECD economies. Moreover, the recent growth in the middle classes in the region provides another foothold for skills acquisition, as the middle classes are more likely to demand education services (BBVA, 2013). However, these trends should be treated with caution, since the main comparative tests for education systems find that the gap in educational quality with advanced economies remains.

On the demand side, shifting wealth and the associated demand for commodities frequently appear as one of the factors that led Latin America and the Caribbean to less complex skill requirements. China's and other emerging economies' demand for commodities has driven countries with abundant natural resources to move away from knowledge-intensive activities, relatively speaking, and towards the provision of commodities. This shift has increased demand for skills related to natural resources (Aedo and Walker, 2012). The situation is also challenging for countries that do not specialise in commodities, since they struggle to maintain or develop comparative advantages in manufacturing because of China's position as "global factory".

Latin America therefore appears to have experienced an incomplete structural transformation with a non-skill-intensive production model. The region's commodity sector, operating as an enclave with little capacity to create jobs or production linkages, coexists with a limited manufacturing sector exposed to strong competition from abroad and a highly informal services sector whose human capital is poorly qualified (McMillan and Rodrik, 2011; Cimoli and Correa, 2002).

Globally, however, technological change is driving demand for skills acquired through higher qualifications. The wave of technological innovations over the past few decades has fostered an increase in the relative demand for skilled workers for two reasons. First, absolute demand for qualified workers has increased because of the complementarity between skilled workers and new technologies, since they are the ones who can use them. Second, relative demand for less-skilled workers has decreased because some of these technological innovations are taking over routine tasks that they previously carried out (Acemoglu and Zilibotti, 2001; Autor, Katz and Krueger, 1998).[7]

Globalisation is another driver of demand for skills. Trade liberalisation and capital liberalisation in recent decades have strengthened the role of skills as a source of economic competitiveness (Lall, 2000). This same liberalisation process has facilitated new business structures, especially businesses whose production stages are spread across various geographic areas. These new structures have given rise to a new labour structure based on a horizontal, flexible approach with adaptability. These attributes generate additional demand for a wide array of skills, ranging from technical knowledge of the digital world to "soft skills" such as agile thinking, interpersonal communication and the ability to operate in multicultural, geographically dispersed environments (Oxford Economics, 2012).

Global value chains are a prime example of this new production structure. Global value chains define much more specific competitiveness niches that are directly related to a particular activity in the production chain. Identifying and correcting skills mismatches therefore becomes a much more arduous task, since there is no longer such a direct link with the sector, but rather with a particular segment in the production process. Likewise, changes to the distribution of value in the chain suggest that skills have become a more important factor in generating value added, because knowledge-intensive activities in the production chain (research and development [R&D], design, marketing, etc.) tend to increase their relative contribution to value added (OECD, 2013c).

In conclusion, several counteracting factors are determining the balance between supply and demand for skills. The entry of some large emerging countries into the global economy is having a crucial influence, increasing the global labour supply. In addition, measures for the provision of education in some of these countries are significantly affecting the supply of skills worldwide. On the demand side, technological and structural changes are affecting demand for skills, which is becoming more complex and segmented.

As a result, the interaction between supply and demand in national labour markets is becoming more complex because the global supply of skills is growing and demand is

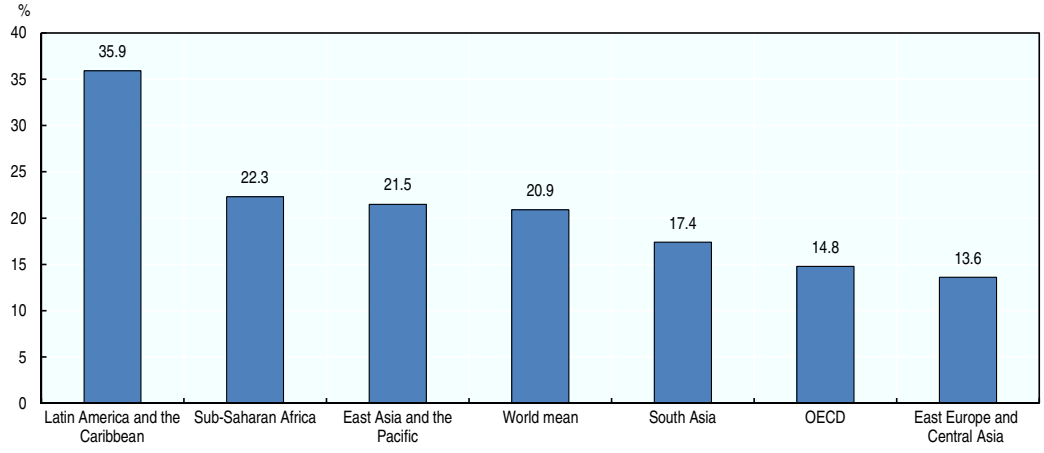
being shaped by increasingly more specific know-how, the balance between technical and soft skills, the need for continuing education and retraining, and the fragmentation of production.

Latin America is struggling more than other emerging regions to meet demand for skills

Latin America is one of the regions where the gap between supply and demand for skills seems to be having the greatest impact. There is a wide gap between the training that the education system provides and the skills that the production sector demands. Furthermore, according to the World Bank Enterprise Surveys,[8] Latin America's production sector struggles more than that of any other region to find the skills that are in demand. Specifically, 35.9% of firms say they struggle to find an adequately educated workforce (Figure 3.3).

Globally, it seems to be mainly the middle-income countries that struggle to meet demand for skills. An "inverted U" trend is observed, with firms in low-income and high-income countries having the least difficulty in finding an adequately trained workforce, and firms in middle-income countries, especially in upper-middle income countries, and more so in Latin America, having the most difficulty finding the skills they need. The difficulty in finding skills acts as a barrier to development (Figure 3.4).

Figure 3.3. **Percentage of firms that believe an inadequately educated workforce is a major constraint on their operations, by region**



Note: Data are taken from the last survey available for each country. The countries included in the sample, by region, are: Sub-Saharan Africa: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Côte d'Ivoire, Cabo Verde, Chad, Congo, Democratic Republic of Congo, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Lesotho, Madagascar, Mali, Mauritania, Mauritius, Malawi, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe. Latin America and the Caribbean: Argentina, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Lucia, Suriname, Trinidad and Tobago, Uruguay and Venezuela. East Asia and Pacific: Cambodia, China, Fiji, Indonesia, Laos, Malaysia, Micronesia, Myanmar, Mongolia, Philippines, Samoa, Thailand, Timor-Leste, Tonga, Vanuatu and Viet Nam. South Asia: Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka. Eastern Europe and Central Asia: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Georgia, Hungary, Kazakhstan, Kosovo, Kyrgyzstan, Macedonia, Moldova, Montenegro, Romania, Serbia, Tajikistan, Turkey, Ukraine and Uzbekistan. OECD: Chile, Estonia, Germany, Greece, Ireland, Israel, Korea, Poland, Portugal, Slovak Republic, Slovenia, Spain.

