

# Institutions for productivity

Towards a better  
business environment



# Institutions for productivity

## Towards a better business environment

Title:  
Institutions for productivity:  
towards a better business environment

Editor: CAF  
publicaciones@caf.com

The views expressed in this publication  
are the responsibility of the authors  
and do not necessarily represent the official position of CAF.

Graphic design: Estudio Bilder / Buenos Aires.

Printed in: Panamericana Formas e Impresos S.A.  
acting only as a printer  
Bogota, Colombia – March 2019

The digital version of this book  
can be found at: [scioteca.caf.com](http://scioteca.caf.com)

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# Foreword

In the last decades, many countries in Latin America have experienced a shift in policies towards the pursuit of common objectives that can be deemed social pacts, understood as broad political consensus. In the 1990s, we have witnessed the beneficial results of the pact for macroeconomic stability and trade integration; and in the early years of the new century, taking advantage of the surpluses from the global commodity expansion cycle, we observed a pact for inclusion.

Nevertheless, the return to low commodity prices in global markets highlighted the need to intensify our efforts to promote a sustained increase in productivity as a way to achieve continued economic growth. This would enable us to reach the level of wellbeing of more developed nations. In line with this common objective of sustained growth, CAF -development bank of Latin America- is promoting the consolidation of a pact for productivity. This initiative constitutes a priority action plan within CAF's strategy of support for shareholder countries, which is reflected in credit operations that favor governments, private firms, and financial institutions, as well as in technical assistance and the generation of knowledge.

The starting point for improving productivity is to have a clear diagnosis. In this regard, this report provides evidence suggesting that Latin America's productivity gap is mainly due to a very low productivity level across all sectors of its economies, rather than to a concentration of resources in particularly low productivity sectors. In turn, this generalized low productivity is due to institutional factors that shape policies and regulations affecting firms' productive environment across the whole economy, beyond the sector in which they operate. This report focuses on four key realms of this environment: competition, access to inputs and cooperation among firms, employment, and financing.

The report provides evidence of competition problems in the region and how these problems compromise productivity. In order to tackle them, it is essential to increase the capacities of antitrust agencies, reduce entry barriers to firms, and deepen international trade and regional integration, which are still limited by non-tariff and logistical barriers.

It also emphasizes the importance of promoting access to high-quality inputs and encouraging cooperation among firms. In this sense, and by virtue of their role as a direct and indirect supplier of inputs, the report highlights the relevance of some service sectors such as retail trade, transport, and energy, whose deficient functioning represents a limitation for the productive development of all industries. To improve access to inputs, international trade is once again an ally. Additionally, there is a need to improve the regulatory framework to encourage competition and public-private partnerships, especially in key infrastructure services. Finally, policies that support productive clusters can favor synergies among firms and strengthen links within value chains.

Regarding labor relationships, the report documents some patterns of workforce allocation that undermine productivity; specifically, the existence of a significant gender gap, a mismatch between workers' skills and their tasks and, especially, an enormous concentration of the labor force in low productivity, informal jobs. Some labor policies and regulations that seek laudable objectives, such as employment protection policies, wage-setting institutions, and payroll taxes and contributions associated with formal employment can have negative impacts on productivity. The challenge is to achieve a balance that guarantees the protection of workers and, at the same time, avoids generating incentives that discourage innovation, hinder the reallocation of resources, and promote informality.

The report concludes by analyzing Latin America's gap in financial system development and exposing its main implications for productivity. To improve this realm, it highlights the importance of adjusting key regulatory aspects, such as bankruptcy procedures. It also points to the need to improve interventions aimed at promoting access to financing, especially with regard to the targeting of beneficiaries.

In order to achieve considerable gains in productivity, the institutional framework needs to be adapted in such a way as to create a better business environment that encourages more innovation and more efficient resource allocation. This institutional change is complex and requires significant political agreements. Reaching them will be easier if there is evidence as to which initiatives and best practices are most appropriate.

Ultimately, this report contributes to the stock of knowledge on the actions needed to foster a greater productive development of countries in the region, and represents a contribution by CAF toward the establishment of a new Latin American pact, a pact for productivity.

**Luis Carranza Ugarte**  
CAF's Executive President

# Acknowledgements

The Vice Presidency of Knowledge for Development, led by Pablo Sanguinetti, publishes annually the Report on Economic Development (RED). The 2018 edition of the RED was coordinated by Fernando Álvarez and Manuel Toledo. Marcela Eslava participated as academic advisor.

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Jimena Zúñiga participated as content editor. Roberto Ferrer and Federico Juncosa participated as copyeditors, with the assistance of Jonás De Sousa. Translanguage was responsible for the English translation.

The chapters benefited from research papers produced specifically for this publication by Nadia Alvis, George Alessandria, Roberto Álvarez, Eugenia Andraesen, Oscar Avila, Fernando Barrios, Sofía Bauducco, Evangelina Dardati, Diego Escobar, Marcela Eslava, Clemente Forero, David Giuliodori, Sebastián Guiñazú, John Haltiwanger, Bryan Hurtado, David Kohn, Rachid Laajaj, Jeanne Lafortune, Andrea Lanteri, Fernando Leibovici, Bernabé López-Martín, Julián Martínez-Correa, Pamela Medina, Lucas Navarro, Heitor Pellegrina, Guillermo Perry, Alejandro Rodriguez, Lucía Rosich, Flavia Rovira, Loris Rubini, Fernando Saltiel, Erica Sánchez, Michal Szkup, José Tessada, Darío Tortarolo, Carlos Urrutia, Sergio Urzúa, and Roman Zárate.

The authors gratefully acknowledge the valuable contributions and comments received from Nadia Alvis, George Alessandria, Roberto Álvarez, Eugenia Andraesen, Leandro Arozamena, Adriana Arreaza, Karina Azar, Lucila Berniell, Irene Brambilla, Pablo Brassiolo, Fedora Carbajal, Lucio Castro, Joaquín Coleff, Jose Francisco de Anchorena, Dolores de la Mata, Joao de Mello, Emilio Espino, Ricardo Estrada, Gustavo Fajardo, Clemente Forero, Sebastian Galiani, Pablo García, Esteban Greco, Sebastián Guiñazú, Juan Carlos Hallak, Agustina Hatrick, David Kohn, Rachid Laajaj, Jeanne Lafortune, Julio Leal, Carlos Frederico Leao Rocha, Omar Licandro, Bernabé López-Martín, Alejandro Micco, Daniel Ortega, María Fabiana Penas, Alejandro F. Rodríguez, Hernán Ruffo, Christian Ruzzier, Martín Solá, Mariano Tappata, Carlos Urrutia, Juan Vargas, and Federico Weinschelbaum.

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# Institutions, productivity, and development

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## Chapter 1



# Chapter 1

## Institutions, productivity, and development<sup>1</sup>

*“Political and legal institutions play a central role in setting the environment that can nurture prosperity and economic growth”.*

Angus Deaton

In 1960, GDP per capita in Latin America was approximately 20% of that in the United States. Today, almost six decades later, this gap remains practically the same. During the same period, several countries in Asia and Europe, such as South Korea and Spain, have noticeably reduced their income gap with the US. What is behind Latin America’s long and persistent gap? Answer: The bulk of the region’s per capita output gap is due to its low productivity, i.e. its limited capacity to transform productive resources into high-quality goods and services.

This low productivity is not due to certain industries (e.g. services) that are particularly unproductive carrying too much weight in the region, but rather to the fact that productivity is low across all sectors. In other words, the low productivity of Latin America does not relate to what the region produces but to how. This guides our focus of analysis to the economic institutions, both *de jure* and *de facto*, that affect the business environment regardless of the sector.

These institutions include, on the one hand, key deep elements such as the protection of property rights, contracts enforceability and state capacity. On the other hand, they also encompass specific policies and regulations that affect firms’ decisions in the different realms of their operations: when they compete, when they access inputs or cooperate with each other, when they hire workers, and when they obtain credit or access other forms of financing. In short, these decisions affect productivity through three mechanisms: the allocation of resources among productive units, the level of innovation and firms’ entry and exit processes.

The analysis carried in the report suggests the following conclusions. First, Latin American economies suffer from competition problems to a greater extent than developed regions. This negatively affects productivity, since sectors with greater market power exhibit greater inefficiency in the allocation of resources and fewer incentives to innovate and adopt new technologies.

Second, understanding the productivity problem requires a deep look at the relationships among firms. These relationships determine the access to supplies, the propagation of shocks, as well as the cooperation among firms and the

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1. This chapter was authored by Fernando Álvarez, Pablo Sanguinetti, and Manuel Toledo, with research assistance from Roberto Ferrer and Federico Juncosa.

**Advances in macroeconomic stability and social inclusion are insufficient. Productivity advances are fundamental.**

diffusion of technology in the context of value chains or clusters. Moreover, the analysis of input-output linkages among sectors allows identifying key sectors for development based on their degree of influence as an input provider. In this regard, some service industries stand out, such as energy, transportation and retail trade services.

Third, labor policies, institutions and regulations affect the allocation of labor among firms and condition employer-employee relationships within firms. They influence productivity through both channels. Unfortunately, there is a significant gender gap in the allocation of workers in Latin America, a mismatch between workers' skills and their tasks and, especially, an enormous concentration of the labor force in low-productivity, informal firms and jobs. Informality partially stems from labor market institutions that affect hiring costs as well as the cost and the perceived benefits associated with formal employment.

Finally, the functioning of financial systems in Latin America is still inadequate. The poor operation of these markets impairs productivity through various channels: occupational choices, firm' decisions to grow and innovate, and their reactions to real and financial shocks. Improvements in the financial system would therefore considerably increase productivity and GDP in the region. Public policies play a fundamental role in improving the development of financial systems and firms' access to credit, partly by improving regulatory frameworks and partly through direct finance interventions aimed at correcting market failures. Both approaches involve design and implementation challenges.

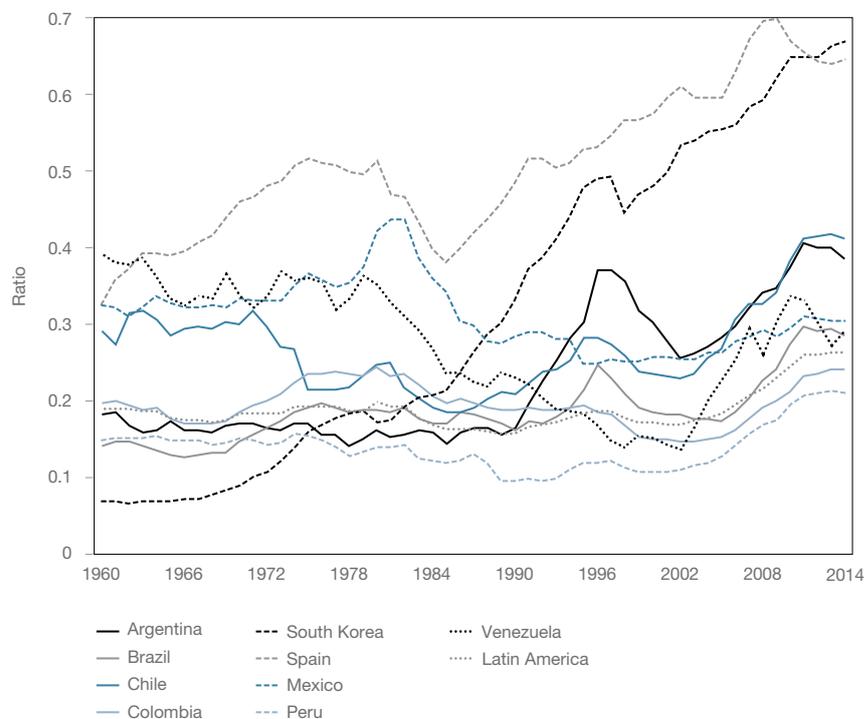
In recent years, Latin America has made significant progress in terms of macroeconomic stability and social inclusion. While these achievements favor productive growth, they are insufficient on their own. Sustained productivity growth is a prerequisite for returning to a path of greater prosperity and wellbeing. This report proposes a number of steps to achieve this objective based on an analysis of how economic institutions affect the environment in which firms operate.

## **Why does productivity matter?**

Latin America faces the fundamental challenge of significantly reducing its enormous per capita income gap relative to more developed countries. The average income in Latin America is about a quarter of the average income in the United States. Even within the group of the most advanced countries in the region, the level of per capita income currently fluctuates between approximately 20% and 40% of that in the United States (see Graph 1.1). This problem has not improved substantially in the last 60 years: In 1960, Latin America had, on average, 20% of the per capita income in the United States. In other words, countries in the region have not noticeably reduced their income gap, although the relative position of several countries has changed.

Other countries, on the other hand, have shown significant progress in the same period. For example, Spain has gone from one-third of the per capita income level in the United States to two thirds. South Korea, on the other hand, has gone from 7% to 67%.

**Graph 1.1** GDP per capita relative to the United States



Note: The graph shows GDP per capita (purchasing power parity) relative to the United States. Latin America refers to the average of Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Paraguay, Uruguay, and Venezuela.

Source: Produced by the authors based on data from the Penn World Table 9.0 (Feenstra, Inklaar, & Timmer, 2015).

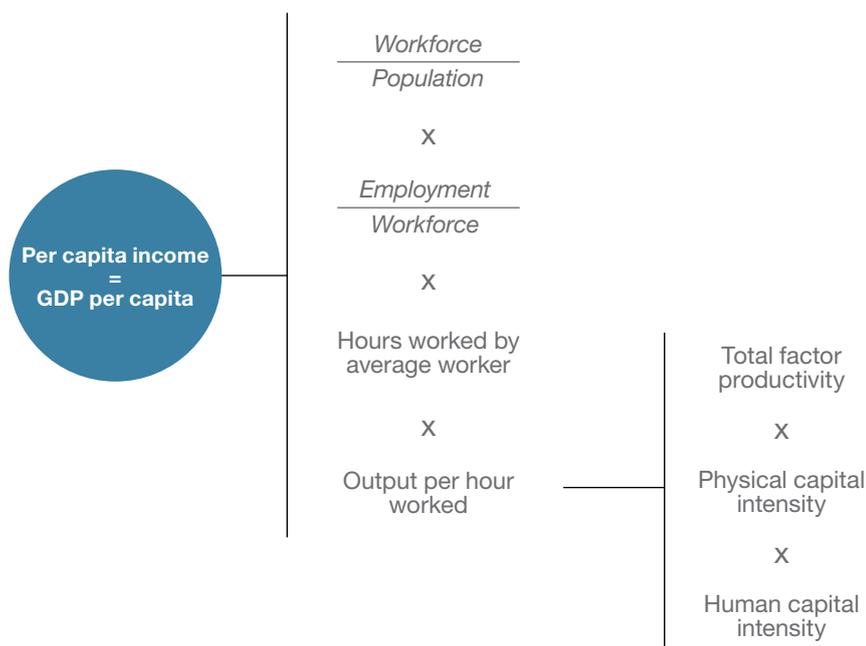
What is behind the large and persistent per capita income gap of Latin America relative to more developed economies? How can Latin America close it? To answer these questions, we must first understand the many factors that comprise per capita income, as exhibited in Figure 1.1.

We must start by recognizing that people's income is their remuneration for participating in the production of goods and services, both for the contribution of their human talent and for the contribution of their assets. If we consider the economy as a whole, per capita income is about the same as per capita gross domestic

product (GDP).<sup>2</sup> Therefore, per capita income gaps among countries largely reflect differences in their average productive capacity.

As shown in Figure 1.1, per capita GDP is broken down exactly into: (i) the fraction of the population that is in the labor force; (ii) the fraction of the labor force that finds employment; (iii) the hours worked by the average worker; (iv) productivity per hour worked.<sup>3</sup> In other words, per capita GDP depends on how many hours the average person works (both because they want to do so and join the workforce and because they find a job) and the productivity of such hours.

**Figure 1.1** Components of per capita income



Source: Produced by the authors.

The process of producing goods and services combines workers' effort and skills with the use of equipment, buildings, and other capital goods. Hence, the hourly

2. Gross National Income (GNI) per capita is equal to GDP per capita minus amortizations and net payments to foreign productive factors.

3. This follows from the following equation:  $Y/P = F/P \cdot E/F \cdot L/E \cdot Y/L$ , where  $Y$  is GDP,  $P$  is the total population,  $F$  is the labor force,  $E$  is the number of people employed, and  $L$  is the total hours per worker. It follows that per capita GDP,  $Y/P$ , is equal to the product of labor participation rate ( $F/P$ ), employment rate ( $E/F$ ), hours worked per worker ( $L/E$ ) and hourly labor productivity ( $Y/L$ ).

productivity of the average worker can be broken down into the contribution of the intensity of use of physical capital, that of human capital and the contribution of total factor productivity (TFP) (the formal derivation of this decomposition is presented in the Appendix). The latter reflects the efficiency of the economy in combining human capital and physical capital to produce a given amount of final goods and services.<sup>4</sup>

### **Text box 1.1** Measurement of productivity and wellbeing

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The concern about the existence of productivity gaps among countries is motivated by the relationship between these gaps and differences in levels of wellbeing (given that consumption is an important element for wellbeing). This raises the question of the extent to which differences in output per unit of input among countries actually reflect differences in consumption capacity. That is, the extent to which it is possible to measure productivity relevant to wellbeing.<sup>a</sup>

One aspect that makes it difficult to compare countries is their different prices, even for very similar goods. The fact that, for example, a hamburger in the same fast food chain costs more than twice as much in Switzerland than in Mexico means that buying a certain consumption basket requires less income for a Mexican resident than for a Swiss resident.<sup>b</sup> Failure to recognize these differences would lead to an undervaluation of Mexico's productivity and income relative to Switzerland. Thus, productivity comparisons among countries are usually made based on GDP measurements in purchasing power parity units (as is the case in the figures in this chapter), which ensure that the same products are valued using the same prices among countries and that baskets of equally constant products are taken into account.

In addition, the wellbeing that eating a hamburger generates for an average consumer in Mexico may be different from the wellbeing that this generates in Switzerland: the quality of ingredients, product presentation, customer service, how much one culture enjoys hamburgers compared to the other, among other factors, may differ between the two countries. Valuing this good at the same price and with the same weight across countries implies disregarding these differences in quality and preferences, and raises additional concerns about the degree to which the usual productivity measures are relevant for welfare. Even if the basket of goods and services consumed by two countries comprised the same categories of goods and services, a measure of productivity relevant for wellbeing should take into account these differences in consumption attributes: productivity relevant for wellbeing considers not only the efficiency of production processes, but also the degree to which the consumer has access to varied, high-quality goods and services.

Unfortunately, it is not yet customary to incorporate product quality adjustments and consumer preferences into productivity analyses, largely because neither the tools to do so are widely accepted nor is the data available. Productivity characterizations in this report therefore do not take into account considerations related to differential attributes of products and services among countries or periods. It is worth mentioning, however, that existing research suggests that introducing them into the analysis would not change the conclusion that Latin America exhibits large effective income gaps with respect to the United States and that TFP is by far the main factor that explains them.

The few existing calculations of differences in consumption attributes suggest that, in the last decade, the evolution of productivity gaps relative to the United States does not vary according to whether or not the calculation is adjusted by the valuation that consumers give to different goods in their basket. However, a longer-term analysis probably does show a more favorable evolution in Latin America when this adjustment is made, especially in the period of structural reforms of the 1990s, given the gains in quality and variety of consumption that occurred during that period.<sup>c</sup>

a. Basu, Pascali, Schiantarelli, & Serven (2016).

b. In July 2017, the price of a Big Mac hamburger from McDonald's expressed in USD was \$6.74 in Switzerland, \$5.30 in the U.S., \$3.84 in Chile, \$3.23 in Peru and \$2.75 in Mexico, according to the Big Mac Index (The Economist, 2018).

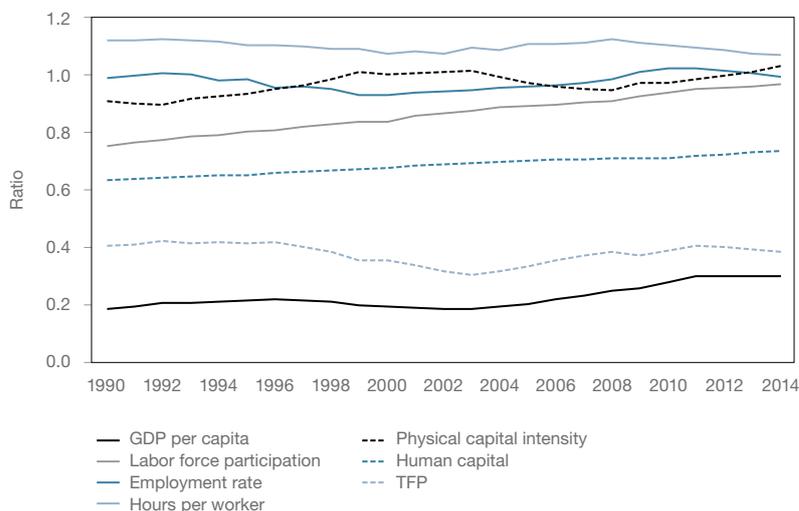
c. Redding & Weinstein (2017) have found that the effective consumption gain from quality changes (measured by the lowest loss of effective consumption from changes in quality-adjusted prices) between 2007 and 2014 in the United States is between three and five percentage points per year. Using a comparable methodology, although with data of a different nature, Eslava & Haltiwanger (2017) have found that, for the same period in Colombia, this gain is similar. In other words, by adjusting for quality, the (effective) income gap between Colombia and the United States would be maintained. However, the same research suggests that the gains in wellbeing implied by the evolution of quality-adjusted prices accelerated in the 1990s, and especially in the 2010 decade, compared to the 1980s. This is consistent with findings suggesting an improvement in the quality of raw materials and final products in Colombia as a result of trade liberalization at that time (Fieler, Eslava, & Xu, 2018).

Which components of per capita GDP are of greatest relative importance? Of the four dimensions described in Figure 1.1, labor productivity explains almost all of the gap in per capita GDP. In turn, the labor productivity gap is explained mainly by the TFP gap and, to a lesser extent, by differences in human capital. Graph 1.2 reveals that this is indeed the case, especially in the last decade, for a group of Latin American countries comprised of Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Peru, Uruguay, and Venezuela, for which data on hours per worker are available from at least 1990 onwards. Graph A 1.1 in the Appendix reproduces the exercise for these countries on an individual basis.

These graphs show that the gap of almost 70% of GDP per capita relative to the United States in recent decades cannot be explained by differences in the contribution of physical capital intensity or human capital. Labor force participation, employment, and capital intensity in Latin America are roughly the same as in the United States. The average hours that a worker devotes to the production process each year are, in fact, higher in the region. In contrast, TFP is about 40% of that observed in the United States, while human capital is almost 75% of that in this country.<sup>5</sup>

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5. In Penn World Table 9.0, human capital is measured through an index that is built, as is customary in the literature, based on average years of schooling and estimates of rates of return to education by country. For more details, see the PWT 9.0 documentation at [https://www.rug.nl/ggdc/docs/human\\_capital\\_in\\_pwt\\_90.pdf](https://www.rug.nl/ggdc/docs/human_capital_in_pwt_90.pdf).

**Graph 1.2** GDP per capita relative to the United States and its components

**Nearly 80% of the income gap between Latin America and the United States is due to a low total factor productivity.**

Note: The graph shows per capita GDP, in constant dollars at purchasing power parity, and its components according to the decomposition shown in Figure 1.1. The series are expressed in proportion to the United States and correspond to the simple averages of the following Latin American countries: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Peru, Uruguay, and Venezuela (the only countries in the region with information on total hours worked).