Source: *Enterprise Surveys* (2012), World Bank, Washington, DC.

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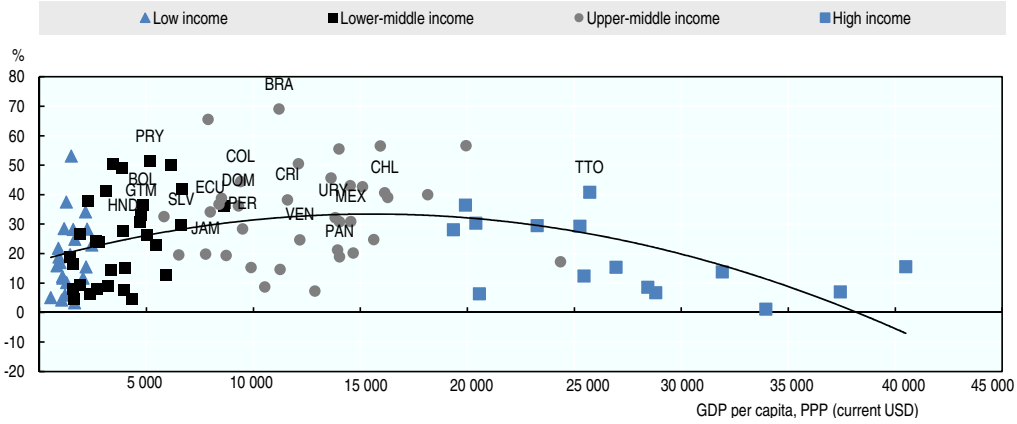
Figure 3.4. **Percentage of firms that believe an inadequately educated workforce is a major constraint on its operations, by country and income per capita**



Source: Authors' work based on data from *Enterprise Surveys* (2012), World Bank, Washington, DC and World Bank (2014), *World Development Indicators*, World Bank, Washington, DC.
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Explaining demand for skills in Latin America vs. other emerging regions through empirical analysis[9]

This section analyses whether there is more trouble for firms to meet their human capital needs in Latin America than in other emerging regions. It looks at the intensity of skills required by the production process in the regions' economies, the level of development and the sector in which the company operates.

A variable was used to analyse the difficulty posed by the lack of adequately educated workers to operate a company (based on the World Bank's *Enterprise Surveys* database). The variable is an integer from 0 to 4, where 0 means the company faces no obstacles and 4 means the company faces "very severe" obstacles. A sampling of emerging and developing economies was used, with data from 2006 to 2010. Econometric analysis was applied to the sample, with two types of ordered logit specifications. First, collapsed values of the dependent variable were taken, with those firms reporting least difficulties (0 and 1) placed in one group and those encountering most difficulties (3 and 4) in the other.[10] Second, a generalised ordered logit model was used to enable all the levels described to be included.[11]

Latin America was the region with the highest percentage of formal firms reporting greater operating difficulties due to the skills shortages.[12] Based on the collapsed values of the dependent variable, 53% of the Latin American firms[13] in the sample reported facing major operating difficulties because they struggled to find adequately educated human capital, while 47% reported facing limited difficulties. Only Europe and Central Asia used to have results close to these a few years ago, while in the other regions a much smaller proportion of companies face such difficulties.[14]

To evaluate properly these difficulties, it is important to consider the intensity with which firms use skills (measured as the ratio of non-production workers to production workers), the level of development of the country in which the firm is based (measured as GDP in US dollars at purchasing power parity), and the firm's region and sector (identified using dummy variables). Thus, some of the specifications included interaction terms between the region dummy and the skill-intensity variable.

The empirical analysis confirms that Latin American firms are more likely to encounter difficulties in finding skills than firms in other regions. The odds ratios show that Latin American firms are 2.9 times more likely to encounter major difficulties in meeting their demand for skills than firms in South Asia, and around 13 times more likely than in Pacific Asia. Furthermore, in Latin America, firms with a skill-intensive production process are more likely to face major difficulties in finding the skills they require.

In terms of production sectors, the automotive and machinery industries have greater difficulties meeting their demand for skills. To enable analysis by sector, 12 category variables were included to represent 12 industries. These sector dummy variables do not affect the above conclusions drawn from the geographical variables, with Latin America remaining the region with the greatest difficulties. The machinery and automotive industries have greater difficulties meeting their human-capital needs. The chemicals and services industries, on the other hand, have statistically significant negative ratios, while industries involved in exploiting raw materials do not have significant skills deficits. The results hold true both for the sample of all emerging regions and for a sample containing only Latin American firms.

The greater difficulty encountered by the automotive and machinery industries is especially challenging, since those industries could be vital to the region's structural transformation. These sectors tend to show a greater degree of sophistication, connectivity and complexity than most tradeable industries. To analyse this, an empirical analysis compared the two sectors with all the other industries using three "product space" variables (Hausmann, Hwang and Rodrik, 2007; Hidalgo et al., 2007). Some of these variables were built using trade data from the United Nations' COMTRADE database and the product-complexity index designed by Hausmann et al. (2011).

The main benefit of this methodology is that it can evaluate an economy's structural transformation based on certain features of the tradeable industries in the export basket. In particular, these features include the industry's sophistication and its similarity or "closeness" to other industries (see Box 3.1). The automotive and machinery industries have higher average values for all the product-space variables. This is true not only compared with all the other sectors combined but also compared with the individual sectors most closely involved with raw materials (foodstuffs and basic metals).[15]

Nevertheless, product-space analysis has certain limitations: because it uses final transaction values, the above conclusions should be treated with caution. First, trade specialisation is a less accurate proxy for an economy's production structure than other indicators such as sector contributions to GDP. The use of final transaction values can create a false picture of the value added generated by an economy, especially in sectors in which there is a strong presence of global value chains (OECD, 2013c). Finally, the database used in the analysis does not cover the services sectors, which can be an essential pillar in emerging economies' development strategies, including those of Latin America (OECD, 2013a).