Source: Produced by the authors based on data from the Penn World Table 9.0 (Feenstra, Inklaar, & Timmer, 2015) and World Development Indicators (World Bank, 2018).

To put these figures into perspective, if Latin American countries managed to fully close the TFP gap relative to the United States, they would, on average, reach a per capita GDP of about 75% of that in the United States. In contrast, if they managed to eliminate their differences in human capital, per capita GDP would be about 40% of that in the United States. In other words, nearly 80% of the gap is attributable to Latin America's low TFP, while the remainder is almost entirely due to differences in human capital. Table 1.1 shows the decomposition of per capita GDP for Latin American countries on an individual basis, as well as for the regional average over the period 2004-2014.

In sum, Latin America's low-income problem lies in its low capacity to transform human capital, physical capital and other productive inputs into goods and services. As a result, Latin America will only be able to reduce significantly its income gap vis-à-vis the developed world to the extent that its TFP increases.<sup>6</sup>

6. In the last decade, both labor participation and capital use intensity are practically level with the United States, with the implication that TFP and, to a much lesser extent, human capital are the only two sources explaining income disparities.

**Table 1.1** GDP per capita relative to the United States and its components per country (2004-2014)

	GDP per capita	Labor force participation	Employment rate	Hours per worker	Productivity per hour	Physical capital intensity	Human capital	TFP	TFP contribution to GDP per capita gap
Argentina	0.35	0.88	0.98	1.01	0.39	0.89	0.77	0.57	63%
Brazil	0.24	1.01	0.99	0.99	0.23	1.08	0.67	0.31	84%
Chile	0.34	0.89	0.99	1.19	0.34	0.94	0.80	0.45	80%
Colombia	0.20	0.96	0.96	1.03	0.19	0.98	0.64	0.31	80%
Costa Rica	0.23	0.90	1.00	1.32	0.19	0.86	0.69	0.31	79%
Ecuador	0.18	0.90	1.01	1.23	0.18	1.02	0.73	0.25	90%
Mexico	0.29	0.84	1.03	1.21	0.28	0.94	0.70	0.43	73%
Peru	0.17	1.00	1.00	1.04	0.17	0.93	0.74	0.25	87%
Uruguay	0.29	0.98	0.98	0.92	0.32	1.09	0.70	0.41	80%
Venezuela	0.29	0.89	0.98	1.04	0.33	1.08	0.69	0.45	76%
Average	0.26	0.93	0.99	1.10	0.26	0.98	0.71	0.37	79%

Note: The table reports GDP per capita, in constant dollars at purchasing power parity and its components according to the decomposition shown in Figure 1.1. The series are expressed as a proportion to the United States and correspond to the averages from 2004-2013 for each country. The last line refers to the simple average of the countries shown.

Source: Produced by the authors based on data from the Penn World Table 9.0 (Feenstra, Inklaar, & Timmer, 2015) and World Development Indicators (World Bank, 2018).

## Conceptual framework

In the development accounting exercises presented in the previous section, the country-level TFP is obtained as a residual: it is the difference between GDP and the combination of human and physical capital used in production. Understanding this remainder demands an approach that brings the firm and its decisions, together with the allocation of resources between firms, to the center of the analysis.

The aggregate productivity of an economy can be broken down into two components. The first is the productivity level of existing firms and the second is the way in which productive resources are allocated among these firms. Both elements change over time depending on three closely related mechanisms (or channels).

First, both components of aggregate productivity are affected by the entry and exit of firms, or “selection channel”. To the extent that the economy favors the entry of more productive firms and the exit of those that are less productive, the level of productivity of that country will be higher. Second, the productivity of each firm depends on its innovation, that is, the adoption of cost-reducing technologies, the development of new products and the use of more efficient management practices, including human talent management methods promoting employee’s effort and reducing labor mismatches (between workers’ skills and the skills required by the tasks they perform). This is the “innovation channel”. Third and lastly, the continuous process of expansion and/or contraction of

surviving firms has implications for aggregate productivity. The “reallocation channel” captures this effect: When resources move from low-productivity firms toward more productive firms, aggregate productivity increases.<sup>7</sup>

There is evidence documenting the importance of these mechanisms as proximate drivers of the aggregate productivity of an economy. In the case of the innovation channel, Hsieh and Klenow (2014) document for Mexico and India a relatively slow growth in the productivity of businesses throughout their life cycle. The authors evaluate the importance of this channel, finding that the effects have significant magnitudes and can explain a substantial proportion of the productivity gap between these countries and the United States.

With regard to the allocation channel, Hsieh and Klenow (2009), working with data for the manufacturing sectors of China and India, provide evidence of dispersion of marginal productivity of factors across establishments within narrowly defined industries. According to the author, this dispersion suggests resource misallocation that imply productivity losses between 30% and 50% in aggregate productivity in the manufacturing sector in these countries. Using the same approach, Pagés (2010) provides similar evidence for several Latin American countries. CAF (2013) highlights the importance of reallocating factors of production from informal to formal firms within each industry or sector. In this case, wages (or labor productivity) could increase by up to 24%, even controlling for worker characteristics. Finally, Levy (2018) shows recent evidence for Mexico on the problem of factor misallocation, emphasizing the problem of the huge informal sector existing in that country. In fact, informality is one of the most notorious features of the productive underdevelopment in the region, affecting productivity not only through the allocation channel, but also through companies’ incentives to innovate.

The level of innovation by firms and the efficiency in both the firm selection process and in the allocation of resources among firms are manifestations, but not the ultimate origin, of a country’s productivity level. In the context of Latin America, in order to understand why the region has not been able to consolidate a process of continuous productivity growth, it is necessary to understand why firms innovate little, why inefficient firms survive while new ventures with high growth potential do not enter the market, and why are production factors inefficiently allocated among firms. The search for answers to these questions leads to the study of the role of economic institutions (the “fundamental drivers”).

These fundamental drivers condition the realms of interaction of firms with citizens, with the State, and with each other to compete, to access supplies or cooperate, to hire workers, or to finance their operations. These include, first and foremost, deep institutions that determine, for example, the protection of property rights, the enforcement of contracts and State capacities, including the control of corruption. They also include institutions that determine the functioning of

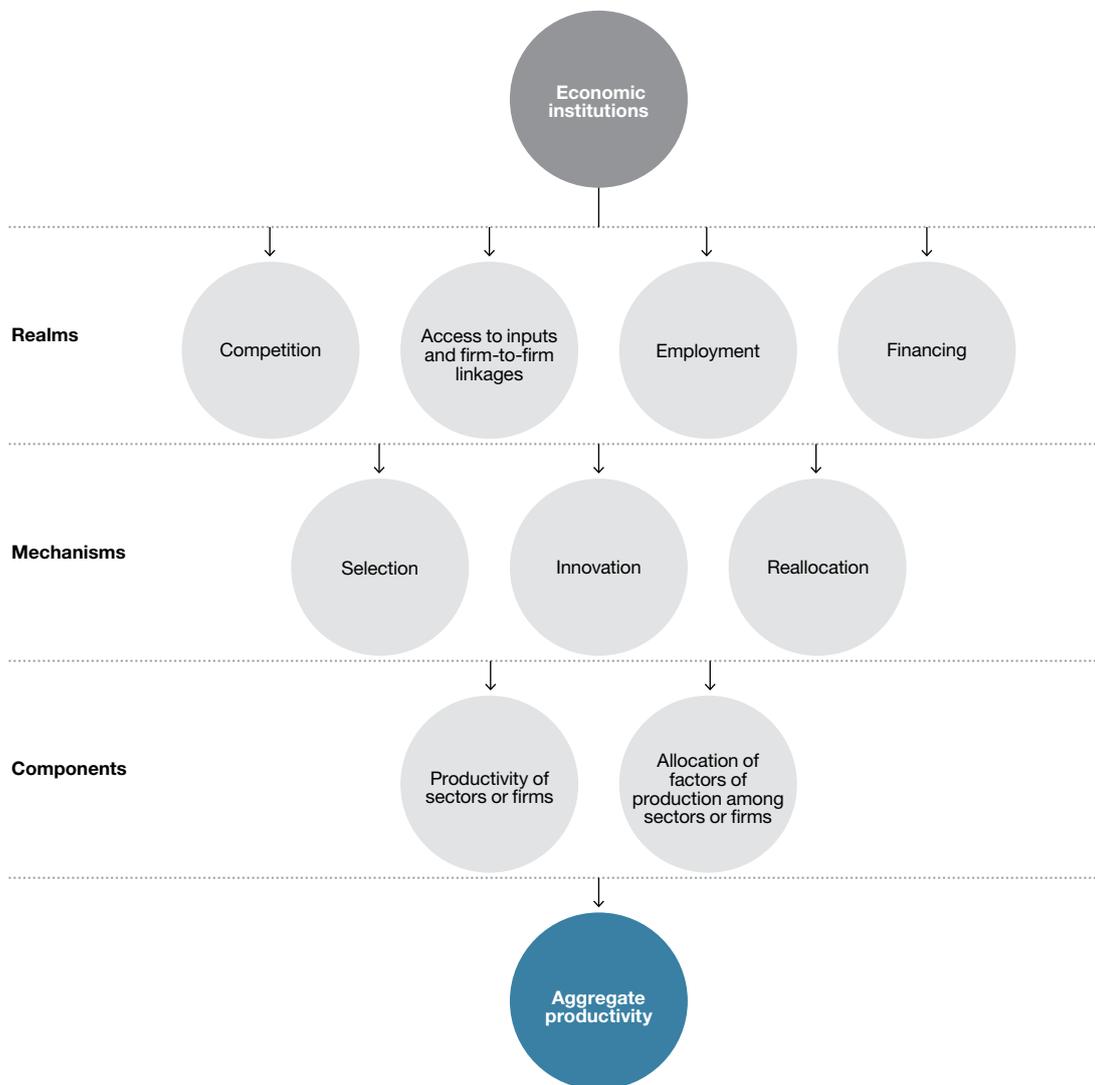
**An economy’s productivity is affected through three channels: selection, reallocation and innovation.**

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7. More specifically, the allocation of resources is considered efficient if it is not possible to increase output by redistributing factors of production among firms. Theoretically, this happens when the marginal productivities of factors are equal among firms. This eliminates the possibility that some kind of factor reallocation translates into greater output and productivity gains.

regulatory frameworks and public policies in specific areas.<sup>8</sup> Figure 1.2 illustrates this approach to addressing productivity.

**Figure 1.2** Analytical framework: What lies behind productivity?



Source: Produced by the authors.

8. There is a great deal of complementarity among all these institutional dimensions. It is clear that, in general, these overarching institutions affect different spheres of the productive environment simultaneously. For example, failures in the judicial system or in state capacities affect all of the above areas. On the other hand, some interaction among these domains is to be expected. For example, as discussed in Chapter 3, competition in the goods and services market may influence the labor market environment, limiting trade unions' scope of action. Moreover, as will be seen in the next section, many of the geographical, political or cultural drivers that affect the establishment or functioning of institutions, whether general or specific, are common, suggesting a positive correlation among the different dimensions of the institutional framework.

The Figure 1.2 also presents the structure of the report. The rest of this chapter analyzes the impact of fundamental, overarching institutions on productivity. Chapter 2 provides a diagnosis of the decomposition of aggregate productivity at different levels of aggregation between the *internal component* that reflects the average productivity over sectors, industries or firms, and the *external component* that captures the role of factor allocation among firms, industries or sectors. Finally, Chapters 3 to 6 address the role of relevant institutions in the four mentioned realms of firms' interaction: competition, access to inputs and inter-firm relations, the labor market, and the financial system. The intention is to establish, in these specific contexts, the connection between some institutions (regulatory frameworks and public policies, including their implementation and control) and productivity through their different mechanisms: selection, innovation, and reallocation.

**Cross-cutting institutions are key to fostering productivity and economic development.**

## Institutions and productivity

Economic institutions are critical to boosting productivity and development. These institutions include those of an overarching nature that promote, for example, the protection of property rights and the enforcement of contracts, as well as others referring to rules, regulations and programs applied in more specific areas or markets (such as the labor market). The analysis of the rest of the chapter focuses on the former, while the rest of the report also analyzes the role of the latter.

### Institutions: concept and measurement

According to the forerunners of the institutional approach to development, institutions are the rules of the game –formal and informal– that structure the interactions of the different actors in society (governments, citizens, companies, etc.) in the social, economic, and political spheres (North, 1990). It is worth noting that the concept of institutions encompasses both *de jure* or formal rules or policies as well as *de facto* or informal ones, including social norms, that affect their implementation and enforcement in practice and that are ultimately the ones that matter when determining the behavior of agents.<sup>9,10</sup>

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9. For example, the imperfect compliance of labor regulations, as occurs when only medium and large companies pay taxes, may penalize firm growth and, as such, could generate incentives against an increase in productivity both through the allocation channel and through the innovation channel.

10. That is why an institutional reform agenda should be seen as a continuous process of improvement. The initial design and implementation phase of policies is followed by changes in aspects related to control and compliance (based on the learning that is given by their implementation) to adjust the operation of the intervention to the objectives sought.

**The level of institutional development in Latin America is low, some indicators showing levels that rival those of Sub-Saharan countries.**

This definition comprises a wide range of institutional development indicators. Table 1.2 shows the average value for the period 1996-2015 for four institutional indicators for the countries of Latin America and six other regions of the world, taken from the International Country Risk Guide (PRS, 2018). These are: “Rule of Law and Order”, “Regulatory Quality”, “Government Effectiveness or Bureaucratic Quality” and “Control of Corruption”.<sup>11,12</sup>

These indicators, which are widely used in international rankings and empirical studies,<sup>13</sup> are constructed from surveys of investors and other relevant political and economic actors, with the aim of capturing perceptions of how the different institutional dimensions work in different countries. Thus, they do not directly reflect the formal and procedural rules (such as the legal details of economic regulations on contracts) but their functioning in practice as perceived by investors and other actors. This may in fact be an advantage because it is the way institutions work in practice which determines the behavior of economic agents.

Table 1.2 suggests, first, that institutional development in Latin America is well below that of the developed countries in North America and Europe. In fact, the indicators of institutional development in the region are at the level of African countries, and for the case of rule of law and order, the level in Latin America is even lower than that of Sub-Saharan Africa.

Second, there is significant heterogeneity across countries. Chile, for example, exhibits a relatively high index value in all dimensions. Mexico, on the other hand, shows important contrasts, being very well rated in quality of regulation and effectiveness of the Government, but very badly rated in corruption and rule of law. Venezuela, at the other extreme, presents very poor ratings in all dimensions.

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11. Rule of Law and Order: considers one indicator related to the strength and impartiality of the legal and justice system, as well as another related to the general public's perception of compliance with the law. Regulatory Quality: includes risk of expropriation, ease of repatriation of profits, and delays in contract payments. Government Effectiveness or Bureaucratic Quality: includes indicators related to political independence of bureaucracy and to the presence of pre-established mechanisms for the selection and training of civil servants. Control of Corruption: includes variables related to clientelism, nepotism, secret campaign financing and connections between business and politics.

12. The database includes other institutions associated with political issues, such as Voice and Accountability, which measures military involvement in politics and accountability, and Political Stability and Absence of Violence, which includes variables associated with government stability, internal conflict, external conflict and racial tensions.

13. A similar database that compiles information on institutions is the one on perceptions of government effectiveness, prepared by Kaufmann, Kraay, & Mastruzzi (2011).

**Table 1.2** Institutional operation indexes per country (1996-2015)

Country	Government effectiveness	Regulatory quality	Control of corruption	Rule of law and order
Argentina	0.74	0.46	0.40	0.46
Bolivia	0.51	0.49	0.36	0.47
Brazil	0.51	0.56	0.45	0.35
Chile	0.75	0.89	0.69	0.80
Colombia	0.51	0.61	0.44	0.27
Costa Rica	0.50	0.67	0.46	0.60
Dominican Republic	0.26	0.74	0.38	0.44
Ecuador	0.50	0.36	0.47	0.46
El Salvador	0.49	0.62	0.44	0.36
Guatemala	0.49	0.77	0.36	0.32
Honduras	0.49	0.55	0.34	0.28
Jamaica	0.75	0.71	0.32	0.36
Mexico	0.72	0.79	0.36	0.37
Nicaragua	0.25	0.62	0.42	0.64
Panama	0.51	0.78	0.33	0.50
Paraguay	0.26	0.65	0.24	0.38
Peru	0.49	0.64	0.42	0.51
Trinidad and Tobago	0.74	0.88	0.36	0.44
Uruguay	0.51	0.78	0.56	0.43
Venezuela	0.26	0.24	0.25	0.33
North Africa	0.45	0.63	0.36	0.68
Sub-Saharan Africa	0.31	0.55	0.34	0.49
Latin America	0.51	0.64	0.40	0.44
North America	1.00	0.95	0.77	0.91
Asia	0.63	0.64	0.43	0.63
Europe	0.90	0.85	0.70	0.88

Note: The indexes have values ranging from 0 to 1, from worst to best. The values for each country are calculated as the simple average of the available data between 1996-2015. The values for each region are simple averages of member countries. Countries included in each region can be found in the Appendix.

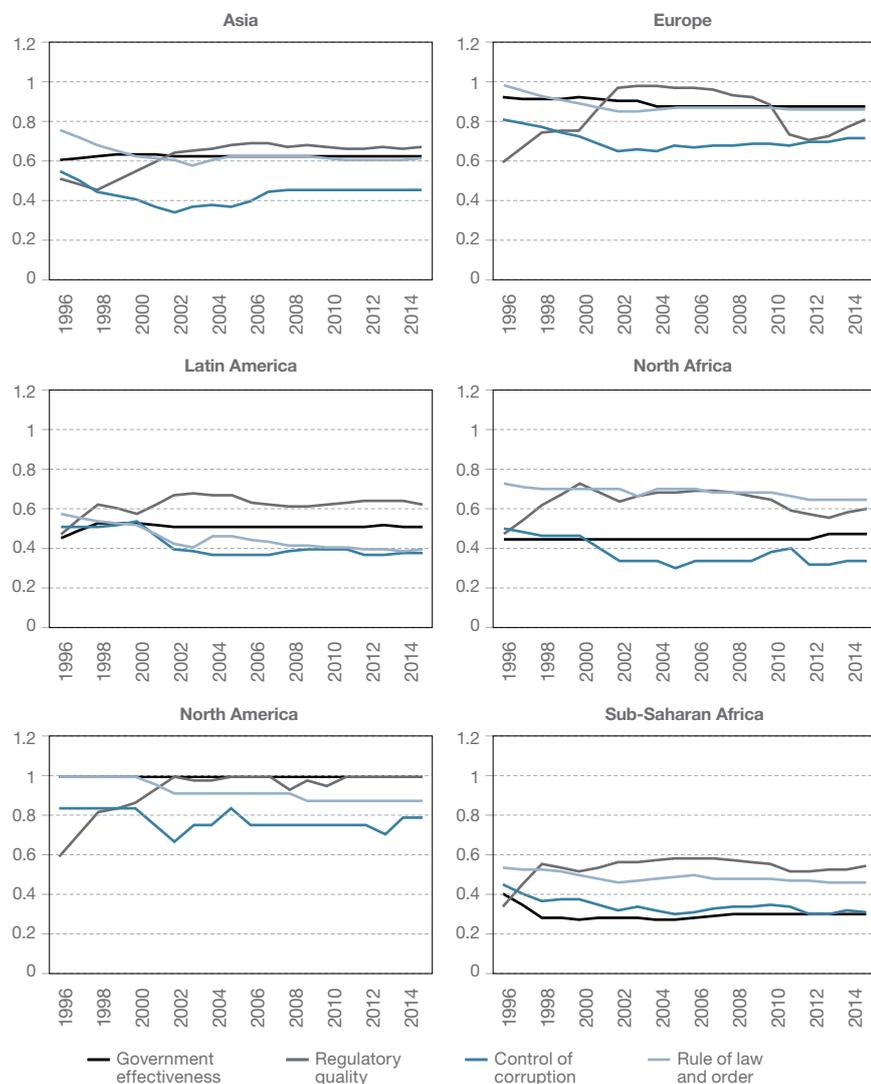
**Source:** Produced by the authors based on the International Country Risk Guide (PRS, 2018).

It should be noted that, although institutional development is an attribute that could *a priori* be considered relatively stable, these indicators may vary over time as a function of changes in perception originated by events such as macroeconomic crises, debt defaults, or episodes of corruption. This is why, in some cases, there are strong fluctuations from one year to the next. Graph 1.3 illustrates the evolution of these indicators in the six regions considered between 1996 and 2015.<sup>14</sup>

14. Of course, in each case there are important differences within each region.

For Latin America, there has been a sharp drop in the indicator “Rule of Law and Order”, especially since 2000. On the contrary, in the case of “Regulatory Quality”, there is a positive trend in almost all regions, suggesting a certain process of convergence or transfer of good practices with tangible results. The “Government Effectiveness” indicator increases at the beginning of the period and then remains relatively constant. Finally, the “Control of Corruption” indicator deteriorates throughout the period.

**Graph 1.3** Institutional operation indexes per region



Note: The graph reports the simple average from each year of the countries included in each region. Index values range from 0 (worse) to 1 (best). Details on the countries included in each region can be found in the Appendix.

Source: Produced by the authors based on the International Country Risk Guide (PRS, 2018).

## Impact on productivity and development

How do these indicators affect productivity and per capita GDP? Tables 1.3 and 1.4 present, respectively, the results of a simple regression analysis that explores these relationships. In addition to displaying the corresponding estimated partial correlation coefficient for each variable and its statistical significance (using standard notation), they also display the percentage of productivity and income variation that each institutional variable helps explain (in parentheses). The estimates use the panel structure of the data (variations by country and over time) and alternatively incorporate fixed effects by year, country, and region.

As the tables show, most indicators show a strong and significant positive correlation with productivity (TFP) and per capita GDP. In the preferred specification (which includes fixed effects by country and by year, column 2 of each Table) “Government Effectiveness” exhibits the greatest explanatory power, followed by “Regulatory Quality”. The results are slightly weaker for the variable “Control of Corruption” and for “Rule of Law and Order”, especially in the case of regressions that use TFP as a dependent variable.

**There is a positive correlation between strong cross-cutting institutions and total factor productivity.**

**Table 1.3** Institutional operation indexes and TFP

	(1)	(2)	(3)
<b>Institutions</b>			
Government effectiveness	0.587*** (37.5)	0.259** (9.3)	0.703*** (24.0)
Regulatory quality	0.468*** (25.1)	0.236*** (6.5)	0.443*** (14.8)
Control of corruption	-0.034 (16.8)	-0.009 (4.9)	0.158* (10.6)
Rule of law and order	0.323*** (20.6)	-0.169* (5.6)	-0.073 (10.6)
Year fixed effects	no	yes	yes
Country fixed effects	no	yes	no
Region fixed effects	no	no	yes

Note: The table reports coefficients and general dominance statistics (in parentheses) resulting from simple linear regressions. The dominance statistics indicate the percentage of the total explanatory power of the model attributable to each variable. The sample was taken from 101 countries over 16 years. The regions used are: East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, South Asia, and Sub-Saharan Africa. Countries included in each region can be found in the Appendix. The three models include a statistically significant constant term.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Robust standard errors are used.

**Source:** Produced by the authors based on the Penn World Table 9.0 (Feenstra, Inklaar, & Timmer, 2015) and International Country Risk Guide (PRS, 2018).