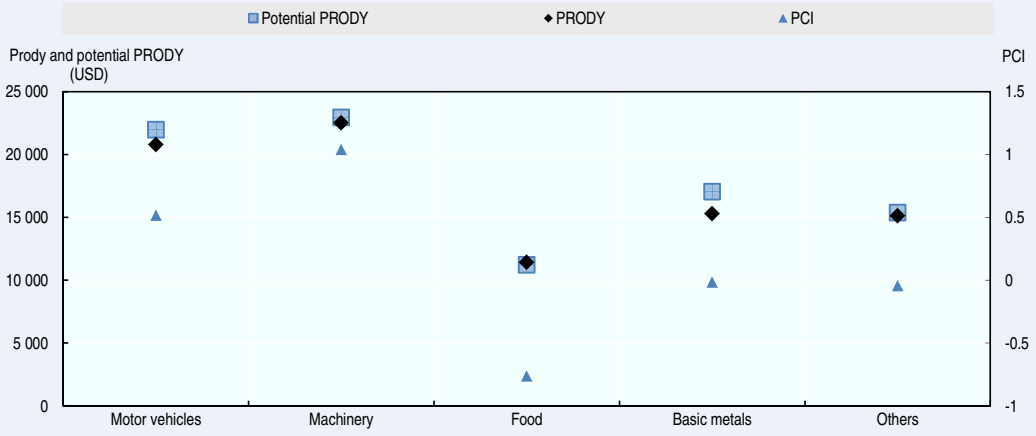
Box 3.1. **Sectors with unmet demand for skills: Fundamental for structural transformation?**

This box presents the findings of the sectoral analysis using the product-space variables. The prior econometric analysis identified the automotive and machinery sectors as those with the most human-capital problems. We must therefore now determine whether this situation is related to Latin America's difficulty in implementing a more profound structural transformation.

The analysis is based on comparisons of the medians of three variables (PRODY, potential PRODY and product complexity index; see the note to Figure 3.5) derived from the product-space methodology.

These comparisons are made for five sectors: motor vehicles, machinery, foodstuffs, basic metals, and the entire sample except automobiles and machinery (referred to as "other"). The sectors with the most acute problems meeting their workforce needs in Latin America (motor vehicles and machinery) are therefore compared against the other sectors ("other") and against the food and basic metals sectors, which act as proxies for commodity sectors, therefore linked to the "reprimarisation" of the region's economy resulting from shifting wealth.

Figure 3.5. **Median of product-space variables**



Notes: PRODY: a product-sophistication index calculated as a weighted average of GDP per capita of countries that export a product with a revealed comparative advantage (RCA>1), where the weights reflect the RCA. The PRODY index is thus an approximation of a product's sophistication, with higher indices representing products that are exported by countries with a higher GDP per capita (Hausmann, Hwang and Rodrik, 2007). The median was taken for the years 2000-05, which is the interval that covers the largest number of industries.

Product complexity index (PCI): an index created by Hausmann et al. (2011) using the "method of reflections". This method uses information on a country's diversification of exports and the ubiquity of the products it exports to build an index that evaluates the skills used to produce a good. The PCI is calculated using the average diversification of countries that export a given product with RCA and the average degree of ubiquity of other goods exported by those countries. Higher indices are associated with products requiring a greater number of production capacities, or capacities that are more complex.

Potential PRODY: the PRODY index and the variable for proximity among sectors (Hidalgo et al., 2007) are used to build the potential PRODY variable, which measures a product's connectivity with the rest of the product space. It is calculated as a weighted average of the PRODY values of the sectors to which the sector is connected, where the weights reflect the distance (measured as probability) between the two products. High potential PRODY values therefore indicate goods that are situated better in the product space, which is determined by the product's proximity to a wide range of sectors or to highly sophisticated sectors (PRODY).

Source: Authors' work based on United Nations Statistical Division (2013) (http://comtrade.un.org/) and Hausmann et al. (2011), *The Atlas of Economic Complexity*, Puritan Press, accessed in May 2014.

StatLink http://dx.doi.org/10.1787/888933174406

Box 3.1. **Sectors with unmet demand for skills: Fundamental for structural transformation?** *(cont.)*

Under these parameters, the median values for the product sophistication (PRODY), connectivity in the product space (potential PRODY) and product-complexity index (PCI) variables are compared (Figure 3.5). This comparison confirms that the automotive and machinery sectors have higher PRODY, potential PRODY and PCI values. This holds true in comparisons with the other sectors in the product space and comparisons with sectors more closely involved with raw materials. The tradeable industries with particular difficulties finding the skills they need are therefore also some of the industries that would be better able to underpin structural change and the region's transition to a knowledge-intensive and technology-intensive development model

The relationship between supply and demand for skills in the labour markets can be analysed by the distribution of workers and by the returns to education

Recent studies all confirm that there is unmet demand for skills in Latin America. In 2014, 56% of employers in the region reported that they had difficulties finding the workforce they needed (Manpower, 2014), compared with only 42% in 2010. These difficulties were particularly prominent in Peru (67%), Brazil (63%) and Argentina (63%). The same survey found that employers had more difficulties finding technical skills than other skills.

Latin American firms are seeking a series of "soft skills" that are particularly scant in the region. In addition to cognitive skills, a number of non-cognitive skills related to aspects such as critical thinking, responsibility in the workplace, teamwork, dealing with complex situations, and oral and written communication can be very important to the performance of a profession. Usually known as "soft skills", these skills are in high demand among the region's employers, who say they struggle to find workers that have them (IDB, 2012).

The interaction between supply and demand in the Latin American labour market shows that there is a high concentration of low-skilled workers and jobs

The relationship between supply and demand for skills can be analysed in the labour market. To this end, supply and demand for lower, medium and higher skills are compared. The supply of skills is measured as the percentage of people with different levels of education employed in an economy. Those with only primary education are classed as low-skilled, those with secondary education as middle-skilled, and those with tertiary education as high-skilled. Demand, meanwhile, is measured using the proxy of the percentage of employment in a particular occupation, and each occupation is associated with a certain skill level (Box 3.2). Figure 3.6 (panels A, B and C) shows the results of these skills' supply and demand proxies for low, medium and high skills in a wide range of countries.

Box 3.2. **Demand for skills: Classification of employment by occupation and skill level**

To determine demand for skills in the labour market, the percentage of employment in a particular occupation is taken, and that occupation is associated with a certain skill level. Demand for skills can thus be compared against supply, which is approximated using workers' level of education, as shown on the horizontal axis in Figure 3.6.

Skill levels were assigned to each occupation based on the ISCO-88 classification (see Table 3.1). Each of the ten major groups of occupations in the classification was associated with one of three skill levels: low-skilled, medium-skilled and high-skilled.

Low-skilled workers (skill level 1) included unskilled workers and members of the armed forces. Medium-skilled workers (skill level 2) included clerks; service workers and shop and market sales workers; skilled agricultural and fishery workers; craft and related trades workers; and plant and machine operators and assemblers. Finally, high-skilled workers (skill levels 3 and 4) included legislators, senior officials and managers; professionals; and technicians and associate professionals.