**Table 1.4** Institutional operation indexes and GDP per capita

	(1)	(2)	(3)
<b>Institutions</b>			
Government effectiveness	2.062*** (40.6)	0.234*** (15.4)	1.286*** (23.4)
Regulatory quality	1.532*** (24.5)	0.193*** (9.9)	1.245*** (15.2)
Control of corruption	-0.295* (13.8)	0.004 (6.4)	0.227* (9.1)
Rule of law and order	1.262*** (21.1)	-0.147* (9.1)	0.691*** (12.6)
Year fixed effects	no	yes	yes
Country fixed effects	no	yes	no
Region fixed effects	no	no	yes

Note: The table reports coefficients and general dominance statistics (in parantheses) resulting from a simple linear regression. The dominance statistics indicate the percentage of the total explanatory power of the model attributable to each variable. GDP reported in 2011 constant dollars at purchasing power parity. The sample is taken from 134 countries over 17 years. The regions used are East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, South Asia, and Sub-Saharan Africa. Countries included in each region can be found in the Appendix. The three models include a statistically significant constant term.  
\* p<0,05, \*\* p<0,01, \*\*\* p<0,001. Robust standard errors are used.

**Source:** Produced by the authors based on World Development Indicators (World Bank, 2018) and International Country Risk Guide (PRS, 2018).

These relationships, of course, do not imply a causal link between institutions and productivity or per capita income. To begin with, causality could be reversed: countries with higher productivity and per capita income (due to other factors, such as the presence of natural resources) could establish better institutions (for example, because they could provide more funding for bureaucracy or the judicial system).<sup>15</sup>

In addition, the relationship between institutions and productivity and per capita income could be determined by other factors that simultaneously affect both variables and give rise to the observed relationship (omitted variables). One such factor, for example, could be geography, which could contribute to both per capita income and institutional development through various channels.<sup>16</sup>

15. See Glaeser, La Porta, Lopez-de-Silanes, & Shleifer (2004) for a view that emphasizes causality from per capita income or GDP to institutions.

16. In relation to geography, a relevant variable could be climate. In this sense, Acemoglu, Johnson, & Robinson (2005) cite Montesquieu, who mentions the fact that high temperature directly and negatively affects income (less incentives to work) and at the same time negatively affects the adoption of democratic institutions favorable to private property typical of the West by discouraging the immigration of European settlers.

For these reasons, properly assessing the hypothesis that certain economic institutions cause greater prosperity requires finding a source of exogenous variation in these institutions.

One strategy for this purpose is to analyze the historical experience of Europe's colonization of America, Asia, and Africa between the 16th and 19th centuries.<sup>17</sup> This experience could be an important driver of institutional development in past periods (with lasting consequences over time) and at the same time be unrelated (except for this effect) to current income. To what extent did that experience involve the development of economic institutions that favored entrepreneurship and innovation, which in turn promoted in the long-run more or less widespread prosperity in the new societies overseas?

The answer to this question is not straightforward, given that the European colonization of America, Africa and Asia reveals very dissimilar situations: while in some territories were established institutions that promoted economic freedom and civil rights, in others an extractive exploitation model was imposed under the control of small local and foreign elites (Acemoglu, Johnson, and Robinson, 2005).

What determined one form of colonization over another? On the one hand, the resource endowment of the new territories and in particular the availability of minerals or agricultural products of high value in the international market was certainly one of the drivers. Sokoloff and Engerman (2000), for example, have noted that differences in the initial endowment of resources among the various colonies influenced the initial concentration of income and wealth and influenced, through an unequal distribution of political power, the development of political and economic institutions. On the other hand, other drivers also associated with geography were the climate and the possibility of contagion of diseases (such as malaria), which had an impact on the massive immigration of settlers to the new territories and thus on the incentive for new migrants to establish ground rules that promoted greater political and economic freedom.<sup>18</sup>

Given that both histories—not necessarily mutually exclusive—explain institutional development based on geographic variables, it is interesting to explore whether these variables can have a direct effect on per capita income, beyond their

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17. Hall & Jones (1999) is one of the first papers to use variables related to European immigration (measured as the percentage of the population that spoke European languages) as an instrument to explain variation in institutions.

18. Acemoglu, Johnson, & Robinson (2001) found evidence that institutions cause sustained increases in the per capita income of nations, using the mortality rate of European settlers in colonies as an instrument (or source of exogenous variation) of institutional development. The authors argued that this is a valid instrument because it fulfills two requirements. First, it is not negatively correlated with the income or wealth of those territories at that time (this has been verified since, on the contrary, the tropical areas where the presence of malaria and other diseases for which Europeans had no immunity were generally areas with greater wealth and native population density). Second, the institutional development that took place between the 16th and 19th centuries induced by migration is correlated with the current level of institutional development (this has also been verified, as there is a strong and negative correlation between the mortality rate of European settlers and the measure of protection against the risk of expropriation estimated in recent periods).

**Evidence suggests that some economic institutions are important drivers of development.**

impact through institutional development.<sup>19</sup> The evidence, however, seems to suggest that once controlled by the effect of geography on institutions, this variable has no additional impact.<sup>20</sup>

An alternative approach to understanding the impact of institutions on development is to analyze more recent historical episodes that make a “natural experiment” possible. This is possible when an incident (not directly related to development) generates an abrupt change in the institutional environment, so that from this incident two societies, regions, or countries that previously shared the same characteristics (economic, cultural, and political) adopt very different institutional regimes. For example, the division of the Korean peninsula between North and South Korea, with a communist system in one case and a capitalist economy in the other, provides such a scenario. In this case, the divergence after the institutional change in the evolution of per capita income is striking and well known, despite the fact that initially both regions shared the same climate, similar natural resources and a common economic structure (Acemoglu, Johnson, & Robinson, 2001).

In summary, various historical and empirical analyses provide evidence that certain economic institutions such as the protection of property rights, the rule of law, and regulatory quality are important drivers of development. Why do some countries have good institutions and others do not; and in particular, why in light of this evidence do relatively less developed countries not adopt these rules? The next section discusses this question.

## **Determinants of Institutional development**

Economic institutions affect not only the aggregate level of production and income of economies but also how this income is allocated among various groups and individuals in society (Acemoglu et al., 2005). For example, duly established land ownership rights, respected and secured by laws and independent courts of law, create incentives for farmers and agricultural entrepreneurs to invest in innovation and machinery for higher yields, with the peace of mind that their incomes will not be expropriated.

This distributional aspect is crucial for the dynamics of institutions. In a context in which economic institutions are endogenous, the institutional arrangement emerging from any mechanism of collective choice is influenced not only by the perception of its effects on production and

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19. After all, geography affects the quality of the land and, with it, the productivity of agriculture of different crops. It also conditions the technologies that can be applied. For example, in relation to temperate regions, tropical areas tend to have lower crop yields, especially cereals (Diamond, 1997 and Sachs, 2001). Geography also determines the distance to the main markets. If a country does not have access to the sea, international trade becomes more difficult and expensive, and with it, the use of economies of scale in the production of certain industrial products (Frankel & Romer, 1999).

20. This analysis is not only found in the original work of Acemoglu, Johnson, & Robinson (2001) but also in later works that review the robustness of the results found by these authors (Easterly & Levine, 2003 and Rodrik, Subramanian, & Trebbi (2004).

aggregate income, but also, and fundamentally, by the perception of its distributional implications.

This distributive aspect may therefore induce conflicts of interest among various groups regarding which institutions they prefer. For example, the interest of rural farmers and entrepreneurs could be in conflict with that of urban entrepreneurs who use rural products as an input and who, in order to keep prices down, could lobby for quasi-confiscatory measures, such as State control over their trade.<sup>21</sup> Despite the inefficiency of this type of measures, the Government could adopt them to obtain revenues that it would not obtain from better institutions.

Therefore, due to this distributive aspect, economic institutions that maximize aggregate income are not always established if they involve a conflict of interest among different groups in society. The resolution of this conflict of interest will depend on how the *de jure* and *de facto* political power is shared.

*De jure* political power is affected by political institutions. For example, a system of open and competitive elections allows citizens to influence public institutions and policies regardless of their income or wealth, via the election of candidates with certain preferences. Following the above example, this system could give rural sectors some political representation to oppose confiscatory policies.

*De facto* political power, however, can be affected by the distribution of income or wealth itself, since interest groups with sufficient resources (monetary, human, or otherwise) can influence the design of public policies and institutions (or their functioning in practice), through lobbying, protests, or other methods.<sup>22</sup> In the example cited, urban entrepreneurs could finance candidates' political campaigns or threaten boycotts or other measures to put pressure on governments.

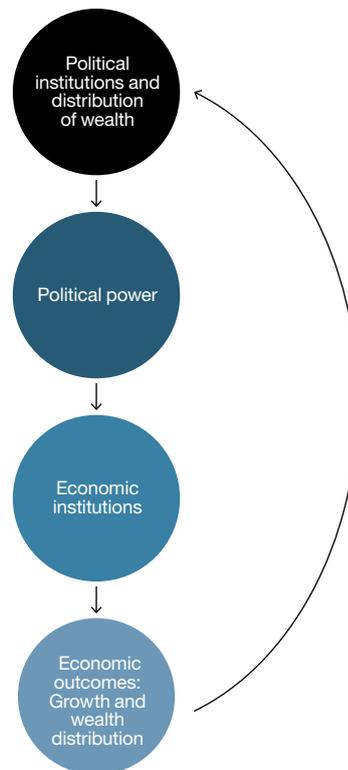
*De jure* and *de facto* political power, then, affect the choice and functioning of economic institutions, which in turn affect economic outcomes including the distribution of wealth that, as explained earlier, is a very important driver of *de facto* political power. This gives rise to either a virtuous or a vicious circle that confers a certain persistence to political and economic institutions and their development outcomes. Figure 1.3 illustrates this mechanism.

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21. This type of policy was very common in the 1960s and 1970s in several countries in Africa and Latin America (see Bates, 1981).

22. Returning to historical cases, merchants of the Middle Ages were able to resist their monarchs in the face of abusive tax policies, if their wealth allowed them to finance armies. This was precisely the case in England in the 17th century (Acemoglu, Johnson, & Robinson, 2005).

**Figure 1.3** Feedback between institutions and economic outcomes



Source: Produced by the authors.

This approach to institutional development has been applied to understand the development lag of the economies of Latin America and the Caribbean with respect to the United States and Canada, despite the fact that both regions had very similar income levels at the beginning of the nineteenth century.<sup>23</sup> Differences in initial wealth in the respective colonies and, above all, in their degree of concentration, may have influenced the further development of their political and economic institutions, explaining the contrast in their performance (Sokoloff & Engerman, 2000).

On the one hand, in the Caribbean and the northern region of South America (including the coast of Brazil and Peru) the exploitation of minerals (gold and silver) and agricultural products such as sugar and coffee, oriented to external markets, required a large workforce and much capital to be profitable, as their production was subject to economies of scale. A high proportion of this workforce

23. In fact, some Caribbean economies such as Cuba and Barbados had much higher per capita income levels (Sokoloff & Engerman, 2000).

was provided by native populations under conditions of slavery. This implied a greater concentration of wealth in a few families or local elites.

On the other hand, in the northern colonies of the United States and Canada, cereal and livestock production could be profitable even on relatively small farms and without the need to massively employ the native population, which in any case was less numerous. In this case, the workforce was provided by the same European settlers who, given the wide availability of land and its greater adaptation to the temperate climate, migrated and settled in greater numbers in these colonies.

Thus, the initial endowments of resources and production technologies in the different regions were a relevant driver of the initial distribution of wealth and, by this route, of the development of political and economic institutions.

For the case of the Caribbean and the northern region of South America, the wealth of the elites that produced minerals and tropical crops allowed them to amass an important political power in coexistence with the colonial government to which they paid taxes. The slavery or semi-slavery of the local workforce (or that coming from Africa) implied an institutional precedent that curtailed individual liberties and accentuated conditions of inequality and concentration of wealth. This led to the development of political and economic institutions that ensured the *status quo*.<sup>24</sup> Politically, for example, universal suffrage was established much later (Engerman, Haber, & Sokoloff, 2000). Economically, the immigration of new European settlers and the possibility of undertaking commercial activities, especially abroad, was restricted. These policies were also reflected in the distribution of land which, given the power of the local elites and their influence on the governments in power, tended to perpetuate the concentration of wealth through transfers and donations that resulted in large estates, even though the production of certain products, such as cereals in the Southern Cone, did not require it.

For the case of the northern region of the United States<sup>25</sup> and Canada, the production of cereals and later cattle attracted European migrants familiar with this type of technology. As a result, these colonies were much more equitable in terms of the distribution of wealth and political power. This implied a greater balance in decision-making and encouraged the development of more participatory political institutions (such as local assemblies). At the same time, it generated greater economic freedom, since no sector had the strength to impose regulations that privileged its interest. This was reflected in fewer restrictions on immigration and trade and, later, in other economic institutions related to the creation and regulation of industries and corporations, such as patent laws (which secured property rights over innovations) and antitrust laws (which kept

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24. In part, this type of extractive economies, based on the exploitation of valuable natural resources using a native workforce, reproduces situations existing before the colonization processes, such as those verified in Mexico and Peru with the Aztec and Inca civilizations, respectively.

25. The pattern of development in the southern United States was also characterized by extractive exploitation (cotton and tobacco) similar to that of the Caribbean colonies and the rest of Latin America.

**Adopting the formal political and economic rules of developed economies is not a sufficient condition for success.**

markets open for the free entry of new competitors). It was also reflected in the regulation of financial markets, affected by the establishment and elimination of monopolies, in part driven by greater political participation (Harvey, 2001).

The approach developed so far, suggests an important inertia of political and economic institutions, which can perpetuate situations of low economic growth or, on the contrary, sustain virtuous processes of high growth. However, it also leaves room for significant changes in these dynamics due to shocks or disturbances. For example, the emergence of new technologies or access to new markets can change the distribution of wealth and the balance of political power and, as a result, bring about substantive change in economic institutions.

Such episodes abound in economic history. For example, Acemoglu et al. (2005) have explained how property rights in England were strengthened as a result of the enrichment of the merchant class, originated in the significant increase in trade with the New World since the mid-17th century. This altered the distribution of wealth between the monarchy and this new class of merchants, who began to demand laws to protect the right to property and limit the power of monarchs in setting taxes.

A closer example is the transition of the Southern Cone countries (for example, Argentina) from policies promoting trade integration with the rest of the world and openness to foreign investments, which were maintained from the second half of the nineteenth century until the mid-30s, to policies favoring protectionism and import substitution, which were consolidated from the 1950s onwards. In part, this transition originated in the shock of the Great Depression and then the Second World War. Both phenomena negatively affected world trade, generating a process of forced import substitution due to new international circumstances. This created an industrial bourgeoisie that, by means of a high level of wealth and the support of urban workers, successfully pressured the government to maintain protection of new industries once international conditions normalized (Gerchunoff & Llach, 2018; Torre, 1998).

The previous discussion implicitly assumes that all political, social, and economic actors have full knowledge of the impacts of existing economic institutions, but that the best institutions are not always adopted because the balance of political power does not allow it. However, it is unrealistic to assume that economic institutions that ensure rapid growth take the form of a well-established set of laws and procedures that can easily be moved from one country to another, and that it is enough to know the experience of other more developed economies to implement them successfully. Following Douglas North:

“Economies that adopt the formal rules of another economy will have very different performance characteristics than the first economy because of different informal norms and enforcement. The implication is that transferring the formal political and economic rules of successful Western economies to third-world and Eastern European economies is not a sufficient condition for good economic performance.” (North, 1994: 366).

In other words, the adoption of efficient economic institutions requires much effort to adapt them to local realities. Much of this learning and adaptation is based on their own experience, and different countries adopt different formal institutions with the same economic effects (Mukand & Rodrick, 2005).

That said, in some cases bad institutions may persist, partly because of ignorance about their consequences. In this context, more knowledge can affect the balance of political forces and lead to change. Some episodes of pro-market public policy reforms in several Latin American countries since the late 1970s reflect this clearly incomplete and noisy learning process that the region has undergone (Lora, 2007).

To what extent is this analysis of the drivers of institutional development relevant to public policy? And how can it inform an agenda of institutional reforms that promote productivity gains? First of all, it is important to note that geography and history do not determine everything. Beyond geographical and historical conditions, there is ample room to improve the institutions that affect productivity. Second, the best institutions to adopt are not set in stone. International best practices are only an incomplete answer to that question. Finally, adopting the best institutions may require difficult changes in the balance of political forces that sustain the *status quo*. However, these changes are not impossible and can be brought about through technological changes, new information, or evidence about the negative consequences of the *status quo*.

## **Conclusions: key messages of the report**

Latin America needs to design and implement an institutional reform agenda with a focus on productivity. This claim does not deny that the region has made efforts in this regard. In fact, several countries have maintained a continuous process of reforms (that began between the mid-1980s and early 1990s) including macroeconomic stabilization efforts, trade liberalization and openness to foreign investment, and a process of privatizations of certain key public service sectors. These initiatives were followed by a series of “second-generation” reforms in fiscal matters (taxes, pension systems, and decentralization), labor, and aspects related to justice and social policies. Finally, during the years 2000, several countries in the region implemented reforms and policies targeted to firms with the explicit goal of boosting productivity, such as innovation programs, programs to facilitate access to credit and to promote entrepreneurship.

This whole process led to important achievements in terms of macroeconomic stability, poverty reduction and, to a lesser extent, inequality reduction. It also contributed to the internationalization of some productive sectors, including not only those associated with the exploitation of natural resources, but also some manufacturing sectors.

**Cross-cutting institutions are important, but so are the policies and regulations affecting specific firm realms, such as competition, access to inputs, labor markets, and financial markets.**

Nevertheless, even though the average growth of Latin American economies became somewhat stronger, the pace of growth was not high compared to that of developed countries (with some exceptions, such as Chile) and even less so compared to that of other developing economies in Asia, Eastern Europe, or North Africa. In fact, the region's growth rate accelerated notoriously only when the price of its exports (commodities) performed extraordinarily well; that is, in the period from 2004 to 2013. This relative stagnation stems primarily from a productivity problem in the region; indeed, aggregate productivity of Latin American countries, on average, has been weak over the past 60 years.

The productivity gap of the region relative to developed countries does not seem to respond to an inefficient sectoral structure of its economies; in fact, the correlation between size and productivity at sectoral level in the region is not weaker than in the United States. Moreover, productivity is a problem across the board: all sectors of the economy have a considerable productivity lag with relative to developed countries. This is due in part to a significant level of informality that is present in most sectors: the labor productivity gap between the formal and informal sectors is close to 45%, after controlling for sector, firm size, and worker characteristics. Hence, from an accounting perspective, if all informal employment could be reallocated to the formal sector, aggregate labor productivity would increase considerably.

The roots of Latin America's productivity problem are deep and cut across the entire productive fabric. Hence, it is mandatory that our countries continue their effort to improve the institutional framework, primarily regarding cross-cutting aspects such as the business environment and the rule of law, as well as in specific policies and regulations to foster competition, access to inputs and cooperation among companies, and the better functioning of labor and financial markets.

Regarding competition, there are several indications that Latin American economies lag far behind developed economies. Market-entry costs are considerably higher in the region, and this is also the case for price margins over costs that firms are able to obtain.

This lack of competition and high market power affect productivity through both the allocation and the innovation channels. Data for Chile, Colombia, Mexico, and Uruguay confirms the positive association between market power and factor misallocation. It also confirms that sectors with greater market power (measured by price margins) have a lower rate of productivity growth, mainly due to a lower productivity growth of firms that remain in the market over time. This result is consistent with the hypothesis that competition fosters innovation and productive efficiency of firms.

Improving competition in the region requires, among other things, favoring the institutional framework linked to the application of laws that promote competition as well as opening to international trade. The region has certainly made progress with policies in all these areas but there are still pending tasks. With regard to competition laws, while *de jure* aspects (such as the scope of the antitrust legal framework) do not appear to be far from OECD standards, there are notable

differences in implementation aspects (such as the probity of enforcement investigations). As far as openness to international trade is concerned, there is still scope for action on non-tariff barriers.

Understanding the productivity problem also requires a deep look at the relationships among firms. The most obvious reason for the importance of firm-to-firm linkages is that in order to produce goods and services, other goods and services are required as inputs, and these are obtained from other firms. Access to inputs in the required quantity, quality, and variety is essential for firms to achieve high levels of productivity and competitiveness. These linkages also improve productivity because they favor cooperation, knowledge spillovers and other positive externalities.

How can public policies improve access to productive inputs? A first ally is international trade, which is strongly associated with trade in inputs. Evidence clearly indicates that the better access to productive inputs that followed trade liberalization processes has improved the productivity of local firms as well as their ability to create new and/or higher quality products. A second pillar, especially for the case of services, concerns the adequacy of regulatory frameworks in the region, which shows ample room for improvements. Improvements in regulatory frameworks regarding competition in service sectors, openness to international trade in services, public-private partnerships and foreign direct investment would lead to productivity gains. Such gains would not only be restricted to the service sectors but also transferred to the manufacturing sector through input-output linkages.

Beyond the access to inputs, the potential of firm-to-firm relationships to favor productivity can be leveraged by fostering productive clusters. Clusters encourage cooperation among firms to address issues of collective interest and to exploit synergies and complementarities. Consequently, they can improve productivity via an increased division and specialization of labor, the establishment of a broad and high-quality supply of key inputs, the emergence of essential public goods and infrastructure, the formation of business associations, better connections of firms to universities and specialized research and training centers, as well as more knowledge spillover effects. Private agents are not always able to overcome coordination problems and fully exploit synergies among firms. Thus, the public sector could play a catalytic role in this regard. Its policies should have a comprehensive and long-term approach and should incorporate actions that favor the creation of institutional capacities (in both the public and private sectors), the promotion of positive externalities and the strengthening of links within the value chain, as well as the promotion of a deeper penetration into global markets.

Regarding the labor market, institutions in this realm affect the allocation of the labor force and the employer-employee relationships within the firm, influencing productivity through these two channels. Three features stand out in the allocation of labor in Latin America: a gender gap in labor participation rate, a mismatch between workers' skills and their tasks and, especially, an enormous concentration of the labor force in low productivity, informal jobs. All of them harm productivity.

**Increased trade and access to inputs increase firm productivity and their capacity to produce new, better good and services.**

**Labor informality is both a cause and a consequence of low productivity, and must be tackled from multiple angles.**

Workforce allocation is affected by search costs and information asymmetries, as well as by labor policies and regulations that condition which workers are active and which are not, the quality and frequency of job-to-job transitions, and the allocation of workers among jobs, including between formal and informal jobs. In practice, compliance with many of these regulations is partial, with a size bias that discriminates against medium and large companies. This fact, in itself, can negatively affect productivity both by reducing incentives for firms to innovate and by favoring an inefficient allocation of resources.

Informality is the most prominent feature of labor markets in the region, with important implications for productivity. Informality is a multi-causal problem originates, in part, in labor market institutions that determine hiring costs and payroll taxes, as well as in the scope of the benefits associated with formal employment. Empirical evaluations carried out in some countries in the region, relative to taxes and labor costs (e.g. Colombia) or the valuation of the benefits of formality relative to informality (e.g. Uruguay), point to that direction. Informality, however, is both a symptom and a cause of low productivity and demands institutions and policies to address this problem from different angles. One such angle is the low employability of informal workers, which represents a barrier that limits their transition to high-quality jobs. Another angle is the reduction of information asymmetries about workers' skills, which are more salient in informal workers. Thus, job-training programs for informal or unemployed workers and skills certification can also play an important role.