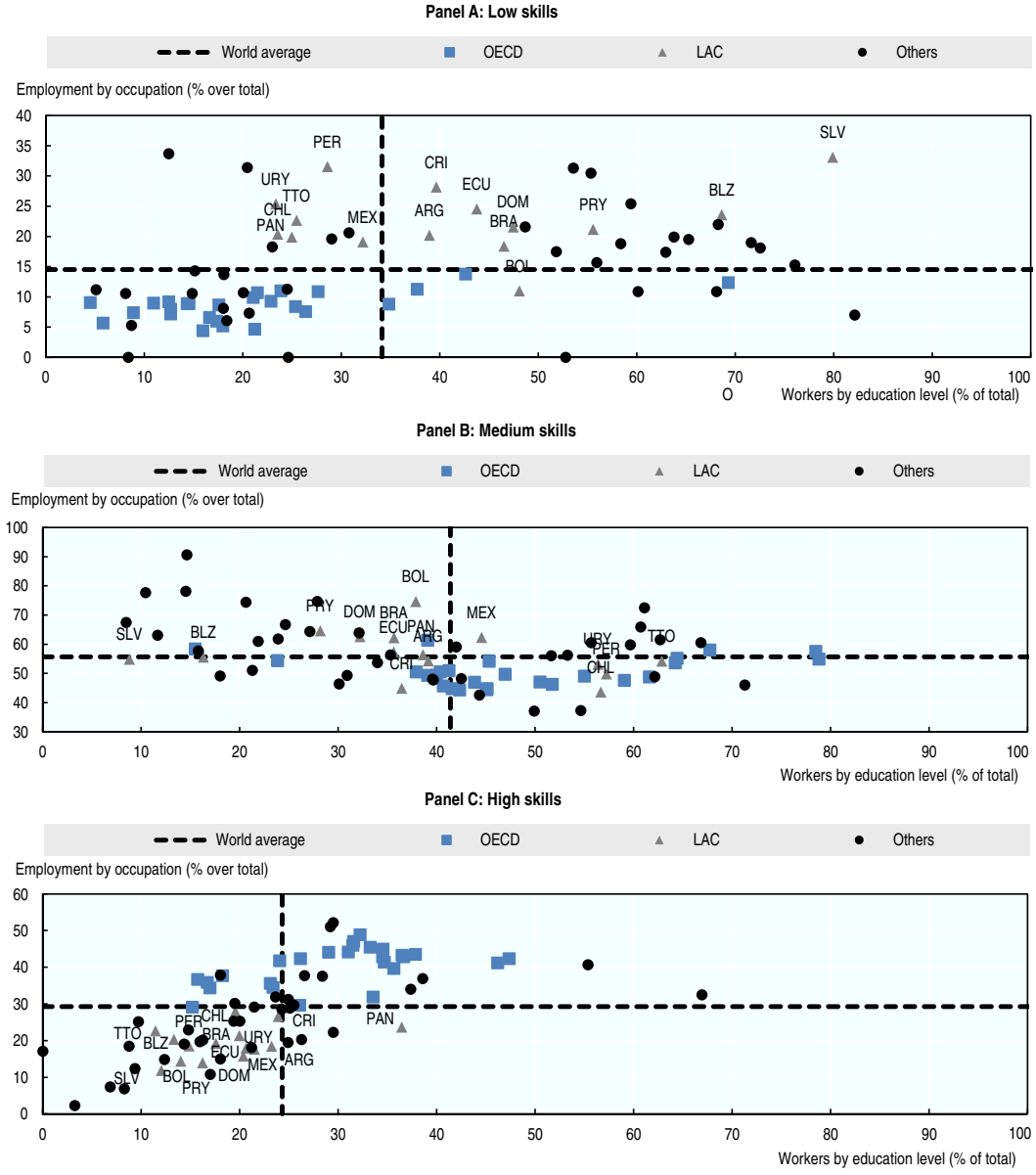
Table 3.1. **Classification of employment by occupation (ISCO-88)**

	Employment by occupation (ISCO-88)	ISCO skill level
1	Legislators, senior officials and managers	-
2	Professionals	4
3	Technicians and associate professionals	3
4	Clerks	2
5	Service workers and shop and market sales workers	2
6	Skilled agricultural and fishery workers	2
7	Craft and related trade workers	2
8	Plant and machine operators and assemblers	2
9	Elementary occupations	1
0	Armed forces	-

Note: The first level of ISCO skills was based on category 1 of the ISCED classification, in which primary education starts at the age of 5, 6 or 7 and lasts about five years. The second level of ISCO skills was based on categories 2 and 3 of the ISCED classification, which includes the first and second parts of secondary education. The first part begins at the age of 11 or 12 and the second part at 14 or 15, both lasting three years.

Latin American countries tend to have a high proportion of low-skilled workers in low-skilled jobs, in stark contrast to the situation in the OECD countries. Supply better matches demand for medium-skilled jobs in both Latin America and the OECD countries (Panel B, Figure 3.6). Finally, supply and demand are similar in both the OECD countries and Latin America for high-skilled jobs (Panel C, Figure 3.6), But while in the OECD countries supply and demand are high, in Latin America they are both low.

Figure 3.6. **Workers by education level and occupation, according to skill level**
(percentage of the total, most recent year)



Note: In most cases, the data refer to the period between 2008 and 2012.
Source: Authors' work based on data from ILO (2014), *Key Indicators of the Labour Market*, eighth edition, International Labour Organization.
StatLink http://dx.doi.org/10.1787/888933174410

Technical and vocational education and training are essential to ensure that education is geared towards employment

In regions with poor skill levels like Latin America, technical and vocational education and training (TVET) is particularly important. TVET is usually related to the knowledge and skills linked to the workplace. It can therefore play a very important role in connecting, complementing and even updating the training offered by the education system to ensure that it meets labour market demands.

TVET covers different learning experiences that furnish job-related knowledge and skills and are acquired through various means throughout a person's career. TVET generally includes learning experiences that can be acquired through: *i)* formal channels, i.e. the education system and/or diplomas; *ii)* non-formal channels, such as uncertified in-house training, that does not lead to any formal credential that would let the learner move up the educational system; and *iii)* informal channels, i.e. largely skills acquired naturally in the course of life in one's interactions with others or in contexts in which a person's personality develops (UNESCO, 2013a). An important characteristic of TVET is that it includes career-long training. It prepares learners for the workplace, thus playing an important role both at the start of a person's working life and during it (UNESCO, 2013b).

The focus of this analysis will now turn to formal education, including both the education system and certified in-house training (see Box 3.3 for more information on on-the-job training in certain countries of Latin America and the Caribbean). However, two observations are particularly relevant to Latin America and should be included in a general analysis of TVET. First, many workers and businesses operate in the informal economy, so some professional skills are acquired in informal contexts, which means they have no subsequent recognition. Second, skills acquired in non-formal contexts, especially informal contexts, are more closely tied to the person's socio-economic setting, gender and geographic location, all three of which are the basis for inequalities.

Box 3.3. **Latest developments in on-the-job training in Latin America and the Caribbean**

One of the big challenges shared by Latin American economies today is to raise the productivity of their workforces. Training provided by the employer in relevant, up-to-date skills can play a substantial role in achieving this objective.

Flores et al. (forthcoming) analyse the impact of on-the-job training on productivity based on data from the only two surveys in Latin America and the Caribbean conducted among formal companies that provide data on on-the-job training in different countries. The first is the Enterprise Surveys, which contain data on on-the-job training in 12 countries in the region, with a large subset containing longitudinal data. The second is the Surveys of Human Resource Productivity and Education (EPF), which are carried out in several countries in the region with support from the Inter-American Development Bank (IDB). This cross-sectional survey includes detailed questions on on-the-job training not included in the Enterprise Surveys or in other traditional surveys, such as the skill level of those who receive on-the-job training, the skills prioritised by employers, decisions on hiring, and sources of funding for training.

The surveys conducted from 2011 to 2013 provide cross-sectional data for the Bahamas, Colombia, Honduras, Panama and Uruguay. Except for the Colombian survey, each survey is representative of the entire economy across the country. In Colombia, the sample is representative at the sector level for manufacturing, trade and services.

In most countries in the region, 30%-50% of firms offer usually brief training programmes to their employees. However, most firms in Latin America and the Caribbean are small and medium-sized enterprises, and these are less likely to offer such programmes. Training is by and large in specific skills for the job given that firms themselves foot most of the cost of the training.

The training is geared primarily towards high-skilled workers, suggesting that the skills gap among workers could be accentuated by employers' investments in human capital. These results highlight the importance of improving the quality of the region's education systems and developing permanent vocational training systems to reduce the skills gap among members of the workforce.

Box 3.3. **Latest developments in on-the-job training in Latin America and the Caribbean** *(cont.)*

In analysing the role of public initiatives to promote on-the-job training, the study shows that Latin American and Caribbean firms rarely obtain subsidies or use public suppliers to support their investment in vocational training. The use of public funds seems to be proportional to company size, even though smaller firms are faced with greater constraints if they want to invest in training.

The results show that, in Latin America and the Caribbean, the coverage of public subsidies for on-the-job training should be reviewed, as should the way the subsidies are targeted. Research is needed to identify market constraints and failures that impact how on-the-job training resources are allocated and to enable the adoption of suitable public policies.

On-the-job training seems to raise labour productivity, but only in larger firms. Using a fixed effects model to compensate for the wide range of business types excluded from the control variables, combined with a set of variable-time controls, shows that a 1 percentage point increase in the proportion of workers with access to training would raise productivity by 0.8% in firms with more than 100 employees. For small businesses, however, there is no significant impact. Therefore, on-the-job training can only raise productivity if some of the characteristics of larger firms are present. More efforts are needed to identify what additional investments are required to make vocational training efficient. These might include, for instance, personnel management.

In conclusion, a company's decision on whether to provide training depends heavily on the skills it requires, which in turn are linked to innovation and the adoption of production technologies that are more advanced. These findings reinforce the need to design integrated interventions in which instruments to promote on-the-job training are part of a broader set of policies to promote technological change and innovation.

TVET systems can play a very important role in the region, but still lack the necessary prestige and recognition.

The large informal economy, unemployment (which particularly affects young people), and the mismatch between the demands of the production sector and the training offered by the education system form a complex panorama in Latin America. The education system must become a more relevant mechanism for providing access to employment, and TVET systems can play a central role in this (OECD, 2013d). However, the vocational pathway is often ignored in the region. This is because it is judged inferior to academic education and because the two education pathways offer different returns. Vocational training has also lost prestige, having become outdated and disconnected from the reality of the workplace (OECD, 2010b). In reality, however, there is no clear evidence that the returns to technical education in developing countries are smaller than the returns to mainstream education. The large variation in results from one country to another and from one period to another suggests that the returns to TVET depend directly on each country's institutional framework, the capacity to adapt TVET to changes in labour demand, and the private sector's willingness to invest in worker training (Eichhorst et al., 2012).

TVET has not expanded enough in Latin America in recent years, and there are a number of challenges that it must still tackle. In the last decade, TVET enrolment in secondary schools increased by an average of 18% in the region, about the same as for secondary education as a whole. Therefore, proportional to mainstream secondary education, the weight of TVET remained practically the same. Efforts to respond to the growing demand for education in the region focused not so much on TVET as on mainstream secondary education as a route to tertiary education. Very often specific knowledge was incorporated into mainstream secondary-education programmes, but not into expanding TVET (UNESCO, 2013a). At the tertiary level, enrolment in TVET rose

significantly over the last ten years, from 15% to 19% of the total number of people enrolled in tertiary education. However, because the duration and nature of TVET programmes vary from country to country, it is difficult to compare results between one country and another in the region (UNESCO, 2013a).

The TVET system has been expanded, often by adding programmes somewhat disconnected from the formal TVET system. As a result, its structure now varies greatly from one country to another, and even within countries. These additional programmes do not count towards completion of any formal education level and provide no credentials valid in the education system. However, because they are shorter and explicitly designed as employment-training programmes with a specific objective, they are more attractive than secondary or tertiary TVET (UNESCO, 2013a).

Although a number of technical and vocational education initiatives focus on the post-secondary level, vocational programmes at the secondary level can have a positive influence on labour-market entry. Vocational training starts in basic secondary education and continues until post-secondary and tertiary education, but most programmes and reforms have focused on advanced levels. A better understanding of the characteristics of schools with vocational programmes and of the students who attend them could help to explain their subsequent performance in the workplace and improve policies regarding such institutions.

In some Latin American countries, students at vocational schools may perform better than students at mainstream schools. International performance comparisons between the two types of programmes using microdata from the OECD's PISA (Programme for International Student Assessment) study find that the situation in Latin America is very different from that in other countries (Altinok, 2011; Avendaño et al., forthcoming). Students in vocational programmes in the region perform better than those in mainstream programmes. In a sample of almost 15 000 vocational students in Argentina, Colombia, Costa Rica, Chile and Mexico (almost 25% of all schools in those countries, compared with an average of 17% in the OECD countries), there is a performance gap of 15 points in favour of vocational students, equal to approximately four months of schooling; in the OECD countries, mainstream schools perform better by 61 points (Avendaño et al., forthcoming; see Box 3.4 for more details).

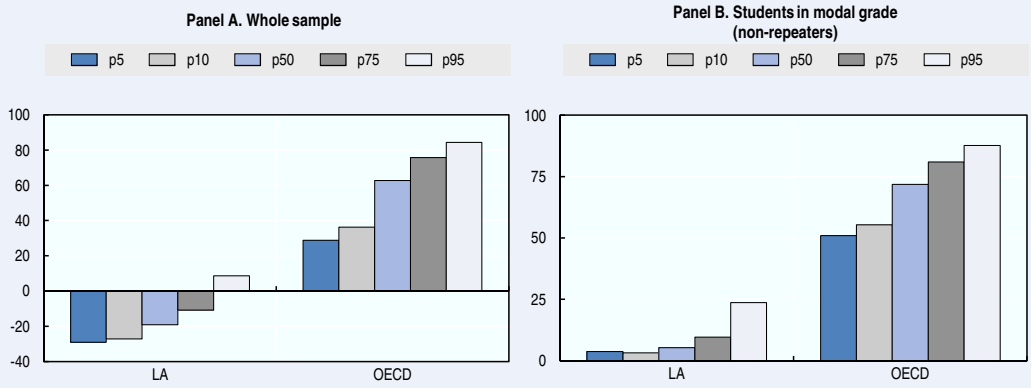
Box 3.4. **Factors behind the performance of skills in secondary education: Mainstream vs. vocational schools**

In Latin America, unlike in the OECD countries, students in vocational programmes perform better than those in mainstream programmes (Avendaño et al., forthcoming). A number of factors explain this difference.