In relation to the financial system, the way credit and capital markets work affects productivity through several channels. First, they affect individuals' occupational choices (e.g. between entrepreneurship, salaried work, or self-employment) and firm size. Lack of access to funding can prevent talented entrepreneurs from carrying out their ventures and high-potential projects from materializing. The lack of high-quality projects and skilled entrepreneurs reduces the returns to capital and labor, and the optimal scale of firms, thereby encouraging self-employment. On the other hand, access to financing plays a key role in firms' decisions to grow and innovate. Underdeveloped financial systems delay decisions to grow and reduce the rate of innovation (of products, processes, and markets) resulting in smaller, less internationalized, and ultimately less productive firms. Given the effects of financial systems on all these margins and the region's lag in this regard, closing the development gap in the financial system would result in significant productivity gains.

Public policies play a key role in fostering the development of financial systems. First, well-designed regulations may promote greater access and use of the system by businesses and households. An example that is often overlooked is the institutional framework regarding bankruptcy, which affects both firms' decisions to take credit and the availability of loanable funds by financial intermediaries. A slow and/or costly bankruptcy process increases the cost of credit and reduces funding availability. This has a direct effect on the selection of credit-taking firms and thus on the productivity of firms operating in the economy.

In addition to improving regulations, other policies linked to the development of new financial products, such as guarantees or promotional lines of credit for research and development can improve the functioning of the financial system. The experience in Latin America with this type of programs shows mixed results depending on the type of instrument used, the performance measure considered, the nature of the targeted firms and the selection mechanism used. In many cases, there is an increase in investment and/or innovation but its effect on productivity is much less clear and not always verified. The experience also suggests that in many cases the beneficiary firms would have been able to access credit in the private sector even in the absence of the program. Finally, it is important to complement the impact evaluation with a consideration of the implementation costs of these programs, in order to have a comprehensive assessment of their adequacy.

The argument so far emphasizes a horizontal approach to the promotion of productivity, applied to specific areas or markets, regardless of productive sectors. This does not mean that the discussion and implementation of policies to favor productivity escape the sectoral dimension. Evidence shows that not all sectors have the same growth potential, the same lag, or the same influence on aggregate productivity. Moreover, the process of adjusting the institutional framework in these dimensions may require elements that are specific to a particular sector. For example, labor regulations applied to the oil sector may require certain specificities (e.g. compensation for permanence in remote locations that are partly tied to production objectives). On the other hand, policies associated with productive clusters clearly have an important vertical-sectoral component that will vary according to the productive sector in question. What is important is that the sectoral policy approach (whether cluster-based or otherwise) is consistent and enhances the productivity gains and comparative advantages that arise naturally, designing policies that do not distort prices or returns among sectors.

The agenda of institutional reforms to foster productivity in Latin America is vast and many countries in the region have been making efforts to advance it for several years now. It is important that this process continues. In that respect, governments need evidence, information, and ideas to support their reform initiatives. In this context, evidence-based diagnostics and recommendations for reform that guide the debate in the right direction are particularly valuable. This report intends to be a contribution to that objective.

## Appendix

To investigate the key drivers of productivity per worked hour, this chapter makes use of the usual decomposition into three elements: physical capital, human capital and total factor productivity (TFP). The contribution of each of these components depends on how the aggregate production process is represented. In this chapter we represent this process as:

$$Y = AK^{\alpha} (Lh)^{1-\alpha}$$

where  $Y$  is GDP,  $A$  is TFP,  $K$  is the capital stock (machines, buildings, equipment, etc.),  $L$  is the total number of hours worked and  $h$  represents the level of human capital of the average worker. Operating on this equation leads to:

$$Y/L = A^{1/(1-\alpha)} (K/Y)^{\alpha/(1-\alpha)} h$$

Thus, the TFP contribution to GDP per hour worked is  $A^{1/(1-\alpha)}$ ; the contribution of capital use intensity is  $(K/Y)^{\alpha/(1-\alpha)}$ ; and the contribution of human capital is simply  $h$ . As usual, in the calculations it is imposed that  $\alpha = 0.3$ . However, the main conclusions of the development accounting exercises undertaken remain if  $(1-\alpha)$  is set to the value of the labor share in each country.

### Details of the composition of the regions included in tables and graphs

**Table 1.2** and **Graph 1.4:** The regional composition is as follows: North Africa: Algeria, Egypt, Libya, Morocco, and Tunisia.

Sub-Saharan Africa: Angola, Botswana, Burkina Faso, Cameroon, Congo, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.

North America: Canada and the United States.

Latin America: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, and Venezuela.

Asia: Bangladesh, Burma, China, Hong Kong, India, Indonesia, Japan, Malaysia, Mongolia, Pakistan, Philippines, Singapore, South Korea, Sri Lanka, Thailand, and Vietnam.

Europe: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

**Table 1.3 and 1.4:** The regional composition is as follows:

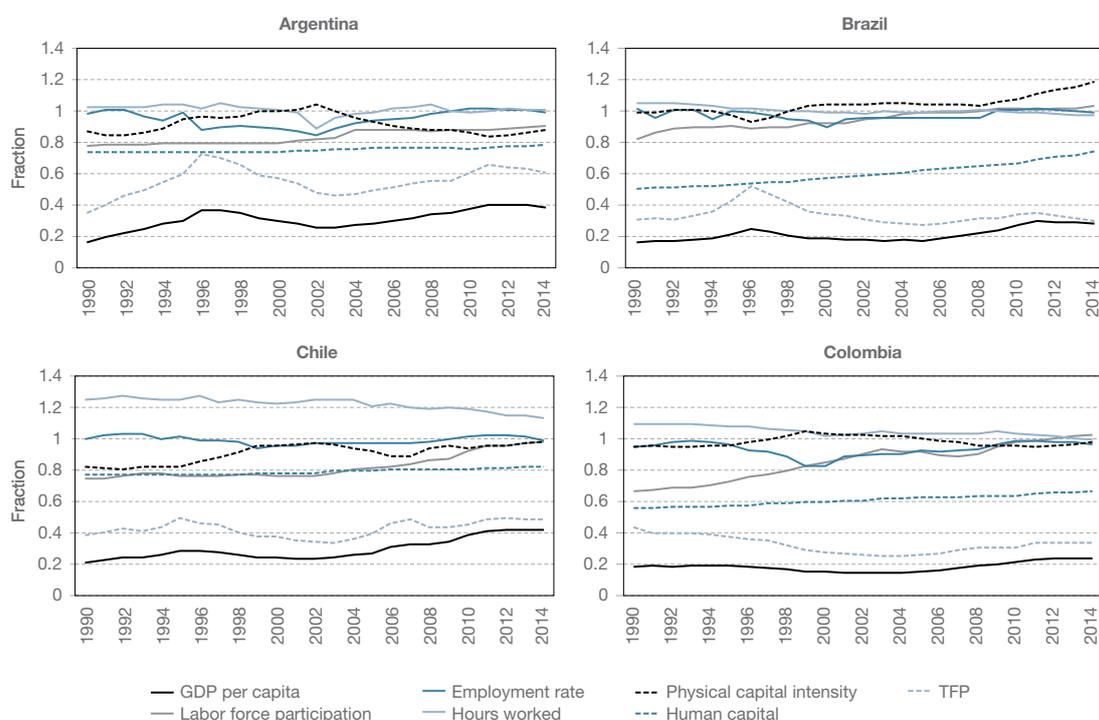
East Asia and the Pacific: Australia, Brunei, Burma, China, Hong Kong, Indonesia, Japan, Malaysia, Mongolia, New Zealand, North Korea, Papua New Guinea, Philippines, Singapore, South Korea, Thailand, and Vietnam.

Europe and Central Asia: Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, and the United Kingdom.

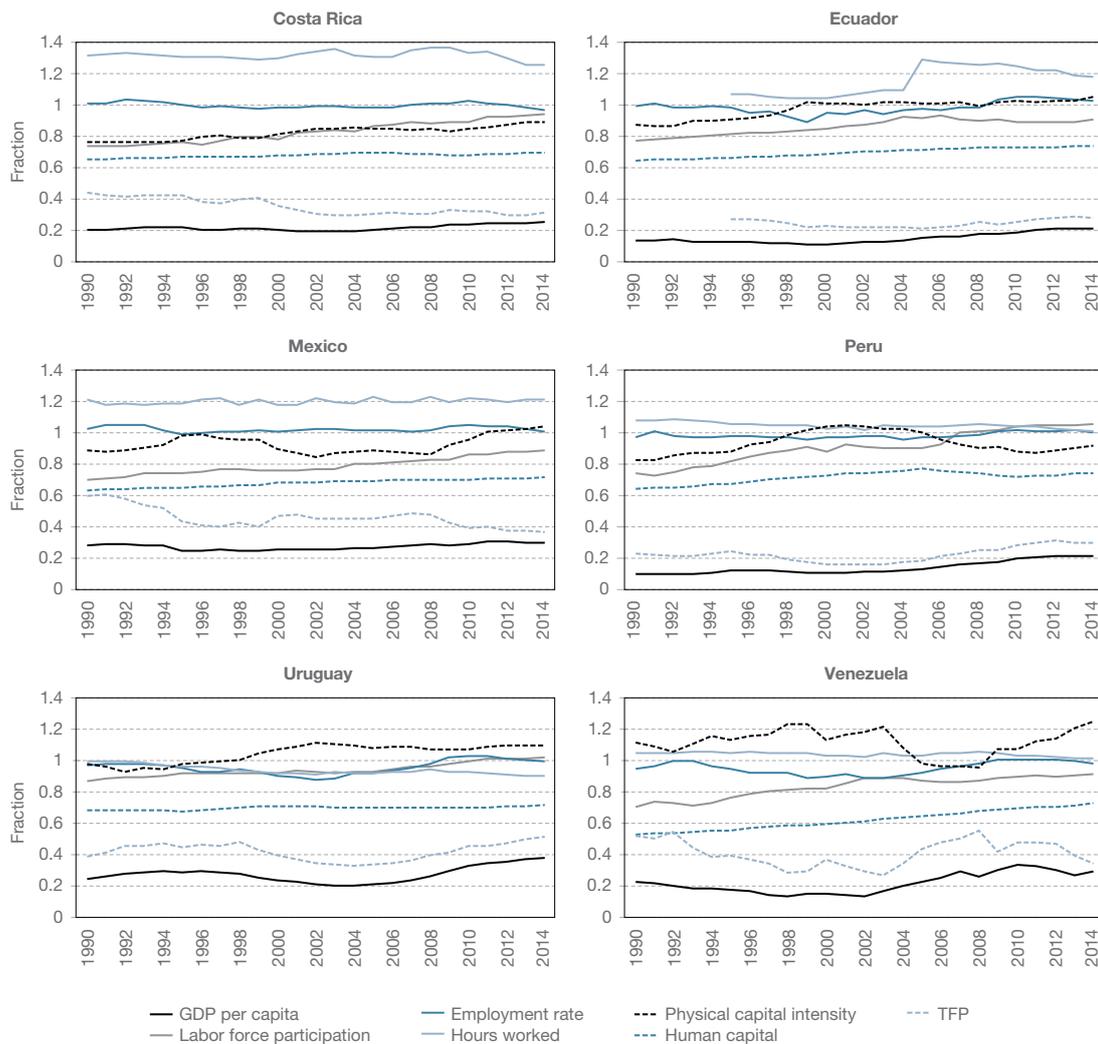
Latin America and the Caribbean: Argentina, Bahamas, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, and Venezuela.

Middle East and North Africa: Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, and Yemen.

**Graph A 1.1** GDP per capita relative to the United States and its components per country and year



Continued >



Note: The graph shows GDP per capita, in constant dollars at purchasing power parity and its components according to the decomposition shown in Figure 1.1. The series are expressed in proportion to the United States.

Source: Produced by the authors based on data from the Penn World Table 9.0 (Feenstra, Inklaar, & Timmer, 2015) and World Development (World Bank, 2018).





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# Anatomy of productivity in Latin America

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## Chapter 2



## Chapter 2

# Anatomy of productivity in Latin America<sup>1</sup>

*“If you can’t measure it, you can’t improve it”.*

William Thomson

An important determinant of an individual’s well-being, although clearly not the only one, is her income. In this regard, there are enormous differences between the highest and lowest income countries in the world: the average inhabitant of the poorest 10% countries earns USD 5 for every USD 100 earned by the average inhabitant of the richest 10% countries. Their consumption capacity is 20 times lower!

Latin American countries are no exception to this fundamental development issue. Per capita income in the most advanced countries in the region hovers between 20% and 40% of that in the United States, which we use as a benchmark.<sup>2</sup> As documented in Chapter 1, a large part of the gap in per capita income is explained by differences in labor productivity, and in particular its Total Factor Productivity component. In 2014, per capita income among the largest Latin American economies was on average 24% of that in the United States, while output per worker, a key indicator of productivity, was 25%.

If the large income gap between Latin America and the United States is explained by a significant difference in productivity, to what extent does that difference reflect an economic structure in Latin America that is concentrated in low-productivity sectors and goods, and to what extent does it reflect the fact that goods and services are produced with less efficient technologies or adding less value?

To answer this question, we decompose an economy’s productivity into two components: the average productivity across economic units (which can be sectors, subsectors, firms, or establishments), and the extent to which economic activity is concentrated in economic units with higher productivity levels. The main purpose of this chapter is to measure the relative importance of these two components of productivity in Latin America.

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1. This chapter was authored by Marcela Eslava, with research assistance from Bryan Hurtado.

2. Throughout this chapter, a general focus is maintained on the productivity gap relative to the United States. Establishing a real benchmark is a useful and normal practice, as without a reference point it is difficult to determine whether a certain productivity level is high, low or average. Among the high per capita income countries that could be used as a benchmark, the United States is the closest to Latin America, not only in a geographical and historical sense, but also because of their economic connection. It is also recognized as a country in which the costs of productive efficiency derived from distortive or poorly designed regulations is minimized. For that reason, it is commonly used as a benchmark in the literature (see, for example, Hsieh & Klenow, 2009).

By consistently applying this accounting approach to different levels of sectoral aggregation, this chapter provides a consolidated view on questions that are frequently addressed from different perspectives. It allows, for example, to explore to what extent the structural transformation of the economy (i.e., the reallocation of resources across major sectors such as services, industry and primary activities) and the reallocation of resources across firms within a sector drives changes in the productivity gap between Latin America and the United States, compared to the efficiency of production methods and innovation at the firm level. It also allows to study to what extent the high prevalence of informal establishments in the region can explain this gap. Therefore, this approach sheds light on the design of public policies aimed at raising productivity in Latin America and closing the gap with developed countries.

From this accounting perspective, as we will explain later, Latin America's productivity gap is not explained by its sectoral structure. At all levels of sectoral aggregation, there is a large productivity gap compared to the United States, while the distribution of economic activity across sectors is not much less efficient than that observed in the United States. However, there is a structural characteristic of Latin American economies that does explain –from an accounting perspective– a large part of the productivity gap: informality. For any category of firm size, in any sector, the average output per worker in the informal sector is close to 35 percentage points lower than in the formal sector, even when excluding self-employment. Despite this, productive resources do not flow toward the formal sector, as one would expect. In fact, the distribution of employment across the formal and informal sectors in Latin America bears no relation to the relative productivity between these two segments of the economy. Thus, allocative efficiency between these sectors does not contribute to alleviating the burden of informality on aggregate productivity. Furthermore, the well-known finding that the distribution of firm sizes in Latin America is heavily skewed towards microenterprises<sup>3</sup> is in fact a characteristic of the informal sector that is not observed in the formal sector.

In the formal sector, closing the productivity gap requires both greater investment to increase within-firm productivity and the reallocation of factors of production from low to high-productivity firms. Although the existence of a large gap in the allocative efficiency of resources relative to the United States is a well-known fact in the case of the manufacturing sector, in this chapter we document an equally or more important gap in terms of firms' internal productivity. This finding is replicated in the service sector, although the issue of allocative efficiency is still relevant.

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3. Defined as firms with 10 employees or fewer.

## An accounting framework to analyze productivity

Within each economy, a set of multiple and highly heterogeneous production units coexist: sectors, subsectors and firms. The large heterogeneity in productivity among these units implies that aggregate productivity depends both on the productivity of the average unit, and the extent to which the available capital and human talent is allocated to high-productivity units. The former captures the “internal component” of productivity –within a productive unit or set of productive units– whereas the latter captures the “external component”, or the “allocative efficiency” across those productive units.

The internal component is, of course, important: it captures the productivity level of an average unit. However, the higher the heterogeneity in productivity, the less representative the average unit is. It is here that the external component of productivity comes into play, which captures a very simple idea: if there are units with different productivity levels in the economy, aggregate productivity will be greater if more resources are allocated to high-productivity units and fewer resources are allocated to low-productivity units.

This can be better illustrated by the following example: in an economy with four hundred workers, which could be located on the Chilean island *Más a Tierra*, each individual can work in one of only two firms: RC, owned by Robinson Crusoe, or firm F, owned by Friday. RC is more efficient, with technology that enables two lobsters to be caught per worker per hour. F is less efficient, and catches only one lobster per worker per hour. If RC employed 300 workers and F employed 100 workers, the total output on the island would be 700 lobsters per hour, an average of 175 per worker. However, if RC employed only 100 workers and F employed the remaining 300, total output in the island would fall to 500 lobsters per hour, or 125 per worker on average. A similar reasoning applies real economies when considering the allocation of productive resources among sectors or subsectors with different productivity levels.

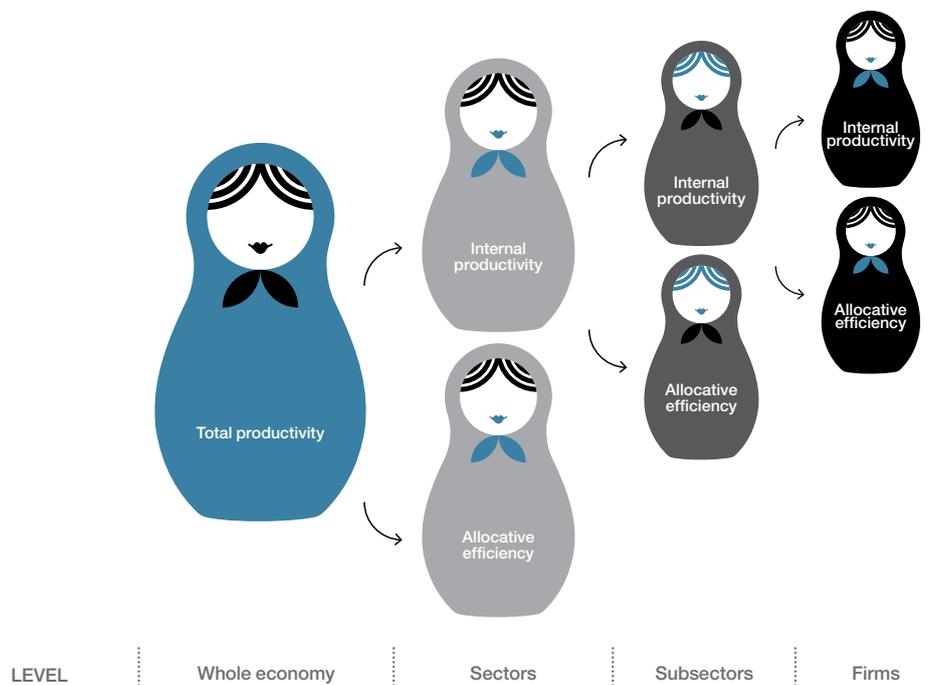
Figure 2.1 illustrates how this approach works on increasing levels of disaggregation like a Russian doll: the productivity of an economy can be decomposed into the productivity of its sectors (internal component) and the efficiency in resource allocation among those sectors (external component). In turn, the productivity of each sector can be broken down into the productivity of each of its subsectors (internal component) and the efficiency in resource allocation among those subsectors (external component), and so on successively in the disaggregation categories considered (the figures in the Russian doll). In Figure 2.1, sectors, subsectors, and firms are considered. The internal component at each level is the average productivity of the productive units that comprise the whole (sectors, subsectors, or firms), while the external component is the extent to which the share of resources that these units employ is positively correlated with their individual productivity levels.<sup>4</sup> For those of a quantitative inclination, Text box 2.1 shows the formal development of this idea.

**Productivity depends on, both, the productivity of the average economic unit (internal component), and the extent to which the available resources are allocated to the most productive ones (external component).**

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4. In practice, this component is the sample covariance between productive units' productivity level and the share of resources they employ. See Text box 2.1.

**Figure 2.1** Total productivity and its internal and allocative efficiency components for different levels of aggregation



Source: Produced by the author.

This accounting approach is useful, for example, to identify the extent to which improvements in resource allocation may, on their own and for given productivity levels, increase the aggregate productivity of the economy. It therefore helps understand the extent to which public policy may help to achieve this goal, and the extent to which it may be acting against it. For instance, although in an efficient economy the most productive firms should more easily deal with the fixed costs of operating and hiring more employees, it could be that RC is hiring fewer employees than is optimal because *Más a Tierra* has set a tax on firms that employ more than 200 people. Does that seem like a bad idea? In reality, there are many regulations in place that are similar to this example.<sup>5</sup>

5. India has established “reservation laws” that only allow production on a small-scale in some sectors (García-Santana & Pijoan-Mas, 2014). France has implemented a set of regulations that only affect firms with more than 50 employees (Garicano, Lelarge, & Van Reenen, 2016). Colombian firms are required to hire apprentices when they have more than 15 employees. Regulations based on firm size not only disrupt resource allocation, generating incentives for firms to remain small despite being highly productive, but also reduce incentives to innovate, as innovations tend to motivate firms to increase their production scale, which would expose them to more costly regulations.

Breaking down productivity into its internal and external components makes it easier to assess to what extent they are responsible for the productivity gap. Moreover, doing this at different aggregation levels makes it possible to identify on which level public policy should focus. Should it promote a change in the productive structure of the economy by mobilizing workers and other resources to the formal sector, or should it promote a reallocation of resources toward sectors and firms with better products and technologies?

It is important to note that although the accounting logic of Figure 2.1 is applied in the same way to different levels of aggregation, the public policy implications in each level are very different. Within a subsector, a firm may be replaced by another that provides similar goods or services with relative ease. This implies that productivity gains are possible through the reallocation of resources from low to high-productivity firms. On the other hand, resource reallocation on a large scale among sectors can take decades, and is limited for three main reasons: the greater difficulty of substituting consumption of one category of goods or services for another, the degree to which people want to specialize in a limited group of occupations, and the specificity of human talent and existing machinery.

The scope of our accounting approach is also limited because it assumes that the relative level of productivity of each productive unit is fixed, which may lead to incorrect conclusions. This caveat is of particular concern when we consider the resource allocation across sectors, instead of different producers of the same good or service. For example, in the hypothetical example of *Más a Tierra*, the highest aggregate productivity level would be achieved if all workers on the island were hired by the most productive firm, RC. However, in a real-world economy, where needs and skills are diverse, much more than just lobsters are produced. If productive resources flow toward a single activity, the unattended demand for complementary products would imply a very high valuation of those products, and therefore a very high productivity. By slightly adjusting the example, if RC produces lobsters and F produces nets, the reallocation of workers to RC would increase the demand for nets, thus increasing the profitability of F and avoiding its disappearance. As in Daniel Defoe's novel, Robinson does not end up alone.