First, the sample of vocational students contains a selection bias, which thus overestimates average performance. Except in Uruguay, students in Latin America choose between mainstream and vocational programmes when they are 15 or 16 years old (vs. 14 years old on average in the OECD countries). But the PISA sample is based on students aged 15.3 to 16.2 years, so most Latin American students who repeated a year will not be included in the results. This selection bias helps to explain why a third of the students in the sample in mainstream programmes have repeated a year at least once, compared to only a tenth of students in vocational programmes. For this reason the sample is divided into students who are in the modal grade (i.e. the grade a student should be in based on their age) and students who are below the modal grade (those who have repeated a year). When only modal-grade students are considered, the gap between vocational students and mainstream students narrows in Latin America (Figure 3.7), while in the OECD mainstream students still outperform vocational students (75 points on average for the 50th percentile).

Box 3.4. **Factors behind the performance of skills in secondary education: Mainstream vs. vocational schools** *(cont.)*

Figure 3.7. **Performance gap between mainstream and vocational schools**



Note: "Latin America" comprises Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru and Uruguay. The percentiles refer to the performance distribution. For the entire sample and for the mainstream students in their modal grade, "Latin America" comprises Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru and Uruguay. For modal-grade students in vocational schools, data are missing for Peru and Brazil. "OECD" comprises all 34 members except Canada for the entire sample. For the modal-group students, there are no data for Canada for the mainstream programmes and no data for Canada, Denmark, Estonia, Finland, Iceland, New Zealand, Norway, Poland, Spain and the United States for vocational programmes.

Source: Avendaño et al. (forthcoming), "Vocational education in Latin America: Is the story different?", *Working papers*, OECD Development Centre.

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Second, the performance gap between vocational and general programmes is greater in rural areas than in urban areas. Analysis of the almost 1 000 rural vocational schools in Argentina, Colombia, Costa Rica, Chile and Mexico, which represent 7% of all vocational schools, shows the stronger performance by vocational schools is more marked in rural areas than in urban environments. Regional inequality can explain this trend.

For rural students (and low-income students), mainstream education is of little practical use and of little interest, since they have few opportunities for social mobility. Vocational education is better adapted to their social and work environments, so the students are more committed to their studies. This could explain why, relatively speaking, rural (and poorer) students perform better in vocational programmes in Latin America. For regional policies, vocational education can be an effective means of improving the performance of rural students and facilitating a smoother transition into the labour market.

Third, students in Latin America who are socio-economically disadvantaged perform better in vocational programmes than in mainstream programmes, but among students with higher incomes there is no such performance gap. By contrast, in the OECD countries, mainstream students outperform vocational students irrespective of their socio-economic status.

Finally, vocational students seem to be more motivated, which can lead to a better relative performance. Although the added value of vocational schools reduces considerably when results are controlled for modal grade, the impact of attending a vocational school remains greater in Latin America than in the OECD countries. An additional explanation is that students in vocational schools are more satisfied with their learning outcome in general, and in terms of the preparation it gives them for their working life.

Regarding motivation for learning mathematics, PISA data show that vocational students are more aware of career and higher-education opportunities than mainstream students. This trend may reflect vocational programmes' ability to relate the education system to the production system, allowing a more efficient transition into the labour market.

Countries in Latin America and the Caribbean and in the OECD have tried some interesting approaches to improve the impact of TVET.

Even though less attention is afforded to TVET in Latin America and the Caribbean, some countries, such as Chile and Mexico, have used interesting approaches in recent years. During the current decade, TVET has gained presence in the region's education policy agenda as a means to improve the link between education and employment (OEI, 2010). National governments have also made efforts to strengthen TVET and give it a more central role in the education system.

Chile, for instance, set up the National Innovation Council for Competitiveness (Consejo Nacional de Innovación para la Competitividad) in 2005 and the Technical and Vocational Training Commission (Comisión para la Formación Técnico-Profesional) in 2009. The latter's contributions have included proposing and implementing a national qualifications framework (OECD, 2009; OECD, 2010b). Mexico, meanwhile, has a Labour Observatory (Observatorio Laboral) with detailed data on the performance of TVET graduates in the labour market. The country has adopted various measures to foster mobility in the education system and encourage dialogue between TVET institutions and employers. It has also taken measures to allow TVET teachers to have professional experience in the field that they teach by continuing to work part-time in the sector, which enables them to keep their skills up to date (OECD, 2009). Most OECD countries have also had interesting experiences with TVET (Box 3.5).

Box 3.5. **Keys to success: Ingredients for relevant, high-quality vocational training systems**

Many factors determine whether training systems for work are successful, relevant and of high quality. Korea, Chile, Germany and the United Kingdom are particularly renowned for having incorporated practices into their work-training systems that have markedly improved the skills of their workforce.

Korea, for instance, aligned its skills-development system with its economic-growth agenda over a series of decades. It did so by developing a technical-education and training system that focused efforts on sectors and occupations that were prioritised by each development plan. This brought the skills developed in line with labour-market demands, and businesses were able to increase their capacity to export increasingly sophisticated products, since they were able to find the necessary skilled labour. Meanwhile, the government also adopted policies to support training for active workers, introducing a training tax and then a grant programme for training, with particular emphasis on small and medium enterprises in certain strategic sectors. The Korean programme drew its inspiration from Mexico's successful CIMO training programme (Capacitación Integral de la Mano de Obra).

Some countries, meanwhile, such as Chile, have institutionalised the role of the production sector in their training system for sectors that are strategic to the economy. For instance, Chile's Framework for Mining Qualifications (Marco de Cualificaciones para la Minería) states the skills requirements for the different occupations in the country's mining sector, allowing the educational supply to be adapted to the production sector's demand for skills. This experience shows that private-sector involvement can serve to: *i)* send signals to the education sector to align technical courses with the areas of industry most in demand based on the production dynamic; *ii)* make those industries more attractive to workers and attract students into related courses; *iii)* reduce transaction costs in the sector thanks to useful standards for human resource management; *iv)* offer a solution to a government that is seeking relevant alternatives to integrate workers into the market; and *v)* co-ordinate labour supply and demand through co-ordinated policies to support skills development.

Box 3.5. **Keys to success: Ingredients for relevant, high-quality vocational training systems** *(cont.)*

Finally, countries such as Germany and the UK have focused on developing dual training systems or systems with a strong emphasis on apprenticeship programmes, which provide training opportunities in the workplace and ensure that education is highly relevant. Both countries have achieved strong involvement from the production sector through co-financing mechanisms, ensuring that training is more relevant and that more of the students can find jobs.

In the British model, for instance, the government bears the full cost of training in the workplace: in full for 16-18 year-old apprentices, up to half the cost for 19-23 year-olds, and 40% for apprentices aged over 24 years. The employer pays the remaining training costs and provides the apprentice with a salary. The German government finances technical schools, research in skills development and training programmes. Firms assume the costs related with the training: apprentice salaries and the cost of trainers and material.

Some countries, including Korea and the United Kingdom, also periodically inspect their skills-development institutions to evaluate their performance, co-ordination with other institutions, and incentives to fulfil the growth vision drawn up by the government, as well as to identify good practices and introduce improvements.

In short, countries have enjoyed a more productive workforce and a more developed economy when they have: *i)* adopted human-capital development strategies that are in line with their economic-growth strategy; *ii)* actively involved the production sector in the training system; *iii)* offered opportunities for continuing learning in the workplace; and *iv)* introduced review and assessment mechanisms to ensure that the measures are improving constantly.

The decline in returns to education is in marked contrast to the unmet demand for skills

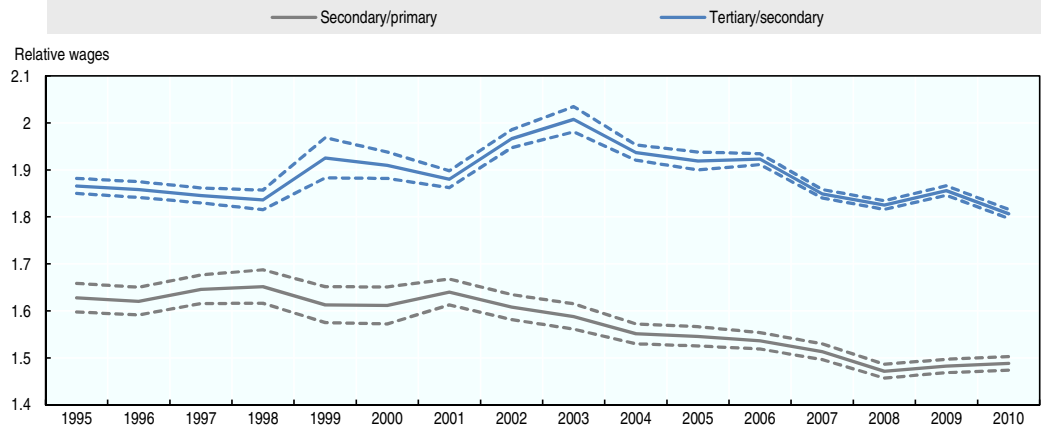
In developed countries and many developing countries, wage premiums have risen continuously in recent decades (Anderson, 2005; Goldberg and Pavcnik, 2007). The wage premium refers to the additional wages earned by workers with a certain level of education compared with the wages of a worker with a lower level of education (tertiary vs. secondary, and secondary vs. primary).

In Latin America, meanwhile, wage premiums have been narrowing since 2000. Several recent studies (Aedo and Walker, 2012; López-Calva and Lustig, 2010, among others) have shown that the wage premiums are falling for all levels of education (Figure 3.8), affecting incentives for lower-skilled young people and workers in Latin America to study.

This fall in education-based wage premiums comes despite the unmet demand for skills in Latin America. To attempt to better understand how these two trends can coexist, we must consider several possible explanations put forward in recent literature.

On the supply side, access to the education system in the region has increased significantly, as has the supply of better-educated workers as a result. The larger labour supply is believed to have sparked a drop in performances associated with education (López-Calva and Lustig, 2010; Azevedo et al., 2013; De la Torre, Levy Yeyati and Pienkgnamura, 2013; Cornia, 2014). This trend is compatible with the fall in returns to education first at the secondary level (in the 1990s), then at the tertiary level (in the 2000s), which would be consistent with the gradual entry of lower-income students into the education system.

Figure 3.8. **Wage premiums in Latin America, 1995-2010**



Note: The dashed lines show confidence intervals. Latin America shows the average for Argentina, Brazil, Chile, Colombia, Mexico, Peru and Uruguay.

Source: De la Torre, Levy Yeyati and Pienknagura (2013), "Latin America and the Caribbean as tailwinds recede: In search of higher growth", *LAC Semiannual Report*, World Bank, Washington, DC, based on *Socio-Economic Database for Latin America and the Caribbean* (SEDLAC and World Bank, 2014).

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The supply may have changed not only in terms of quantity, but also in terms of quality. Lower quality could be due to the change in the composition of the labour supply. People from socio-economic settings with less social and cultural capital have entered the education system, which, some have argued, has lowered the average skill level at each level of education. Other authors blame outdated teaching methods and an outdated curriculum, or an education system that does not offer the skills demanded by the labour market.

On the demand side, many believe the fall in returns to education in the last decade could be due to employers requiring lower-quality, less sophisticated skills as global wealth has shifted. They argue that, either because the commodity-exports sector has grown in response to additional demand from emerging economies (Gasparini et al., 2011) or because of the tertiarisation of the region's economies (De la Torre, Levy Yeyati and Pienkgnamura, 2013), high-skilled jobs have been replaced by less-skilled jobs, causing demand for skills to fall.

From the point of view of labour economics, changes in wage premiums and the salary gap may have been caused by the functioning of the labour markets and reforms to their institutions. The narrowing of the salary gap may be thanks to additional formal employment and stronger labour institutions, especially a higher and more stringently enforced minimum wage and more effective collective bargaining (Casanova and Alejo, 2014; Maurizio, 2014).

It would be interesting to analyse wage premiums by sectors. Differences in demand for skills among sectors may explain the apparent contradiction between unmet demand for skills and lower returns to education. The previous empirical analysis confirms that the automotive and machinery sectors struggle to meet demand for skills. These difficulties may increasingly reward skills, but wage increases in the sector may have been eclipsed by the widespread fall in wages in recent years in other, more buoyant sectors. In short, demand for skills may vary greatly from one sector to another, depending on each sector's needs. This is made clear in Chapter 5, which shows that Latin America's economies are not very diversified.

Finally, we must bear in mind that the data on wage premiums were extracted from household surveys, which include the informal economy. The World Bank and Manpower surveys, on the other hand, collect their data only from formal, often large private enterprises operating in manufacturing industries, thus ignoring a large chunk of the business sector, especially in emerging economies like those of Latin America. Indeed, some studies conducted in Colombia show evidence that workers in the informal economy are paid less than workers in the formal economy with the same level of education (Herrera-Idárraga, P., E. López-Bazo and E. Motellón, 2013).

Conclusions and policy recommendations

Skills are decisive in determining an economy's capacity to escape the middle-income trap since, as confirmed by a review of the economic literature, they are a key input in structural transformation. This is especially important given some of the components of shifting wealth, such as integration of new emerging economies into the global economy, international trade liberalisation and new forms of organisation of production. This scenario hinders the capacity of middle-income economies to identify and acquire the necessary skills to make the transition to a growth model based on knowledge and technology.