Having posed the scope and limitations of this accounting approach, it is now time to put it into practice. How is productivity in Latin America broken down between the internal and external components at the different levels of aggregation shown in Figure 2.1? The next section addresses the first level of this Russian doll: how is productivity broken down between the average productivity of the three major sectors, and the efficiency in resource allocation across them. The smaller dolls are left for a later section. In the following sections, the United States is maintained as a benchmark as far as possible. As discussed previously, maintaining a benchmark helps focus the analysis through a paradigm that, as well as being realistic, is desirable in the sense that it corresponds to a higher level of per capita income. After all, the absolute level of any measure of productivity is difficult to judge as a standalone concept: how much productivity is a lot or a little?

**Decomposing productivity in its internal and external components facilitates the diagnosis of the productivity problem. To do it in increasing levels of disaggregation helps determining which level should be the focus of public policies.**

### Text box 2.1 Aggregate productivity and its internal and external components at different levels of aggregation: a formal derivation

The productivity of an economy is defined as the final product, or value added, that is generated in each period from each unit of productive resources invested in production. In the following derivation, value added is denoted as  $Y_t$ , while productive resources are denoted as  $Z_t$ . In turn,  $Y_t$  is the sum of the value added of different sectors  $S$ , while  $Z_t$  could be the number of hours worked, the number of workers, or a measure of the mix of labor and capital used in production. Given these definitions, the productivity of the economy is:

$$P_t = \frac{Y_t}{Z_t} = \frac{\sum_S Y_{St}}{Z_t} = \sum_S \frac{Y_{St}}{Z_{St}} \frac{Z_{St}}{Z_t} = \sum_S P_{St} s_{St} \quad (1)$$

where  $s_{St}$  is the fraction of total resources  $Z_t$  that are used in the sector  $S$ , and  $P_{St}$  is the productivity of the sector  $S$ . Note that  $\bar{s}_t = \sum_S s_{St} / N = 1/N$ , and therefore the following equalities apply:

$$\sum_S P_{St} \bar{s}_t = \bar{P}_t; \quad \sum_S \bar{P}_t s_{St} = \bar{P}_t; \quad \sum_S \bar{P}_t \bar{s}_t = \bar{P}_t.$$

Adding and subtracting  $\bar{P}_t$  twice to  $P_t$  in (1) gives the following expression, documented by Olley and Pakes (1996):

$$P_t = \bar{P}_t + \sum_S (P_{St} - \bar{P}_t) (s_{St} - \bar{s}_t) \quad (2)$$

The first term of the decomposition,  $\bar{P}_t$  is the simple average of the productivity  $P_{St}$  of each sector, which constitutes the internal productivity component of each sector. The second term is the sample covariance between these productivity levels and the fraction of resources used in each sector, which constitutes the external or resource allocative efficiency component among sectors.

Following the same logic and considering that each sector  $S$  is a collection of subsectors or firms denoted by the subindex  $i$ , the productivity of a sector may be broken down into an internal component, the average productivity of its subsectors or firms, and an external component, the efficiency in resource allocation among them.

$$P_{St} = \sum_{i \in S} P_{it} s_{it} = \bar{P}_{St} + \sum_{i \in S} (P_{it} - \bar{P}_{St}) (s_{it} - \bar{s}_{St}) \quad (3)$$

Equation 2 corresponds to the first level in the decomposition of productivity shown in Figure 2.1, while equation 3 corresponds to the decomposition of the subsequent levels.

## The contribution of sectoral structure

At the highest level of aggregation, productive activities may be grouped into three major sectors: agriculture, industry, and services.<sup>6</sup> Using the accounting framework for the productivity decomposition, Graph 2.1 shows the contrast

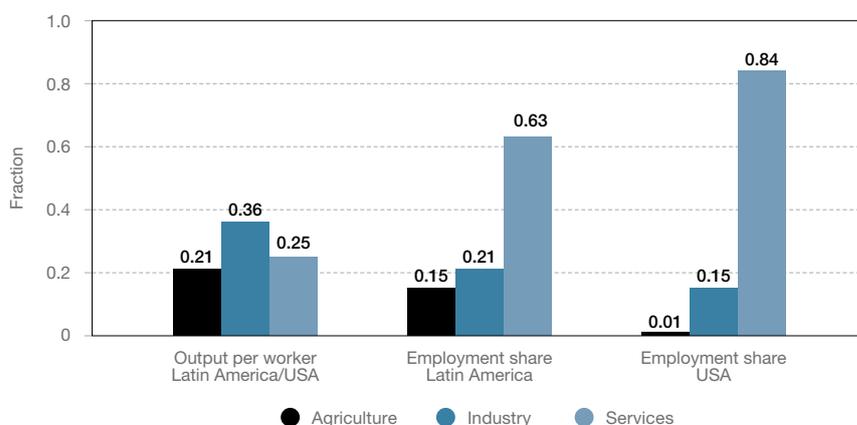
6. Industry includes manufacturing, mining, construction and utilities.

between output per worker in Latin America versus the United States in each of those sectors, as well as the share of workers that they employ.<sup>7</sup>

In 2010, average labor productivity in Latin America was just 27% of labor productivity in the United States.<sup>8</sup> Graph 2.1 shows that this large productivity gap at the aggregate level reflects significant gaps in each of the three major sectors. In this period, output per worker in the region was approximately 36% of output per worker in the United States in the industrial sector, 25% in the service sector, and 21% in the agricultural sector. As shown in Graph 2.2, the existence of these large gaps in output per worker in all sectors is observed since the 1950s.

**In 2010, output per worker in Latin America reached 36% of that in the United States in the manufacturing sector, 25% in the service sector and 21% in the primary sector.**

**Graph 2.1** Output per worker and employment share in three major sectors in 2010



Note: The graph reports the quotient between output per worker for Latin America and the United States in three major sectors, and the employment share of each sector in both Latin America and the United States. The values for Latin America are calculated using the simple average of the values for Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Mexico, and Peru.

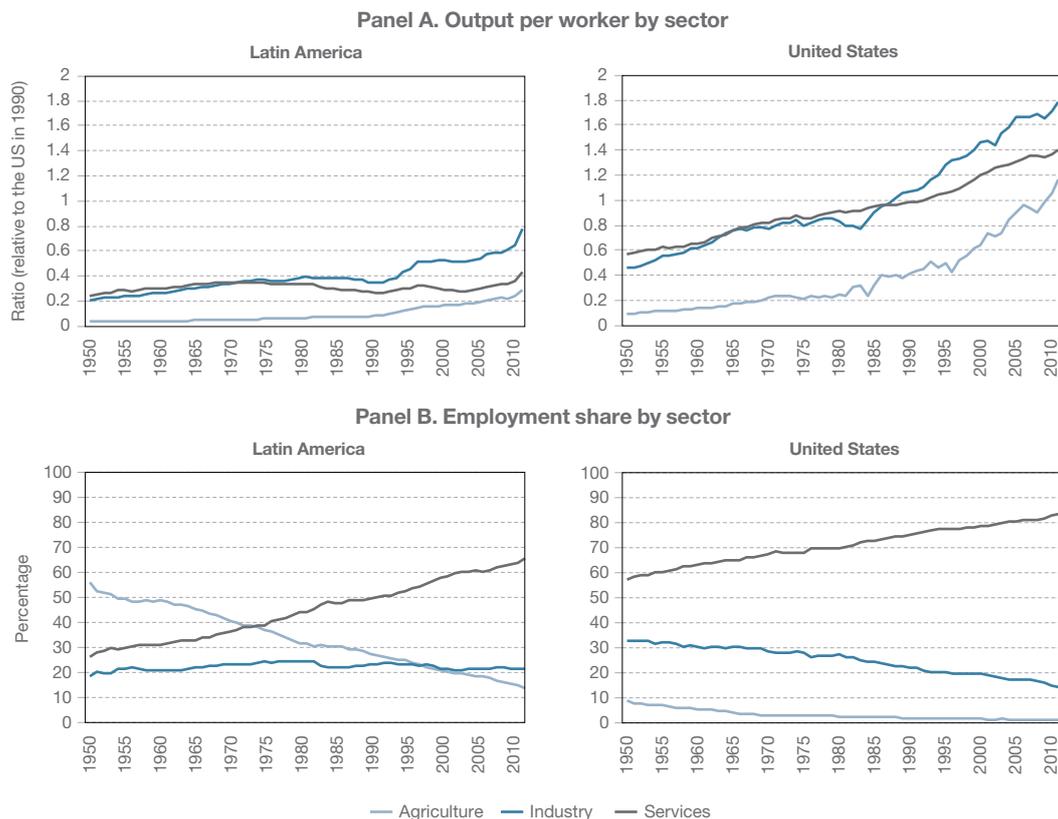
Source: Produced by the author using data from the GGDC 10-Sector Database (Timmer, de Vries, & de Vries, 2015).

7. In order to ensure comparability among the different levels of aggregation, given the availability of data, in what follows the focus is on average output per worker as a measure of productivity. The values of output per worker displayed in Graph 2.2 and the other graphs in this section are normalized by dividing it by its value for the US in 1990. Within each level, productivity is measured as the ratio between value added in 2005 purchasing power parity (PPP) US dollars and the number of workers in the sector. For consistency with the national aggregates provided in Chapter 1, added value in the sector is calculated by multiplying GDP (the Penn World Tables variable RGDP) by the fraction of total value added of the sectors that represent the respective sector in the 10-Sector Database (Timmer, de Vries, & de Vries, 2015). Employment in each sector is calculated in a similar way. The calculations are not adjusted for price differences among sectors. This adjustment would require assumptions regarding the mechanisms behind the patterns of structural transformation, which would go against the descriptive nature of this chapter. Duarte & Restuccia (2010) propose and implement an approach to adjust the patterns of relative evolution of productivity to PPP levels, based on assumptions regarding the mechanisms underlying the structural transformation. The patterns that we show for relative labor productivity levels and its evolution over time for different sectors in Latin America vs. the US are in line with the findings of Duarte & Restuccia (2010) once adjusted for purchasing power between countries and sectors.

8. We consider the average of eight economies: Argentina, Brazil, Bolivia, Chile, Colombia, Costa Rica, Mexico, and Peru.

Graph 2.1 also shows that, as of 2010, Latin America employed a lot more workers in agriculture compared to the United States (15% vs. 1.4%), a similar fraction in industry (21% vs. 15%) and a lower fraction in services, in contrast to what the different productivity gaps for each sector would indicate. This elevated participation of the agricultural sector in employment in the region compared to the United States is inefficient, given that it is the sector with the largest productivity gap. However, this inefficiency contributes a small fraction to the aggregate productivity gap relative to the United States economy. The significant gaps in each major sector have the dubious honor of making the greatest contribution.

**Graph 2.2** Output per worker and employment share in three major sectors



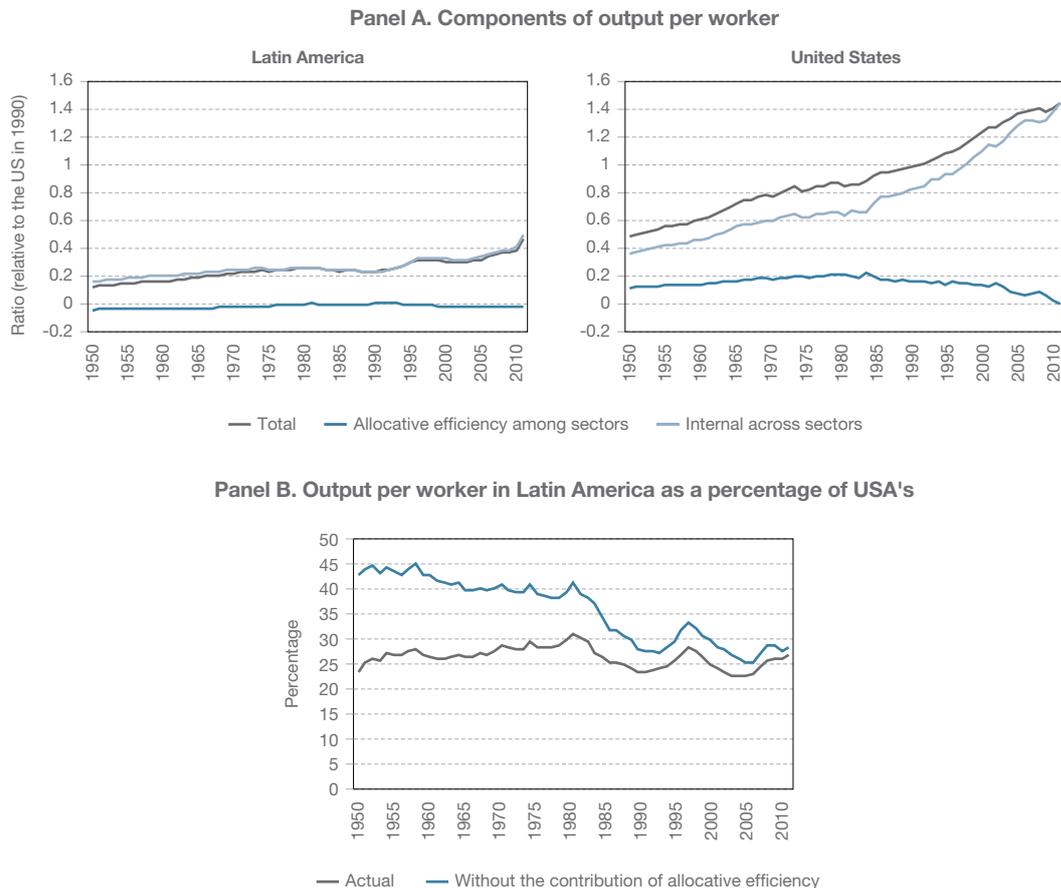
Note: Panel A reports the quotient of GDP and the number of workers as a proportion of that observed for the United States in 1990. Panel B reports the employment share of three major sectors. Values are the Latin American and United States average. The following countries are included in Latin America: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Mexico, and Peru.

Source: Produced by the author using data from the GGDC 10-Sector Database (Timmer, de Vries, & de Vries, 2015).

The pronounced gap in output per worker in the service sector is particularly concerning. This sector employs more than 70% of workers, and that percentage is expected to keep rising in the future, since it has not yet reached the levels

observed in developed countries despite the fact that it has increased for more than five decades. Furthermore, it has particularly strong links with the rest of the economy (see Chapter 4). From a longer-term perspective, the increase in employment in the service sector during recent decades has not been preceded or followed by an increase in output per worker compared to the continued increase that this indicator experienced in the United States. This led to a significant expansion of the gap in output per worker in this sector, the largest in the economy (Graph 2.2, Panel A).

**Graph 2.3** Aggregate output per worker and its internal and external components for three major sectors: agriculture, industry, and services



Note: Panel A reports output per worker as a percentage of the level observed in the United States in 1990, broken down into internal productivity and allocative efficiency components. The internal component is the simple average of output per worker of productive sectors. Allocative efficiency is the sample covariance between output per worker and sectoral employment share. Both statistics are calculated for three major sectors: agriculture, industry, and services. Panel B reports the ratio between output per worker for Latin America and the United States, both the actual values and those that would be observed without the contribution of allocative efficiency. That is, if efficiency in resource allocation in the region were the same as in the United States. The following countries are included in the Latin American average: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Mexico, and Peru.

**Source:** Produced by the author using data from the GGDC 10-Sector Database (Timmer, de Vries, & de Vries, 2015).

**The salient productivity gap within sectors virtually owns the entire gap, while the relatively large share of resources employed in low-productivity sectors is a minority partner.**

Graph 2.3 shows the decomposition of aggregate productivity for three major sectors: the internal component, or average productivity across sectors, and the external component, or efficiency in resource allocation among them. As suggested by Graph 2.2, the pronounced gap in productivity within sectors (light blue line) accounts for practically all of the total gap (gray line), although a greater resource allocation to sectors with higher deficiencies in productivity (illustrated by the dark blue line in negative values), in particular for agriculture, plays a minor role. The implication is that total output per worker in Latin America is even lower than the average productivity of its major sectors. The minor contribution of the external component to the total gap in output per worker is depicted by a single number: if the contribution of the external component were omitted, output per worker in Latin America in 2010 would have been just 29% of output per worker in the United States, instead of 27% (Graph 2.3, Panel B).

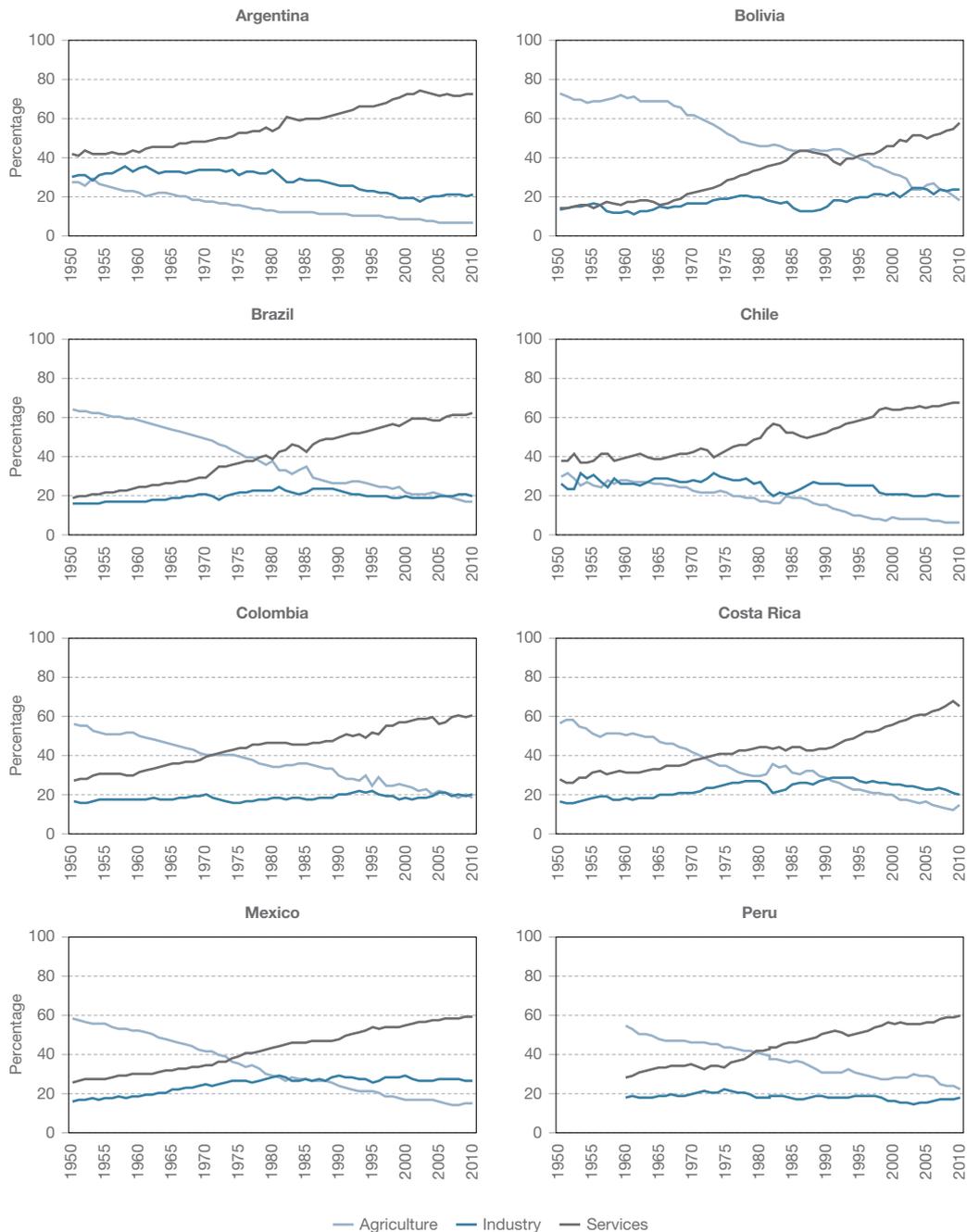
It is interesting that the contribution of the external component to the productivity gap in Latin America compared to the United States was somewhat greater in the past. Specifically, output per worker in the period from 1960-2010 was also 27% of output per worker in the United States on average, but it would have been 36% without the contribution of the external component. In reality, the decreasing importance of this component is not due to an improvement in the sectoral structure of the Latin American economy, but due to the fact that the external component in the United States has deteriorated. Although for decades it made a positive contribution to total output per worker, in recent years it has become negative (Graph 2.3, Panel A).<sup>9</sup> A similar situation can be observed in the gap in output per worker in Latin America relative to Spain, where the external component also deteriorated steadily between the 1980s and 2007 (Graph 2.6).

What is the situation in Latin American countries when considered individually? Graphs 2.4 and 2.5, compared to the United States in Graph 2.2, show similar trends across Latin American countries, although some differences do exist.

As Graph 2.5 shows, output per worker has been greater in industry than in services and greater in services than in agriculture across almost all countries. They also share a trend of increasing output per worker in industry between 1950 and 2010, with significant disparities in the magnitude of that growth. The productivity gains in services have been much lower, and in some cases have followed an inverted U shape that peaked between 1970 and 1980 before falling significantly, with a slight recovery since 1990. With regard to the agriculture sector, labor productivity has been the lowest of the three sectors since 1950, although it shows a secular growth trend in all countries. The magnitude of this growth is highly variable: gains have been pronounced in Chile and Argentina, slightly lower in Brazil and Costa Rica, and hardly noticeable in the remaining countries.

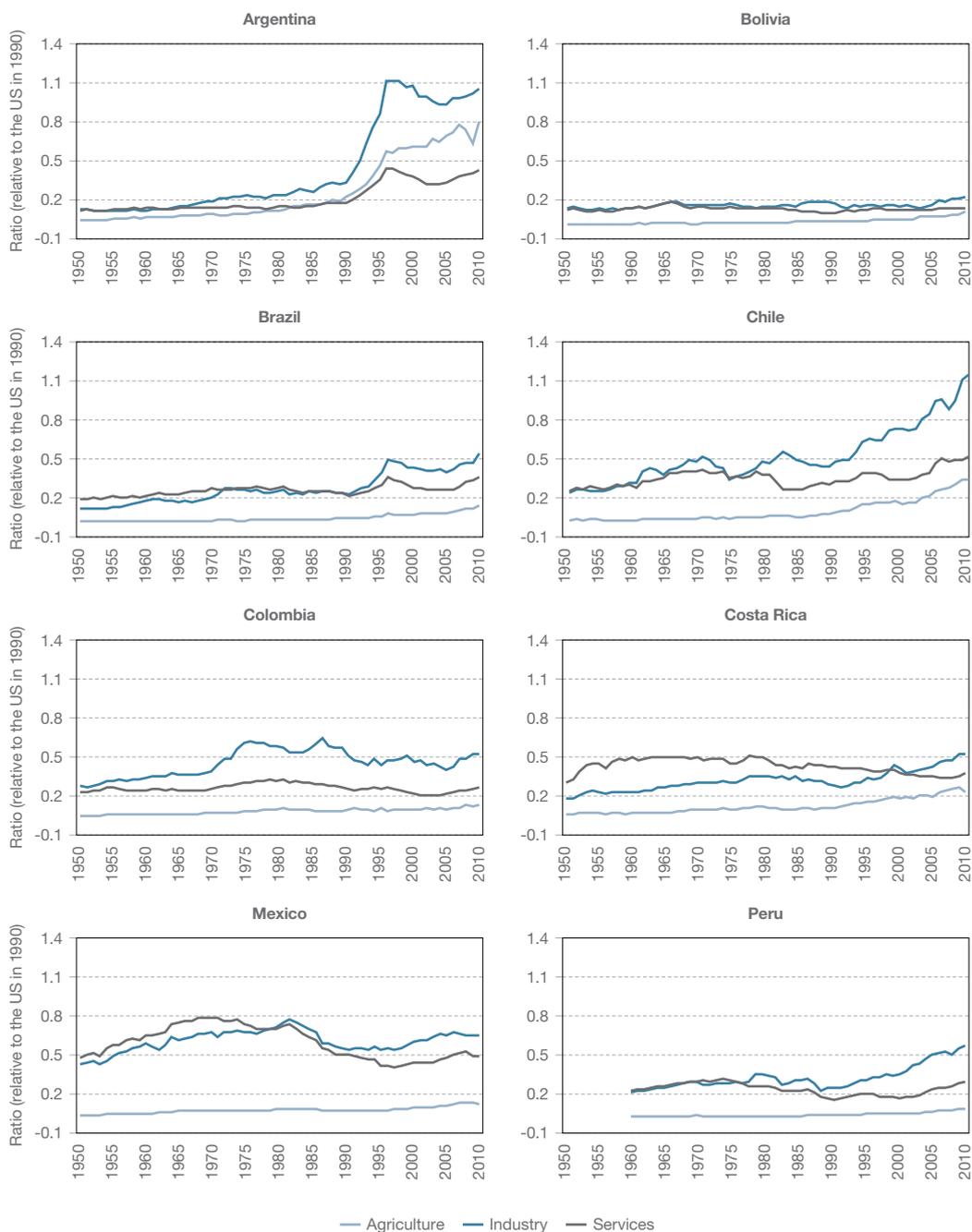
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9. This deterioration is reflected in the steady migration of employment from manufacturing, which is relatively more efficient, toward services.