Latin America is the emerging region that has the most difficulty meeting demand for skills. In the formal sector of the economy, 36% of companies in Latin America report that they struggle to meet demand, compared with 22% of companies in sub-Saharan Africa and in East Asia and the Pacific, 17% in South Asia, 15% in the OECD and 14% in Eastern Europe and Central Asia. Technical skills and soft skills seem to be particularly difficult for Latin American firms to find.

The empirical analysis conducted confirms that there is unmet demand for skills in Latin America, particularly in certain key sectors such as machinery and the automotive industry. It is a particularly tough challenge for firms with a skill-intensive production process and for some of the tradeable industries that would be most likely to bring about a more profound structural change, such as machinery and the automotive industry. Empirical evidence therefore undermines the idea that shifting wealth is reducing demand for skills in Latin America by increasing the region's specialisation in raw materials.

Regarding the match between supply and demand for skills by level of education and occupation, Latin America performs poorly in both categories, in contrast with the OECD countries. TVET could therefore play a key role in rapidly and flexibly increasing training in workplace-related skills. However, such a policy has not been prioritised in the region, because academic training is somewhat overvalued and TVET is perceived to bring lower returns and to be out of touch with the labour market's current needs. Furthermore, technical and vocational training institutions in the region often have a limited capacity to provide the type and level of skills required by the jobs market. In several countries in the region, technical training is provided by public institutions created many decades ago that have not always adapted to changes in the skills required (CAF, 2014). This would explain why, according to the database used in this study, businesses tend to provide their own training for their staff.

Contrary to what is happening in the OECD countries, returns to education are also declining in the region, perhaps because the rapid expansion of education is harming the quality of training, or perhaps because the supply of skills in some sectors of the economy is excessive. Perhaps, then, the skills being provided are not suitable, leading some firms not to reach optimum performance, with poor remuneration for skills.

Various policy recommendations can be made based on these conclusions. First, since the region does not have the level or type of skills needed to compete in a changing global economic environment with increasingly more complex demands, it should invest in more general skills that can be adapted to the changing labour-market conditions. Education systems need to incorporate these skills into their curriculums to improve the employability of those who move from the education system to the labour market, and make it easier for workers to update their skills, thus strengthening lifelong learning.

Throughout this process, the education system must provide qualifications frameworks that enable the recognition and portability of skills acquired in both formal and informal education. Of particular importance are skills acquired through training that is more directly linked to specific tasks in the workplace, such as TVET.

Second, this chapter underlines the need to adapt the supply of skills to the production structure. The unmet demand for skills identified by the agents of production in Latin America contrasts with the major efforts undertaken by the region in recent decades to provide education. Investment in skills needs to become more relevant for the region's efforts to produce better quality and employability.

To achieve this, it is essential to correctly identify which skills are needed, a task made particularly difficult by the emergence of new competitors in the global economy and the fragmentation of the production chain. It is therefore vital that governments and educators work in partnership with the private sector to identify the skills that are currently needed and that will be needed in the future, as well as to train their own staff in the workplace, possibly using co-financing mechanisms to pay for the training.

Third, there must be a more solid diagnosis of existing training programmes and their effectiveness. Most surveys cover only the formal economy, which in Latin America accounts for only around half the businesses and half the workforce. It is essential to compile statistics that show the reality of technical training programmes in the workplace and for informal workers. More importantly, the number of thorough assessments of the impact of these training programmes needs to be increased. There are currently too few assessments, and those that do exist often involve a descriptive analysis, making them difficult to compare or to apply to different contexts (Aedo and Walker, 2012). It is essential for these assessments to cover a wide range of criteria, including employability and wages, but also including productivity and even equity.

Notes

1. Shifting wealth refers to the process by which emerging economies are increasing their relative contribution to the global economy. This shift began when large emerging countries (China, India and Russia) began to open up their economies in the 1990s, and has gathered steam since the turn of the century. The size of these economies, in conjunction with their rapid, sustained growth and their strong demand for natural resources, has supported growth in many emerging and developing economies. As a result, we are witnessing a clear shift in the gravity centre of the global economy towards emerging economies, especially Asia (OECD, 2010a; OECD, 2013a; Quah, 2011).
2. In accordance with the OECD Skills Strategy (OECD, 2013b), skills are "the bundle of knowledge, attributes and capacities that can be learned and that enable individuals to successfully and consistently perform an activity or task and can be built upon and extended through learning. The sum of all skills available to the economy at a given point in time forms the human capital of a country."
3. Simply put, the middle-income trap refers to a secular slowdown in growth as a country becomes a middle-income economy.
4. Im and Rosenblatt (2013) offer a review of the middle-income trap literature.
5. This classification establishes income groups based on national per capita income calculated using the Atlas method. For 2015, the list distinguishes between low-income economies (per capita income of USD 1 045 or less), middle-income economies (from USD 1 045 to USD 12 745) and high-income economies (USD 12 746 and above). The middle-income bracket is divided into lower-middle income and upper-middle income, with the cut-off point at USD 4 125. See http://data.worldbank.org/about/country-and-lending-groups.
6. Felipe et al. (2012) use per capita GDP series measured in 1990 PPP US dollars, allowing them to define groups according to constant income levels over time. They define middle-income countries as those in which per capita GDP is between USD 2 000 and USD 11 750 (1990 US dollars), with USD 7 250 as the cut-off point between upper-middle and lower-middle income.
7. The literature on "job polarisation" deals with the replacement of workers in the middle of the skill distribution (Acemoglu, 1999; Autor, Katz and Kearney, 2006). Employment thus becomes concentrated at the high and low ends of the skill spectrum, reducing the relative weight of jobs with average skills. Such jobs, requiring routine tasks, are more likely to be replaced by better technologies, and therefore disappear (Jaimovich and Siu, 2012).
8. Compiled by the World Bank, this database consists of various topics related to the business environment, including access to credit, corruption, infrastructure, crime, competition and business performance. The results are taken from surveys sent to 130 000 formal businesses in 135 countries since 2002. See www.enterprisesurveys.org/.
9. This section is based on Melguizo and Perea (forthcoming).
10. Responses with the integer number 2, representing moderate obstacles, were eliminated so that all responses would fall into one of the two new combined values.
11. The main advantage of this method is that it relaxes some of the assumptions of standard ordered logit so that all the information included in the original dependent variable can be used.
12. In this study a lack of adequately trained workers is referred to as a skills shortage.
13. The results for Latin America are from companies in Argentina, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay and Venezuela.
14. The database also included results for companies in the Middle East, but these were eliminated from the sample because their results included fewer responses (878) and fewer countries than the other regions.
15. The Enterprise Surveys sample fails to include some of the region's key raw-material sectors, such as hydrocarbons, so a more profound analysis is not possible.

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