**Graph 2.4** Employment share by sector

Note: The graphs report the share of total employment accounted for by each major sector in selected countries.

Source: Produced by the author using data from the GGDC 10-Sector Database (Timmer, de Vries, & de Vries, 2015).

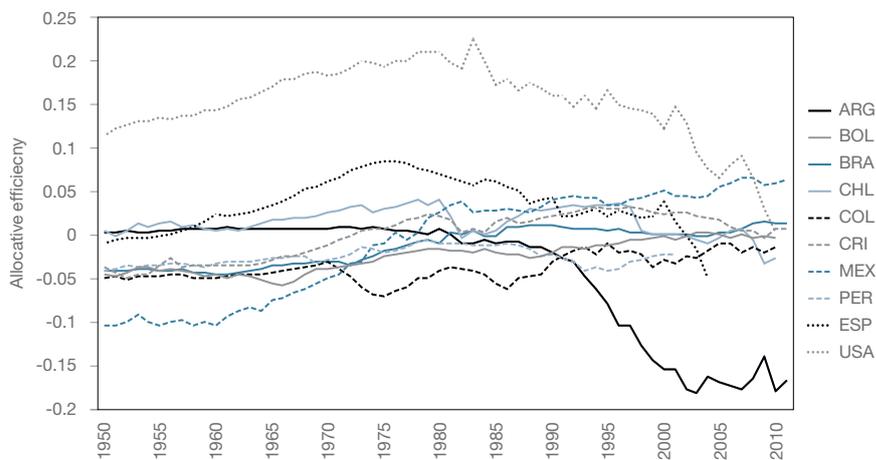
**Graph 2.5** Output per worker in three major sectors

Note: The graphs report output per worker in each major sector at purchasing power parity, as a proportion of output per worker observed in the United States in 1990.

Source: Produced by the author using data from the GGDC 10-Sector Database (Timmer, de Vries, & de Vries, 2015).

Furthermore, between 1950 and 2010, all countries considered exhibit a structural transformation expected for middle-income countries, in which the weight of the agriculture sector in employment contracts while the service sector expands significantly. Services currently account for more than 60% of employment in all of the economies included in Graph 2.4, while the agriculture sector accounts for less than 25%, even in countries in which agricultural activities account for more than 70% of employment in 1950, such as Bolivia. Industry accounts for less than 20% of employment in all countries included, and no clear industrial expansion trend can be observed in any of them.

**Graph 2.6** Allocative efficiency between three major sectors: agriculture, industry, and services



Note: The graph reports efficiency in the allocation of labor among sectors, defined as the sample covariance between output per worker and the sector's employment share. It is calculated for three major sectors: agriculture, industry, and services. Output per worker is normalized dividing by output per worker in the United States in 1990.

Source: Produced by the author using data from the GGDC 10-Sector Database (Timmer, de Vries, & de Vries, 2015).

Finally, almost all countries share a narrowing gap in the efficiency in resource allocation between the three major sectors compared to the United States, which responds more to a deterioration of this indicator in the benchmark country than a pronounced improvement in the Latin American countries considered (Graph 2.6). In many of these countries, the external component has also been deteriorating in recent decades, although generally at a slower rate than in the United States, except in the case of Argentina. Colombia and Mexico are exceptions with an improving trend in the external component, due to the fact that output per worker in industry, of minority participation, has shown a less favorable trend than other countries in that period.

**The central finding that the aggregate gap in output per worker is due to large gaps within all activity sectors is also true at lower levels of aggregation.**

The main observation that the aggregate gap in output per worker is due to major gaps across all sectors persists at greater levels of disaggregation. Table 2.1 shows output per worker in Latin America compared to the United States, as well as the allocation of labor on both sides of the Rio Grande for 10 sectors of the economy. It also shows its evolution over several decades. Clearly, the contribution of the gaps within these sectors to the aggregate gap is very important: all 10 sectors show salient differences in output per worker between Latin America and the United States. In 2010, the level of this indicator on average in Latin America was below 50% of the value recorded in the United States in all sectors, and reached levels closer to 20% in many of them.

**Table 2.1** Output per worker and employment in 10 sectors: Latin America vs. USA

	Output per worker			Employment share		
	1950	1980	2010	1950	1980	2010
	Latin America relative to the USA (PPP)			Latin America		
Agriculture	0.37	0.29	0.21	0.52	0.31	0.15
Mining	0.37	0.53	0.50	0.02	0.01	0.01
Manufacturing	0.61	0.62	0.34	0.14	0.15	0.12
Electricity, gas, water	0.45	0.38	0.36	0.01	0.01	0.01
Construction	0.21	0.27	0.37	0.04	0.07	0.08
Commerce services	1.29	0.89	0.29	0.08	0.14	0.24
Transport services	0.66	0.52	0.39	0.04	0.05	0.06
Financial services	0.55	0.46	0.19	0.02	0.04	0.09
Government services	0.35	0.43	0.40	0.05	0.07	0.08
Personal services	0.33	0.33	0.28	0.09	0.15	0.16
	USA (thousands of 2011 dollars)			USA		
Agriculture	6.8	17.3	86.9	0.09	0.03	0.01
Mining	113.8	193.1	473.7	0.02	0.01	0.00
Manufacturing	18.4	40.8	137.7	0.25	0.19	0.09
Electricity, gas, water	55.0	179.0	457.8	0.01	0.01	0.00
Construction	76.4	86.8	69.1	0.06	0.06	0.05
Commerce services	18.0	29.0	69.8	0.20	0.23	0.24
Transport services	19.6	54.7	130.1	0.08	0.05	0.04
Financial services	98.5	159.0	211.4	0.07	0.11	0.18
Government services	60.2	68.8	74.7	0.19	0.25	0.31
Personal services	28.9	42.7	63.9	0.04	0.06	0.06

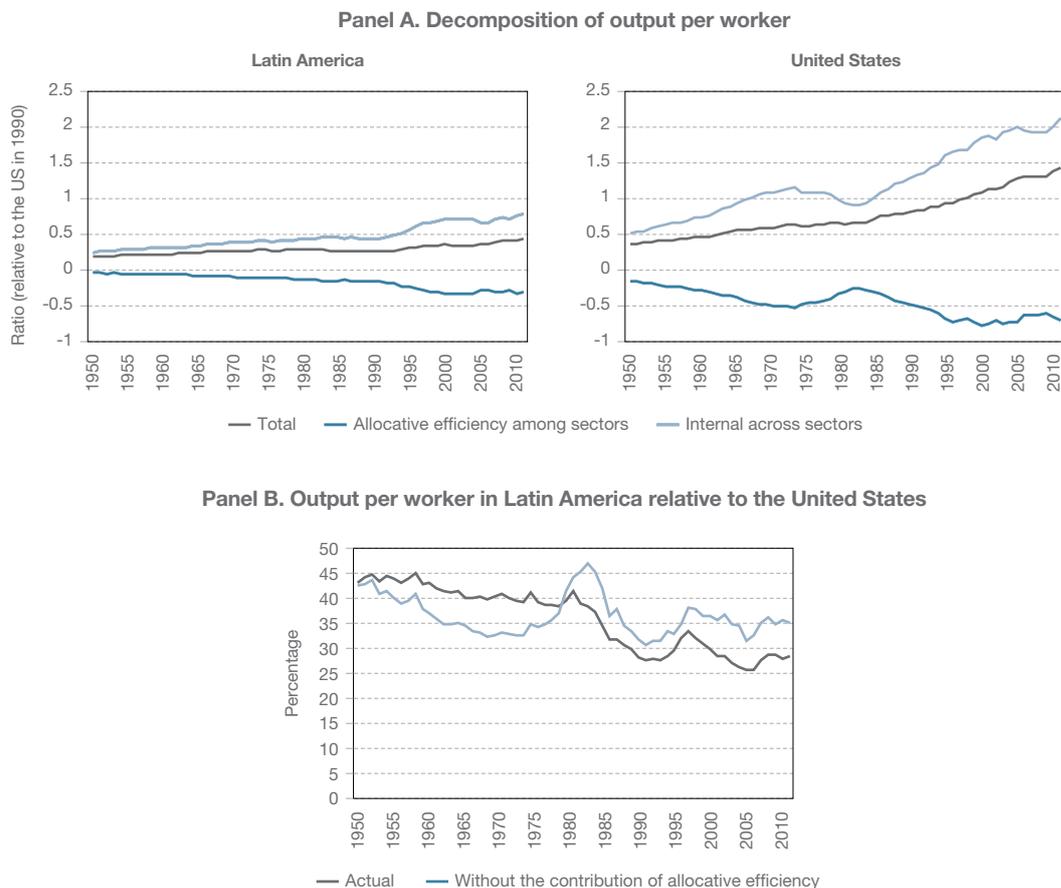
Note: The 3 columns on the left of the table show output per worker in Latin America as a proportion of output per worker observed in the United States. Output per worker in the United States is reported in 2011 dollars at purchasing power parity. The 3 columns on the right show the employment share of each sector for Latin America and the United States. The values for Latin America are calculated as the simple average of the values for Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Mexico, and Peru.

Source: Produced by the author using data from the GGDC 10-Sector Database (Timmer, de Vries, & de Vries, 2015).

In particular, the gap in output per worker is very large in agriculture and some service sectors, particularly financial services, commerce and personal services, in which it has deepened between 1950 and 2010. And it is only slightly less pronounced in industry, where only mining shows output per worker that is markedly greater than that of other non-industrial sectors. The other industrial subsectors (manufacturing, construction and utilities) are closer to the average. In recent decades, this gap has increased considerably in the majority of the service subsectors, as well as in manufacturing and agriculture, with construction and mining counteracting this negative trend.

**The gap in output per worker is very large in agriculture and in some service sectors, particularly finance, trade, and personal services.**

**Graph 2.7** Aggregate output per worker and its internal and external components for 10 sectors



Note: Panel A reports output per worker at purchasing power parity, as a proportion of that observed in the United States in 1990, broken down into the internal productivity and allocative efficiency components. The internal component is the simple average of output per worker of productive sectors. Allocative efficiency is the sample covariance between output per worker and sectoral employment share. Both statistics are calculated for the 10 productive sectors available in the database. Panel B reports the ratio between output per worker for Latin America and the United States, both the actual values and those that would be observed without the contribution of allocative efficiency. That is, if efficiency in resource allocation in the region were the same as in the United States. The following countries are included in the Latin American average: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Mexico, and Peru.

**Source:** Produced by the author using data from the GGDC 10-Sector Database (Timmer, de Vries, & de Vries, 2015).

**The contribution of the external component remains second-order when considering 10 activity sectors.**

On the other hand, the contribution of the external component, even at this greater level of disaggregation, continues to be secondary (Graph 2.7). In fact, at this level the external component is worse for the benchmark country. As of 2010, output per worker in Latin America compared to the United States would be almost the same if the contribution of the external component were excluded. The contribution is a little greater, albeit only slightly, when considering the full period from 1950-2010. Both in Latin America and the United States, the contribution of allocative efficiency among the 10 sectors considered has deteriorated over time, but the deterioration has been worse in the United States.<sup>10</sup>

Improving the efficiency in resource allocation would require either the migration of resources from less to more productive sectors, or a well-defined trend of narrowing productivity gaps in sectors that absorb a greater fraction of productive resources. Upon considering the 10 sectors, the first route would suggest reallocating resources from commerce and manufacturing toward sectors with higher levels of output per worker. However, as discussed earlier, improving efficiency in resource allocation on a sectoral level is a complex task for several reasons. First, due to the low potential for substitution between goods and services produced in one sector compared to another, especially non-tradable sectors. For example, the shift in consumption from goods toward services that accompanies growth in income per capita will probably continue to accentuate the migration of resources toward the service sector. (The reduction in the external component in the last 15 years in developed countries such as Spain and the United States would appear to reflect the difficulty of reverting the trend toward deindustrialization.) Second, reallocation of resources toward more efficient sectors may give rise to other complications. For example, reallocating resources efficiently toward industry would require, in particular, allocating resources to mining, which is the subsector with the highest relative output per worker, but also the subsector that already uses the most resources within the industry sector in Latin America compared to the United States, and which presents the greatest price fluctuations and environmental sustainability challenges.<sup>11</sup> Similarly, Latin America faces the dilemma of whether to increase productivity through greater urbanization, or maintain its relative focus on agriculture. In some countries in the region, measures that drive the outflow of productive resources from agriculture are also the focus of opposition for reasons related to equity, the protection of social capital and traditional ways of life, as well as the management of social tensions.<sup>12</sup> In summary, even if the efficiency

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10. McMillan, Rodrik, & Verduzco-Gallo (2014) find that structural change in Latin America in recent decades was harmful for growth, as it involved the migration of resources toward sectors with relatively low levels of productivity. The comparison with the United States, where this trend is even more pronounced, suggests that these patterns of resource reallocation respond to deeper forces than the evolution of productivity among sectors.

11. Although the fraction of employment accounted for by mining in Latin America is similar to that in the United States, other industrial sectors account for less employment than in the United States. As such, mining accounts for a greater fraction of resources allocated to industry in Latin America.

12. The beginning of the post-conflict era in Colombia is perhaps the most evident context of the strategic nature of agriculture.

in resource allocation among sectors was to blame for the most significant fraction of the gap in output per worker in Latin America, the reallocation of resources among major sectors is a complex route to achieve significant productivity gains in the region.

Therefore, closing this gap requires a major effort to improve productivity within different sectors of the economy. Although the service sector –in particular commerce, as well as financial and personal services– is probably a good focus for greater efforts given its high share in the use of productive resources, there is also enormous potential for productivity increases in industry and agriculture. It is now time to open the next Russian doll of productivity.

**Closing the productivity gap demands a great effort in increasing the productivity level within all sectors of the economy.**

## Productivity within sectors

The low levels of productivity in the major sectors of the economy can be analyzed with the same approach used in the previous section. That is, attempting to answer the following question: to what extent is it attributable to a low productivity of the subsectors or establishments that make up each sector, and to what extent is it attributable to a poor resource allocation among these subsectors or establishments? Answering this question, at this greater level of disaggregation, requires detailed information on the productivity and use of resources at the establishment level. As the availability of this type of data is scarce, the analysis initially focuses on non-microenterprise manufacturing in Chile, Colombia, and Mexico. We address the service sector later on.

### Labor productivity in the non-microenterprise manufacturing sector

The top half of Table 2.2 and Graph 2.8 present the decomposition of output per worker in the non-microenterprise manufacturing sector in Chile, Colombia, Mexico, and Uruguay in three components (which combine levels 3 and 4 of Figure 2.1): the establishment internal component, the efficiency in resource allocation among establishments in the average manufacturing subsector (establishment external component), and the efficiency in resource allocation among subsectors (subsector external component).<sup>13,14</sup> As the comparability of the data from these countries to analogous data from the United States is limited,

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13. The breakdown of productivity in this section, which is obtained from the derivation outlined in Text box 2.1, was implemented by Eslava, Hurtado, et al. (2018) using official microdata from different countries. For non-microenterprise manufacturing, they use data from Chile, Colombia, and Mexico originating from manufacturing surveys conducted by the respective statistics institutes. The Appendix to this chapter explains the characteristics of the microdata used in detail, and the way in which it was processed. It also presents Table A 2.1, which expands on Table 2.2, including other countries and measures of productivity for which useful information is available, but is less comparable among countries than that reported in Table 2.2.

14. Graph 2.8 includes Uruguay, although the data is not fully comparable with the data for Chile, Colombia, and Mexico, as it originates from administrative records maintained by the tax authority. For this reason, we compare Uruguay with the other countries in terms of trends but not magnitudes, and it is not included in Table 2.2.

**The productivity gap in the non-microestablishment manufacturing sector is mainly due to a low productivity within its subsectors; it is not caused by a deficient resource allocation among them.**

the analysis focuses on productivity levels instead of the gaps relative to the US. We provide a comparative perspective with the benchmark country subsequently.

Three main results can be observed:

1. The productivity gap in the non-microenterprise manufacturing sector between the Latin American countries considered and the United States is primarily explained by differences in productivity within subsectors, and not by a deficient resource allocation (in this case, employment) among subsectors. In fact, the subsector external component contributes more to output per worker in the manufacturing sector in Latin America than in the United States, where it is neutral (see column 1 of Table 2.2). This implies that the gap in output per worker within each subsector is, on average, greater than the gap for the manufacturing sector as a whole.<sup>15</sup> To clarify, the classification of manufacturing subsectors distinguishes, for example, the processing of meat from the processing of fruit, and the manufacturing of general-use machinery from the manufacturing of specialized machinery, as well as domestic appliances from office equipment.<sup>16</sup> This classification divides manufacturing into 55 subsectors.
2. Within subsectors, the establishment external component –column 2 of Table 2.2– is positive, as expected in an efficient economy, and as is usually observed in the manufacturing microdata from different countries. However, it contributes significantly to the gap in output per worker, as has been documented in recent years.<sup>17</sup> More precisely, in Table 2.2 the establishment external component in Chile, Colombia, and México contributes 85%, 91%, and 78% of what it contributes in the United States, respectively.<sup>18</sup>
3. Beyond this external component, the internal productivity gap within establishments is highly significant: in 2010, output per worker in the average manufacturing establishment in Latin America was 35% of that in the

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15. Column 1 of Table 2.2 shows our own calculations for the United States using a similar procedure to that used for data on Latin America, and monetary values expressed in the same unit (thousands of 2014 US dollars), based on the NBER manufacturing productivity data (see Bartelsman & Gray, 1996).

16. More precisely, a subsector is a group of manufacturing activities at a three-digit level of disaggregation in the International Standard Industrial Classification (ISIC, revision 3.1). The manufacture of basic precious and non-ferrous metals sector (division 272 of ISIC 3.1), which represents almost 20% of added value in Chile but a negligible fraction in other countries, is excluded from Graphs 2.8 to 2.11 and from Table 2.2. The exclusion of this sector does not change the qualitative patterns discussed herein, but it does increase the productivity gaps of other countries compared to Chile, especially in terms of the subsector allocative efficiency component, to levels of 1.4 (Table A 2.1 of the Appendix). Results for other subsectors do not change significantly.

17. See Bartelsman, Haltiwanger, & Scarpetta (2009) for a broader perspective covering countries from other regions. The finding also extends to other measures of productivity, specifically TFP (Busso, Madrigal, & Pagés, 2013).

18. The value of 85% for Chile corresponds to the ratio of the exponents 0.34 and 0.51, that is, the establishment external components for Chile and the US reported in Table 2.2. The values for Colombia and Mexico are calculated in a similar way. The number for the United States (51 log points) is taken from Bartelsman, Haltiwanger, & Scarpetta (2009, 2013). These authors (2009) also make their own calculations for the establishment external component for Argentina, Chile, and Colombia, and obtain similar results to those presented in Table 2.2 and Table A 2.1.

United States.<sup>19</sup> The preponderance of the internal component of output per worker persists in a dynamic perspective: the low growth of aggregate labor productivity in manufacturing over time has responded to the productivity dynamics within establishments, and only to a lesser extent to changes in allocative efficiency among subsectors, without sustained improvements in the establishment external component (Graph 2.8).<sup>20</sup>

**Table 2.2** Components of manufacturing productivity, 2003-2007

	Allocative efficiency among subsectors	Allocative efficiency among establishments	Internal component across establishments	
			No adjustments	Adjusted for PPP
<b>Output per worker</b>				
Chile	0.17	0.34	-1.30	-0.81
Colombia	0.02	0.42	-1.65	-0.91
Mexico	0.12	0.26	-1.27	-0.88
United States <sup>a/b/</sup>	-0.03	0.51		
<b>Total factor productivity</b>				
Chile	0.80	0.70	-0.62	-0.13
Colombia	0.58	0.66	-0.85	-0.11
Mexico	0.53	0.56	-0.77	-0.37
United States <sup>a/</sup>	0.35			

Note: The table shows two measures of productivity—output per worker and TFP—broken down into the following components: allocative efficiency among subsectors, allocative efficiency among establishments in the average subsector, and the internal component of the average establishment in the average subsector (both before and after adjusting for PPP). For TFP, allocative efficiency is calculated as the covariance between the logarithm of TFP and the sales share (instead of employment). TFP is calculated with the assumption that the labor share in output is 0.7. Processing of basic non-ferrous metals subsector is excluded, except for the United States where its weight is minimal. All values are reported in logarithmic units, based on monetary values in thousands of 2014 dollars. Establishments with less than 10 employees are excluded. Argentina and Uruguay are excluded because the data does not allow comparisons across levels.

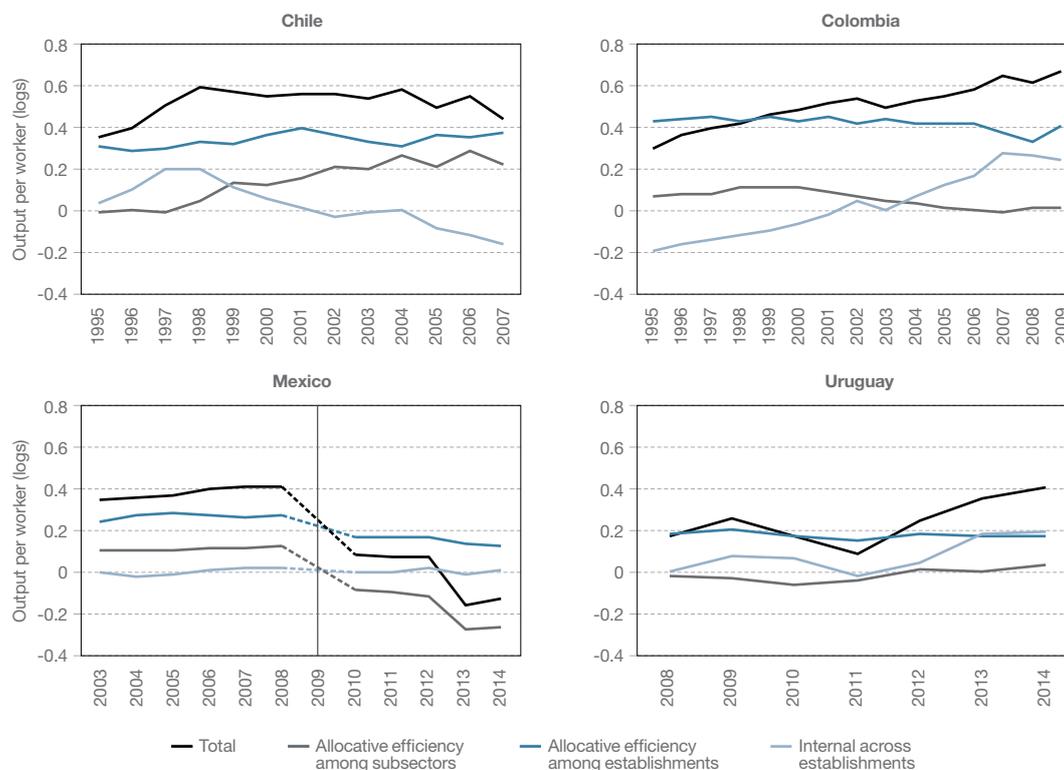
a/ For the United States, allocative efficiency among manufacturing subsectors is calculated using a similar procedure than that used for Latin America, and monetary values expressed in the same unit (logarithm of thousands of 2014 dollars), based on the National Bureau of Economic Research's manufacturing productivity database.

b/ The data on allocative efficiency among establishments within a subsector for the US is taken from Bartelsman, Haltiwanger, & Scarpetta (2009).

Source: Bartelsman, Haltiwanger, & Scarpetta (2009), and the productivity database produced by Bartelsman & Gray (1996) for the United States. The remaining data was obtained from Eslava, Hurtado, et al. (2018).

19. Output per worker in an average establishment for this relative calculation is obtained as a residual: productivity in the manufacturing sector (Table 2.1) is adjusted for subsector and establishment external components (Table 2.2). Please see the Appendix for more details. For Latin America, an average of the country values reported in Table 2.2 is provided.

20. Given the difficulties in comparing the average productivity levels of establishments among countries, in Graph 2.8 the establishment internal productivity component is normalized to zero in 2003 (or the first year of the sample). However, for interested readers, Table 2.2 reports these levels in comparable units. Comparing average productivity levels in databases from different countries is risky, because the differences in criteria for sample inclusion, the share of all manufacturing firms included in the sample, and the effectiveness with which the inclusion criteria are applied in practice involve different measurement levels and biases in each country. These different biases hinder the comparison of productivity levels much more than their spread or correlation. For a detailed discussion, see Bartelsman, Haltiwanger, & Scarpetta (2009, 2013).

**Graph 2.8** Output per worker in manufacturing, and its internal and external components for subsectors

Note: The graph shows output per worker and its breakdown in the following components: allocative efficiency among subsectors, allocation efficiency among establishments in the average subsector, and the internal component across establishments in the average subsector. The internal component is the average of establishments' output per worker. The allocative efficiency among establishments in the subsector is equivalent to the sample covariance between output per worker and establishment employment share. Both statistics are calculated for establishments within a subsector, and are reported for the average subsector. The allocative efficiency among subsectors is equivalent to the sample covariance between output per worker and subsector employment share. See Text box 2.1. The internal component is normalized to 0 in 2003, except for Uruguay, which is normalized to 0 in 2008, and Annual Manufacturing Industry Survey (EAIM) data for Mexico, which is normalized to 3 in 2010. The data for Mexico in 2009 is calculated as the average from 2008 and 2010, with data from two different surveys being merged.

**Source:** Eslava, Hurtado, et al. (2018) based on the Annual Chilean Manufacturing Survey, the Annual Colombian Manufacturing Survey, the Annual Mexican Industrial Survey (up to to 2009), the Annual Survey of Mexican Industry (from 2009 onwards), and administrative records from the Tax Administration Department of Uruguay.

These calculations indicate that reallocating employment toward more efficient establishments in an average Latin American country to match the establishment external component observed in the United States would close the gap in output per worker by 7% in the average manufacturing subsector as of 2010.<sup>21</sup> Alternative calculations following non-accounting approaches attribute even greater importance to the efficiency in resource allocation among establishments: an improvement in resource allocation to the level observed in

21. The Appendix outlines the methodology used to break down the productivity gap into its internal and external components. Based on this method, raising the external component in Latin America to the level observed in the United States, 0.51, reduces the gap from 0.70 to 0.65.

the United States would close half of the aggregate productivity gap.<sup>22</sup> In either of the two scenarios, it is clear that an inefficient allocation of employment among establishments makes a notable contribution to the gap in output per worker, although it is far from totally explaining it.

**There is much to gain from innovations that increase productivity within firms.**

On the other hand, there is a lot to gain from innovations that impact productivity within establishments. Additional evidence that is beginning to emerge with regard to Latin American economies based on microdata such as the one used in this section sheds further light on where these innovations would have the greatest impact. In particular, this evidence suggests that Latin America may be suffering from a deficit of firms that make extraordinary investments to improve their productivity. This conclusion is reached by observing the relatively poor growth of employment and sales in the average Latin American establishment, which may be due to low productivity growth, in addition to distortions that affect employment for a given level of productivity.<sup>23</sup>

For example, recent studies show that after entering the market, the average Latin American establishment grows much more slowly than the average establishment in the United States. After 20 years in operation, employment in an average establishment in Mexico and Colombia grew by half and two thirds, respectively, compared to the level of growth observed for a similar establishment in the United States.<sup>24</sup> This difference appears to be explained, at least in part, by the performance of establishments with extraordinary growth, known as “gazelles”. While in the non-microenterprise manufacturing sector in the United States, the growth of a young establishment in the 90th percentile is almost 14 percentage points higher than the growth of an establishment in the 10th percentile, the same gap in Colombia is less than 9 percentage points.<sup>25</sup>

The apparent importance of establishments with extraordinary growth (or, rather, the lack thereof in Latin America) in explaining the difference in the average growth of establishments between Latin America and the United States is not surprising: both in developed and developing countries, there tends to be a large spread in the speed of growth among establishments in a sector, such

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22. These exercises follow the methodology designed by Hsieh & Klenow (2009), who initially implemented it for China and India. Busso, Madrigal, & Pagés (2013) implemented the methodology for 10 Latin American countries, and found similar results among them. This methodology is based on a model of the ideal economy from the perspective of maximizing TFP, and analyzes the extent to which economies differ from that ideal. It generates a useful indicator for efficiency in resource allocation, which in this chapter is contrasted with our accounting methodology to obtain a range of possible effects. However, Busso et al.'s results may significantly differ from ours because their efficiency measures depend on several assumptions regarding the economic environment (in particular, that all establishments face the same supply costs and operate using technologies without economies of scale and without market power). Their results also depend on technological and demand elasticity parameters and, in particular, in the assumption that all establishments face the same levels for those two groups of parameters.

23. Hsieh & Klenow (2014), Eslava & Haltiwanger (2018).

24. In the sample of Hsieh & Klenow (2014), which includes comparable establishments in the two countries, an average establishment in the United States that has been in operation for 20 years is around four times its initial size, while in Mexico an average establishment is only around twice its initial size after 20 years. In the sample of Eslava, Haltiwanger, & Pinzón (2018), which is also comparable between the two countries considered, that figure reached 2.8 for the United States and 1.7 for Colombia.

25. Eslava, Haltiwanger, & Pinzón (2018).

**The low mean establishment productivity observed can also reflect a poor natural selection process, where low-productivity establishments remain in production.**

that average growth is largely explained by the momentum of a small number of establishments with extraordinary growth, especially during their first years in the market.<sup>26</sup> In the region, there are firms growing at varying speeds, but gazelles are lacking.

The problem of low average productivity among establishments may also partially reflect poor dynamics of natural selection, in which establishments with extremely low productivity are able to continue producing and selling for years in spite of this. As the phenomenon of exiting the market is of a dynamic nature, Graph 2.9 shows productivity growth over two years for the average manufacturing subsector and the contribution to this growth made by establishments that exit the market compared to the contribution of establishments that remain over the two periods. In particular, the exercise in Graph 2.9 breaks down total growth into: the contribution of growth in establishments that remain in the market over the two periods; the contribution of resource reallocation among these establishments; and the contribution of the creation and exit of other establishments.<sup>27</sup> The growth of establishments that remain over the two periods dominates the subsectoral productivity dynamics (in line with the finding that the growth of manufacturing productivity in recent periods has been dominated by the internal component within establishments). The contribution of net entry, which affects both the efficiency in resource allocation and the average output per worker, is generally positive, but the size of this effect is small relative to other variables.

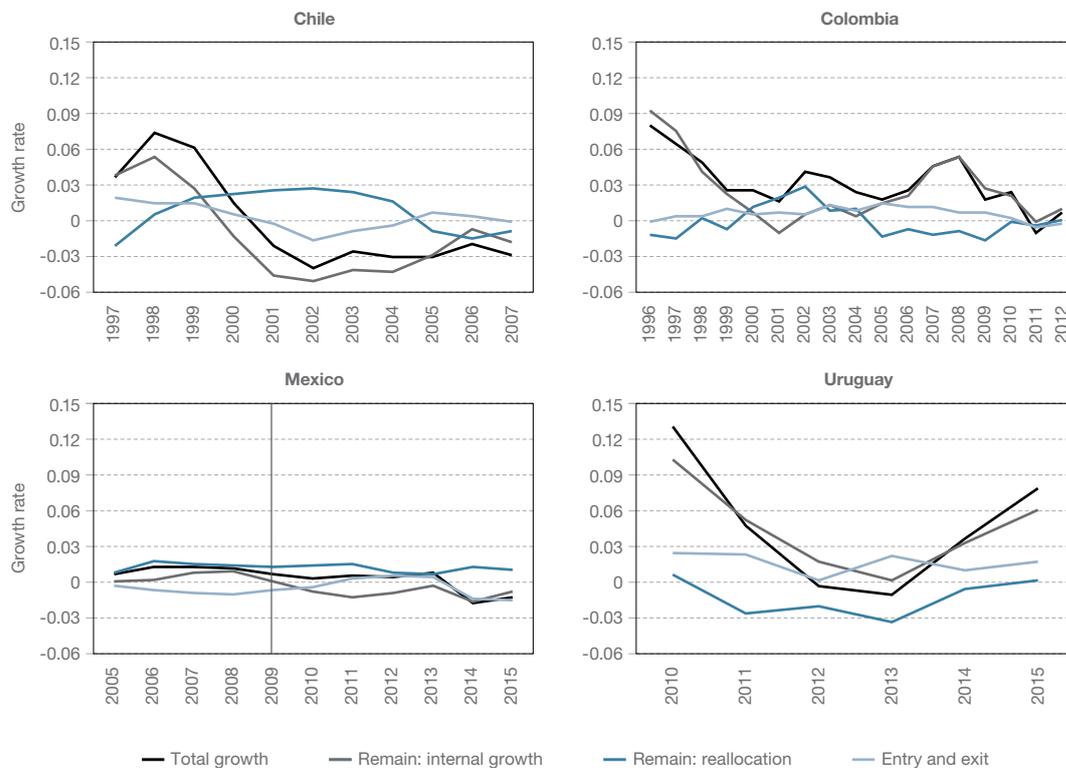
For comparison purposes, Foster, Haltiwanger, and Syverson (2008) find that the average five-year productivity growth of manufacturing in the United States between 1977 and 1998 may be attributed in almost equal parts to the establishment internal and external components, of which resource reallocation among surviving establishments and resource reallocation from establishments that close down and release resources to establishments that open and absorb them contribute in similar proportions. However, it is interesting that the most recent estimates for the United States suggest an increasingly lower contribution of resource reallocation among establishments, both among pre-existing establishments and from those that exit the market toward others.<sup>28</sup>

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26. Haltiwanger, Jarmin, & Miranda (2013) illustrate the significant skew in the distribution of employment growth in the manufacturing sector in the United States toward establishments with very high levels of growth, and Decker, Haltiwanger, Jarmin, & Miranda (2017) show how a higher level of this skew in decades prior to 2000 explains the rapid growth in aggregate employment in the sector during those decades, compared to the post-2000 period. Eslava, Haltiwanger, & Pinzón (2018) illustrate that a lower skew in the distribution of growth toward establishments with very high levels of growth explains the lower average growth of employment per establishment among manufacturing establishments with 10 or more employees in Colombia versus the United States.

27. In the Appendix, we show the decomposition of growth into the following components: growth among the establishments that survive, improvements of efficiency in resource allocation among establishments, and the productivity of establishments that enter and exit the market.

28. Decker, Haltiwanger, Jarmin, & Miranda (2017).

**Graph 2.9** Decomposition of output per worker growth in the average manufacturing subsector

Note: The graph shows a three-year moving average of output per worker growth in the average subsector and its components (see footnote 32). The “Remain: internal growth” line shows the average change in output per worker in the establishments present both in the first and last periods. The “Remain: reallocation” component represents productivity gains through increases in the employment share of establishments with higher output per worker at the expense of those with lower output per worker. The “Entry and exit” line captures productivity gains due to the rotation of establishments, which are positive if the establishments that enter the market (or those that exit the market) have higher average output per worker (or lower average output per worker) than the establishments in the previous period. The vertical line in the graph for Mexico indicates the moment in which the data source changed.

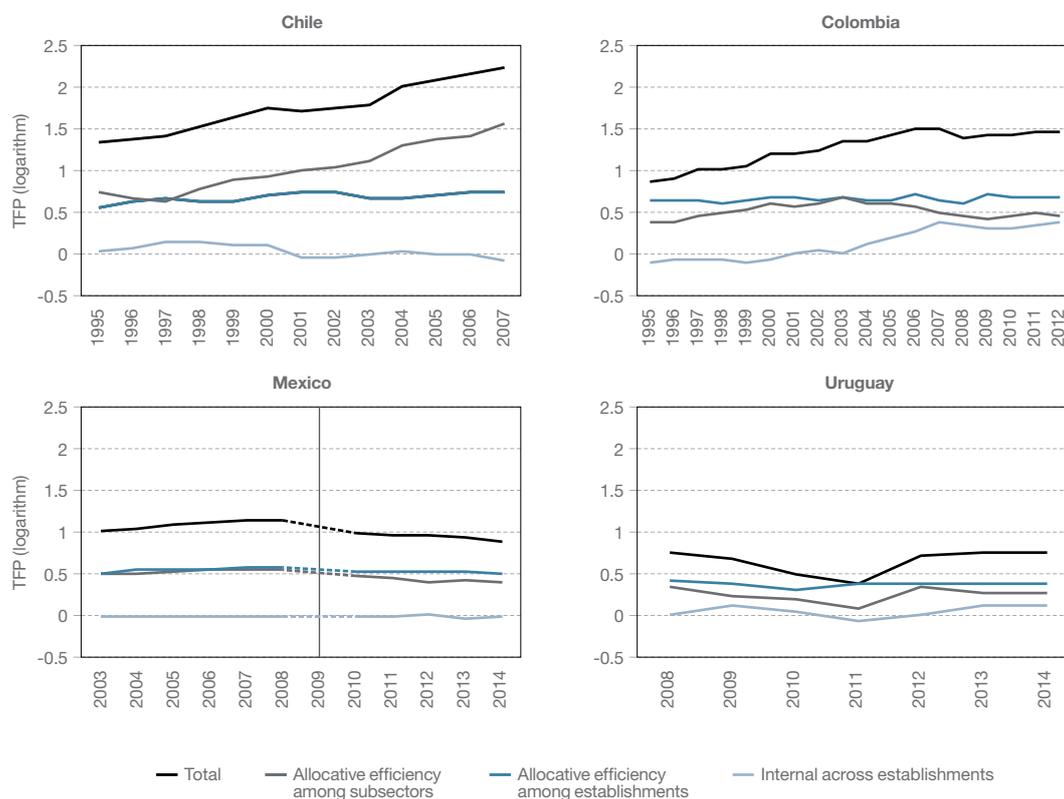
Source: Eslava, Hurtado, et al. (2018) based on the Annual Chilean Manufacturing Survey, the Annual Colombian Manufacturing Survey, the Annual Mexican Industrial Survey (up to to 2009), the Annual Survey of Mexican Industry (from 2009 onwards), and administrative records from the Tax Administration Department of Uruguay.

To what extent do these conclusions depend on the use of a measure of labor productivity versus TFP? A firm can achieve a high level of output per worker by employing more capital, but the apparently higher output per worker may be misleading if it does not also enable an equally high remuneration to those who have invested their capital resources. TFP captures this additional dimension of productivity. The bottom half of Table 2.2 and Graphs 2.10 and 2.11 replicate the breakdown of manufacturing sector productivity, in this case for TFP.<sup>29</sup>

29. In this case, instead of basing the analysis on the distribution of employment, the distribution of added value is used.

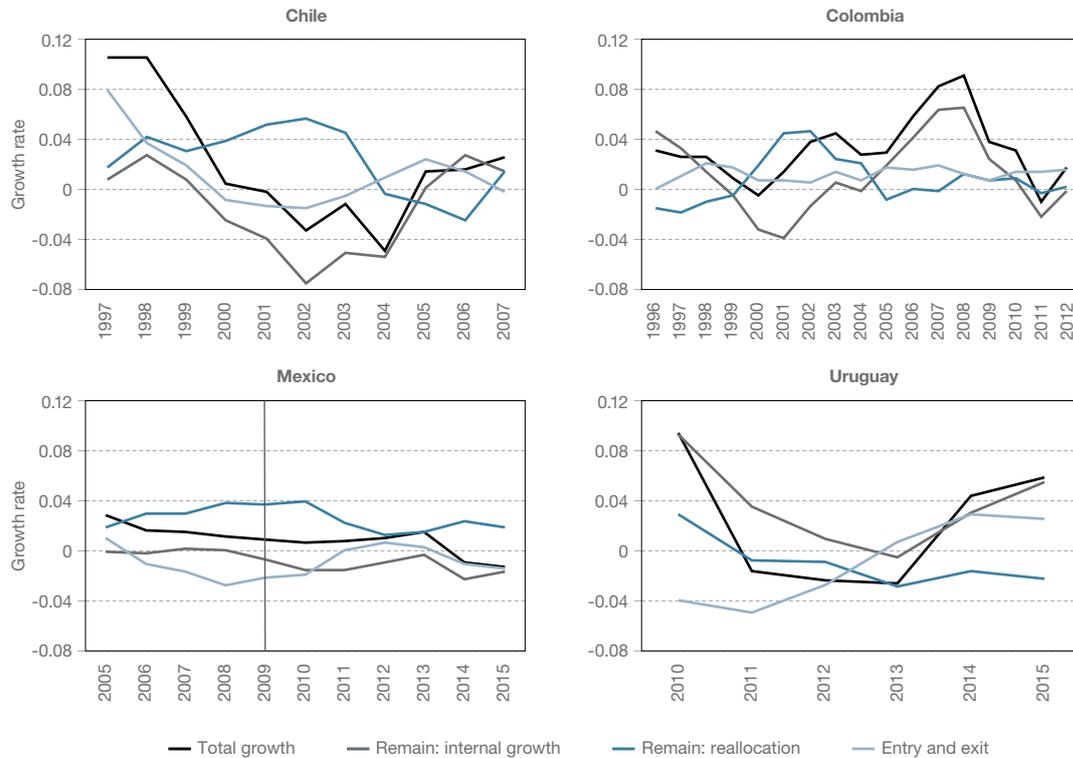
The main conclusions outlined for the case of labor productivity persist using TFP: the subsector and establishment external component is positive in Latin America, and the subsector external component contributes more than in the United States. Meanwhile, there is no significant improvement in resource allocation among establishments. Unfortunately, a comparable decomposition of TFP in the United States, which would help assess the robustness of the observed gap in Latin America's external component relative to that country, is not available.

**Graph 2.10** Manufacturing TFP and its internal and external components for subsectors and establishments



Note: The graph reports TFP and its breakdown into the following components: allocative efficiency among subsectors, allocative efficiency among establishments in the average subsector, and the internal component across establishments in the average subsector. The latter is equal to the average TFP of all establishments. It is normalized to zero for 2003, except for Uruguay, which is normalized to zero in 2008, and Annual Manufacturing Industry Survey (EAIM) data for Mexico, which is normalized to 3 in 2010. The allocative efficiency among establishments in the subsector is equivalent to the sample covariance between TFP and sales share at the establishment level. Both statistics are calculated for establishments within a subsector, and are reported for the average subsector. Meanwhile, the allocative efficiency among subsectors is equivalent to the sample covariance between TFP and sales share, calculated at the subsector level. See Text box 2.1. The data for Mexico in 2009 is calculated as the average from 2008 and 2010, with data from two different surveys being merged.

Source: Eslava, Hurtado, et al. (2018) based on the Annual Chilean Manufacturing Survey, the Annual Colombian Manufacturing Survey, the Annual Mexican Industrial Survey (up to 2009), the Annual Survey of Mexican Industry (from 2009 onwards), and administrative records from the Tax Administration Department of Uruguay.

**Graph 2.11** Decomposition of TFP growth in the average manufacturing subsector

Note: The graph shows the three-year moving average of TFP growth in the average subsector and its components. The “Remain: internal growth” line shows the average change in output per worker in the establishments present both in the first and last periods. The “Remain: reallocation” component represents productivity gains through increases in the employment share of establishments with higher output per worker at the expense of those with lower output per worker. The “Entry and exit” line captures productivity gains due to the rotation of establishments, which are positive if the establishments that enter the market (or those that exit the market) have higher average output per worker (or lower average output per worker) than the establishments in the previous period. The vertical line in the graph for Mexico indicates the moment in which the data source changed.

Source: Eslava, Hurtado, et al. (2018) based on the Annual Chilean Manufacturing Survey, the Annual Colombian Manufacturing Survey, the Annual Mexican Industrial Survey (up to 2009), the Annual Survey of Mexican Industry (from 2009 onwards), and administrative records from the Tax Administration Department of Uruguay.

However, there are interesting quantitative differences between both productivity measures. In all countries, the contribution of the external components to TFP is greater than their contribution to labor productivity, with a lower country dispersion. Therefore, it would appear that productive resources taken as a whole are allocated more efficiently than employment alone, which serves as a reminder that firms can take advantage of different margins in their set of productive resources to achieve the greatest possible value creation.

## Labor productivity in the non-microenterprise service sector

The case of the service sector, as indicated previously, is of special interest due to its high and growing share in economic activity, combined with a high productivity

**Problems in resource allocative efficiency seem more salient in services than in manufactures.**

gap. Little is known regarding the relative intensity of the productivity problem in the internal and external margins of service-sector firms, largely due to the lower availability of comprehensive microdata compared to manufacturing. Precisely for this reason, it is only possible to reproduce the analysis carried out so far in this chapter for very specific cases of countries and business subpopulations, with data that is less comparable among countries. In particular, Argentina and Uruguay provide social security data, while in Colombia the Annual Service Survey can be used (although the service survey is not as comprehensive as the manufacturing survey).<sup>30</sup> Although it is not possible to compare with data from the United States, the service sector may be compared with the manufacturing sector, using the same source for each of these countries. We start with the non-microenterprise sector, leaving microenterprises for the following section. The upper sections of Tables 2.3 and 2.4 present the results of this analysis, enabling several conclusions to be drawn.

First, issues of efficiency in resource allocation are seemingly more pronounced in services than in manufacturing. This is verified in various indicators, both on the establishment and subsector external components, although the result is not robust to the use of salaries as an approximation for productivity (a measure well known to be imperfect). The same result is also reflected in the higher levels of dispersion in output per worker:<sup>31</sup> both the standard deviation of output per worker among firms and the productivity gap between the 90th and 10th percentiles of the distribution of firms are greater in services than in manufacturing, in line with evidence from other countries.<sup>32</sup> The gap is particularly noticeable in output per worker, whose standard deviation in services is more than 10 percentage points greater than in manufacturing, but is also evident in total factor productivity.

Second, despite the limitations of comparing absolute productivity levels between sectors and countries, the establishment internal productivity component (expressed in comparable units) is greater in services than in manufacturing. These two preliminary findings suggest that the labor productivity gap in services compared to manufacturing is explained by inferior resource allocation among subsectors and among establishments, and not because the average establishment in the service sector creates less value per worker than in the manufacturing sector.

Finally, it is interesting to note that the labor productivity gap between services and manufacturing documented in the literature and throughout this chapter does not hold when analyzing total factor productivity. For example, in the case of TFP, the positive gap of manufacturing compared to services in terms of

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30. The data was processed by Eslava, Hurtado, et al. (2018). Further details on data processing and the original sources are reported in the Appendix.

31. We use the dispersion in output per worker as an approximation for the degree of inefficiency in resource allocation, under the assumption that it reflects the marginal product (the gains resulting from moving an additional unit of productive resources to a certain productive unit or activity). This is based on the notion that the dispersion of marginal products implies that there would be efficiency gains if resources were moved from units with a low marginal product to those with a high marginal product. See Restuccia & Rogerson (2017) for detailed summary and specific references.

32. Restuccia & Rogerson (2017).

efficiency does not compensate for the negative gap observed in the internal component. Under standard assumptions, TFP is directly proportional to output per worker, and inversely proportional to capital intensity. That is, although the service sector creates less value per worker than the manufacturing sector, this primarily reflects less intensive capital use.<sup>33</sup>

**Table 2.3** Characteristics of the productivity distribution in manufacturing and services: Argentina and Uruguay, 2008-2012

		P90-P10 gap in establishment productivity distribution	Standard deviation of establishment productivity distribution	Allocative efficiency among subsectors	Allocative efficiency among establishments	Internal across establishments component <sup>a/</sup>
<b>Output per worker in establishments with 10 or more employees</b>						
Uruguay	Services	1.75	0.87	-0.21	-0.02	-1.22
	Manufacturing	1.70	0.74	-0.02	0.18	-1.28
<b>Wages as a proxy for output for worker in establishments with 10 or more employees</b>						
Argentina	Services	1.23	0.51	-0.02	0.20	-2.19
	Manufacturing	0.94	0.38	0.02	0.25	-2.34
Uruguay	Services	1.46	0.75	0.05	0.00	-2.49
	Manufacturing	1.31	0.59	-0.06	0.15	-2.48
<b>TFP in establishments with 10 or more employees</b>						
Uruguay	Services	1.50	0.72	0.12	0.35	-0.29
	Manufacturing	1.44	0.65	0.22	0.36	-0.52
<b>Output per worker in establishments with 2 or more employees</b>						
Uruguay	Services	2.12	0.98	-0.16	0.07	-1.35
	Manufacturing	1.75	0.79	-0.03	0.26	-1.39
<b>Wages as a proxy for output for worker in establishments with 2 or more employees</b>						
Argentina	Services	1.36	0.55	-0.10	0.34	-2.42
	Manufacturing	1.07	0.44	0.01	0.37	-2.53
Uruguay	Services	1.84	0.87	0.05	0.08	-2.59
	Manufacturing	1.47	0.67	-0.05	0.24	-2.62
<b>TFP in establishments with 2 or more employees</b>						
Uruguay	Services	1.75	0.83	0.22	0.46	-0.43
	Manufacturing	1.49	0.69	0.22	0.40	-0.56

Note: The table shows dispersion statistics (difference between last and first decile, and standard deviation) for allocative efficiency (among subsectors and among establishments in the average subsector) and the internal component of the average establishment in the average subsector, using three productivity indicators: output per worker, average wages, and TFP. TFP is calculated with an assumed weight of 0.7 for labor.

a/ Computed based on the logarithm of values in thousands of 2014 dollars.

**Source:** Eslava, Hurtado, et al. (2018). The data for both countries is administrative data for firms and formal employment. The data source for each country is the same for both sectors.

33. For example, note that in the case of TFP the two efficiency components are greater in services than in manufacturing when microenterprises are included. When microenterprises are excluded, the positive gap of manufacturing compared to services in terms of efficiency does not compensate for the negative gap in the internal component.

**Table 2.4** Characteristics of the productivity distribution in manufacturing and services: Colombia, based on sectoral surveys 2008-2012

	P90-P10 gap in establishment productivity distribution	Standard deviation of establishment productivity distribution	Allocative efficiency among subsectors	Allocative efficiency among establishments
<b>Output per worker</b>				
Services	2.42	1.03	-0.55	-0.17
Manufacturing	2.13	0.86	0.02	0.37
<b>Average wages as a proxy for output per worker</b>				
Services	1.31	0.55	-0.26	0.02
Manufacturing	1.05	0.42	-0.01	0.29
<b>Total factor productivity</b>				
Services	2.33	0.98	0.19	0.53
Manufacturing	1.91	0.78	0.44	0.66

Note: The table shows dispersion (difference between the last and first decile, and standard deviation) and allocative efficiency (among subsectors and among establishments in the average subsector) statistics, using three productivity indicators: output per worker, average wages, and TFP, all of which exclude establishments with fewer than 10 employees. TFP is calculated with an assumed weight of 0.7 for labor. All productivity measures are expressed in logarithms.

Source: Eslava, Hurtado, et al. (2018).

## Microenterprises and informality

One limitation of the analysis of productivity within and among establishments in the previous section, due to restrictions in data availability, is the exclusion of microenterprises. This limitation is important not only because the microenterprise sector accounts for almost half of all employment in Latin America, but also because of a related phenomenon that is prevalent in the region, which leads us to suspect that the gap in productivity in the microenterprise segment is particularly large compared to developed countries, including the United States. That phenomenon is informality.

Informality is arguably the most prominent difference between the Latin American productive apparatus and that of developed countries.<sup>34</sup> Informality is understood as the operation of productive activities outside of the basic regulations that govern the economy, such as labor and tax regulations. It is also known that informal establishments generally have lower levels of productivity than formal establishments. Furthermore, the microenterprise segment is more prone to operating in the informal sector.

34. To illustrate the magnitude of the informal sector in Latin America, household surveys summarized in Table A 2.2 report a labor informality rate among salaried employees –defined as the percentage of salaried employees without the right to a pension– of above 50%, on average, for nine Latin American countries. That indicator reaches close to 60% in the commerce sector and 80% in the agriculture sector. Meanwhile, a survey carried out in 2015 by the United States Federal Reserve Board indicates a labor informality rate of 20% (Robles & McGee, 2016).

As such, the elevated prevalence of microenterprises in the region, documented in Tables 2.5 to 2.7, is a potentially serious problem for productivity. For the sake of ease, and in line with some legal definitions, we define microenterprises as those with fewer than 10 employees. In the manufacturing sector, the average size of an establishment in Latin America is approximately half of that observed in the United States (Table 2.5, column 1),<sup>35</sup> which has a lot to do with the more widespread presence of microenterprises in the region. For example, while in Colombia microenterprises represent almost 90% of all manufacturing establishments, accounting for 32% of manufacturing sector employment, in the United States 50% of manufacturing establishments are microenterprises and they account for less than 5% of employment in that sector (Table 2.6). On the other hand, when microenterprises are excluded, Table 2.5 shows that the distribution of manufacturing establishment sizes does not differ much between the region and the United States. Data on salaried employees in household surveys confirm the high prevalence of microenterprises (Table 2.7): in Latin America, the percentage of manufacturing salaried employees accounted for by microenterprises is, on average, 36%.

**The high prevalence of microestablishments in the region poses a big problem for productivity.**

**Table 2.5** Distribution of firms and employment by firm size

Country	Average number of employees (includes microenterprises)	Average number of employees	Distribution of establishments by size (employees)			Distribution of employment by size (employees)		
			Up to 50	From 51 to 200	More than 200	Up to 50	From 51 to 200	More than 200
<b>Manufacturing sector</b>								
Argentina	11.06	60.59	77.96	17.41	4.63	26.80	26.92	46.28
Brazil	15.47							
Chile		75.82	69.30	22.19	8.51	18.62	29.32	52.06
Colombia	8.81	76.62	66.72	24.41	8.87	15.69	29.76	54.55
Mexico	10.69							
Uruguay		53.25	74.78	19.26	5.96	26.09	29.34	44.57
United States	21.79	86.50	65.28	28.18	6.54	17.11	35.24	47.65
<b>Services sector</b>								
Argentina		59.07	83.18	12.87	3.95	27.48	20.10	52.42
Uruguay		47.30	76.36	17.37	6.27	19.78	18.95	61.27
United States		59.94	79.78	17.11	3.11	26.89	29.48	43.63

Note: The table shows the average number employees, including and excluding microenterprises, the distribution of establishments by number of employees, and the distribution of employment according to the number of employees in the establishment in which they work. Both distributions show percentages for three ranges based on the number of employees and exclude microenterprises (those with 10 employees or less). The information for Argentina and Uruguay originates from administrative records in which the unit of observation is firms instead of establishments, and include only formal and directly hired employees.

**Source:** Average employment data with microenterprises obtained from Bento & Restuccia (2017). Distributions for the United States are produced by the author with data from Business Dynamic Statistics (USCB, 2015). The remaining data was obtained from Eslava, Hurtado, et al. (2018).

35. Hopenhayn (2016); Bento & Restuccia (2017).

**Table 2.6** Distribution of employment and establishments by firm size, including microenterprises: Colombia and the United States, 2005

Sector	Firm size (employees)	Establishments (%)		Employment (%)	
		Colombia	United States	Colombia	United States
Manufacturing	1 to 9	87.18	49.90	31.64	4.40
	10 to 49	10.61	32.70	21.49	16.20
	50 to 249	1.81	14.10	19.44	33.40
	250 or more	0.40	3.30	27.42	46.00
Commerce	1 to 9	95.15	63.20	59.40	15.92
	10 to 49	4.28	30.53	16.97	39.16
	50 to 249	0.49	5.84	10.23	33.33
	250 or more	0.08	0.42	13.40	11.59
Other Services	1 to 9	87.87	75.84	40.75	16.18
	10 to 49	10.25	19.60	28.29	24.41
	50 to 249	1.70	3.88	22.88	25.29
	250 or more	0.18	0.69	8.08	34.11
Agriculture	1 to 9	98.58	76.83	82.12	31.93
	10 to 49	1.28	21.31	10.58	47.19
	50 to 249	0.12	1.75	4.95	18.49
	250 or more	0.01	0.12	2.35	2.39

Note: The table shows the distribution of establishments by number of employees, and the distribution of employment by establishment size (in terms of employees). For Colombia, establishments with one employee (presumably the owner) are excluded. For the Colombian agriculture sector, day-laborers are included (excluding them has only a minimal effect on results).

Source: Produced by the author based on the General Census 2005 (DANE, 2005) for services and commerce, and the National Agriculture Census (DANE, 2014) for the agriculture sector in Colombia. Data from Business Dynamics Statistics (USCB, 2015) is used for all sectors in the United States.

In the service sector, microenterprises account for an even greater share of employment than in the manufacturing sector. In Colombia, microenterprises account for 60% of salaried employment in the commerce sector and 40% of employment in other services, while in the United States these percentages are only 16% in both cases (Table 2.6). This is the case even though the data in the table only covers salaried employment, and as such these data do not include independent workers, who are usually numerous in these sectors.

Finally, the share of employment accounted for by microenterprises in the agriculture sector is the highest of the three major sectors of the economy (Tables 2.6 and 2.7). Even though this occurs not only in Latin America, but also in the United States, in Latin America the percentage of salaried employment that is accounted for by microenterprises in this sector reaches 70% (and in some countries, such as Colombia, as high as 80%), while in the United States that figure is less than 50%. This helps explain the well-documented finding that the difference in the average size of agricultural establishments between more and less developed countries is much greater than the difference in the average size of manufacturing establishments.<sup>36</sup>

36. Restuccia & Rogerson (2017).

**Table 2.7** Distribution of formal and informal employment by firm size and sector

	Firm size (employees)	Latin America			United States
		Formal employees	Informal employees	Employees	Employees
All sectors	1 to 9	17	75	48	12
	10 to 99	32	16	23	
	100 or more	50	8	29	
Manufacturing	1 to 9	10	69	36	4
	10 to 99	30	21	26	
	100 or more	60	10	38	
Commerce	1 to 9	28	82	58	11
	10 to 99	37	12	23	
	100 or more	35	6	19	
Other services	1 to 9	15	60	31	13
	10 to 99	33	25	29	
	100 or more	52	15	40	
Agriculture	1 to 9	29	78	70	31
	10 to 99	32	16	19	
	100 or more	38	6	11	

Note: The table shows the average Latin American distribution of formal and informal employment by establishment size and productive sector. Additionally, the proportion of employment in firms with fewer than 10 employees is reported for the United States. The countries included for Latin America are Argentina, Bolivia, Colombia, El Salvador, Guatemala, Honduras, Mexico, Paraguay, Peru, and Uruguay. Formal-sector employees are considered to be those with the right to a pension. The data is pooled from 2011 to 2015.

Source: Produced by the author based on CEDLAS (2018) for Latin America and Business Dynamics Statistics (USCB, 2015) for the United States.

Although, as Table 2.7 shows, not all microestablishments operate in the informal sector, there is a high prevalence of informality among them in Latin America. Table 2.7 is constructed with employment data from household surveys in nine Latin American countries,<sup>37</sup> classifying salaried employees as informal if they do not have the right to a pension. While the percentage of formal salaried employees who work in microenterprises is only 17%, not much greater than the value observed in the United States, the percentage of informal employees who work in these establishments in the region reaches 75%.<sup>38</sup> We also observe this pattern within each major sector and (from an

37. Argentina, Bolivia, Colombia, El Salvador, Guatemala, Honduras, Mexico, Paraguay, and Uruguay.

38. Note that Table 2.5 refers to firm size, which is reported in household surveys, while Table 2.6 refers to establishments, which is comparable between the two countries reported. This is why the percentages reported for the United States differ slightly between the two tables.

**The labor productivity gap between the informal and formal sector is around 45%.**

accounting perspective) is the factor that really makes the difference in terms of aggregate informality rates.

Due to its nature, much of the value created by the informal sector remains off the radar of national accounting systems, and systematic data on labor productivity and TFP in the informal sector is not available. However, to the extent that an employee's salary reflects, among other factors, her productivity, it is possible to approximate a measure of productivity based on salary data from household surveys. Graph 2.12 shows a decomposition of labor productivity in the formal sector versus the informal sector using the average wage, after controlling for employees' demographic characteristics and economic sector.<sup>39</sup> Once again, we follow the guidelines of Text box 2.1 to decompose productivity into its internal and external margins. In the absence of information at the firm level covering all individuals, the decomposition of productivity between the internal and external components can only be carried out among firm-size categories (such as those used in Table 2.7), as well as among sectors.<sup>40</sup> What does this exercise reveal?

First, there is a gap of almost 45% in labor productivity between the formal and informal sectors. Second, this gap can be attributed both to lower average labor productivity in the informal sector (26 percentage points), and a higher concentration of employment among microenterprises (8 percentage points) and low-productivity sectors (10 percentage points).

Although it is not surprising to find that average output per worker is lower in the informal sector than the formal sector, the lower efficiency in resource allocation within this sector is, to some extent, counterintuitive. Given the nature of this sector, efficiency in resource allocation within the sector does not appear to be restricted by the type of regulations that frequently limit the mobility of employment and capital in the formal sector. Other restrictions must explain the results presented in Graphs 2.12 and 2.13. For example, informal firms' use of low-scale production methods and their location being more distant from enforcement authorities, which are more frequent in agriculture and commerce, are characteristics that might be more difficult to transfer to other informal activities.<sup>41</sup> Similarly, for informal microenterprises that are potentially very productive, it may be very difficult to grow in size and at the same time remain informal.

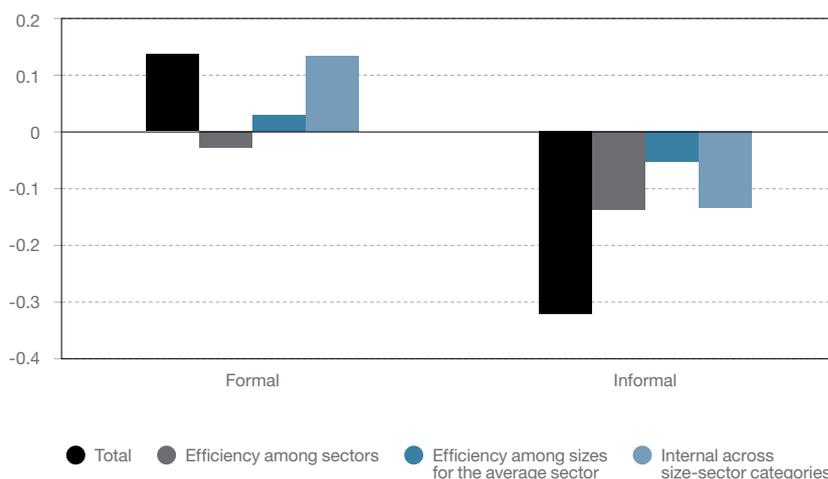
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39. More specifically, we use the residuals of the salary in logarithms after controlling for individual characteristics. Residuals are allowed to vary by firm size, sector, and whether formal or informal. The reference group is formal workers in the agricultural sector.

40. In particular, the components of equation 3 in Text box 2.1 are calculated, redefining subindex  $i$  as an indicator of firm size and fraction  $s$  as the participation of the respective firm size category in the total employment in the sector  $S$  (for example: informal agriculture).

41. Lagakos (2016) shows that the low productivity of retail sales in an extensive group of developing countries compared to the United States reflects composition effects: in the developing world, this sector is much more highly concentrated among small stores. His analysis shows that this composition may be due to the ease with which these types of stores can avoid the costs of formality.

**Graph 2.12** Decomposition of output per worker in Latin America for formal and informal sectors



If we could transfer all the employment from the informal to the formal sector without altering their productivity, aggregate labor productivity would increase by about 30%.

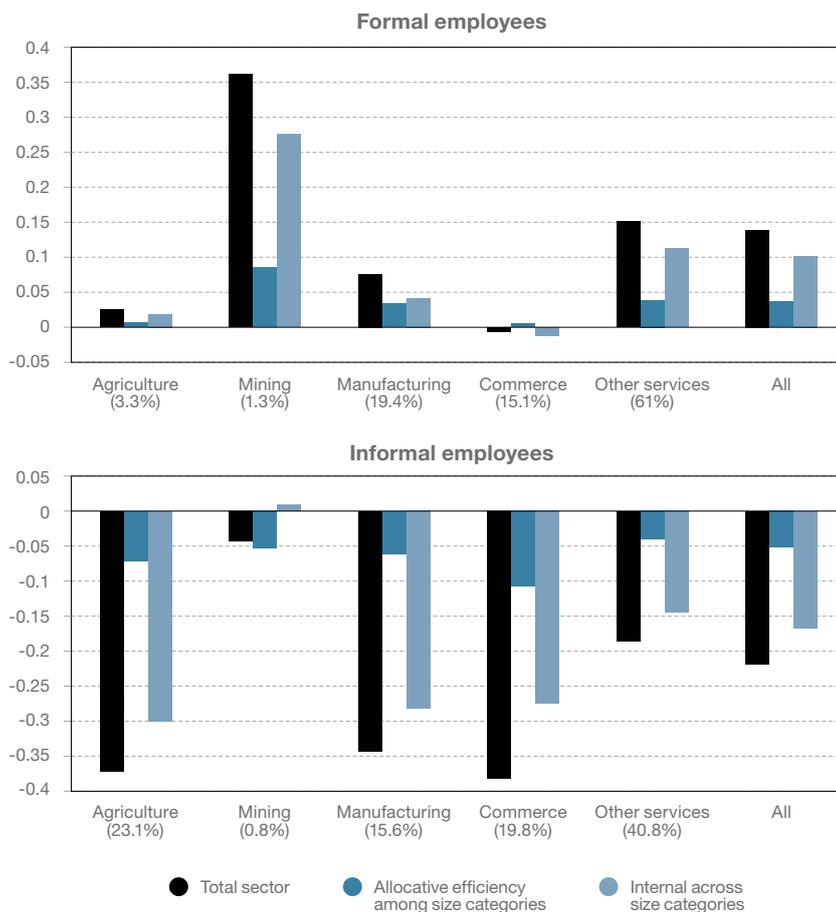
Note: The graph reports an indicator for output per worker for formal and informal sectors, and its breakdown into the following components for salaried employees in Latin America: size-sector internal productivity, allocative efficiency among establishment sizes in the average sector, and allocative efficiency among productive sectors. Output per worker is the average residual wage resulting from a regression of the logarithm of wage, controlling for employee characteristics and productive sector. Three firm-size categories are used (up to 9 employees, 10-99 employees, and 100 or more employees) and five productive sectors (agriculture, commerce, manufacturing, mining, and other services). The countries included are Argentina, Bolivia, Colombia, Guatemala, El Salvador, Honduras, Mexico, Paraguay, Peru, and Uruguay. Formal-sector employees are considered to be those with the right to a pension. The data is pooled from 2011 to 2015.

Source: Produced by the author based on CEDLAS (2018).

Despite the enormous gap in labor productivity between the formal and informal sectors, more than half of salaried employees in Latin America work in the informal sector (compared to the available estimate of approximately 20% in the United States, which in fact considers a more demanding definition of formality). This implies that the efficiency in resource allocation between these two sectors reduces the labor productivity of the economy as a whole by a considerable magnitude. From an accounting perspective, if all informal sector employment were reallocated to the formal sector without altering the formal sector's productivity, aggregate labor productivity would increase by approximately 30%.<sup>42</sup> Of course, this estimate does not consider the fact that some informal salaried employees are not well suited for the formal sector. Nevertheless, the estimates do illustrate the strong connection between informality and low productivity in Latin America.

42. An aggregate productivity of -0.1 is obtained by averaging the productivity of the formal and informal sectors in Graph 2.12, weighting each sector by its employment share. This aggregate productivity would be 0.136 if the informal sector were eliminated.

**Graph 2.13** Decomposition of salaried labor productivity in Latin America, by sector and formality status



Note: The graph reports an output per worker indicator for formal and informal-sector employees by productive sector, and its breakdown into the internal component and allocative efficiency among firm-size categories. The data in parentheses indicate the percentage of employees accounted for by each sector. The output per worker indicator is the average residual wage resulting from a regression of the logarithm of wage, controlling for employee characteristics and productive sector. Three firm-size categories are used (up to 9, 10-99, and 100 or more employees). Formal-sector employees are considered to be those with the right to a pension. The countries included are Argentina, Bolivia, Colombia, El Salvador, Guatemala, Honduras, Mexico, Paraguay, Peru, and Uruguay. The data is pooled from 2011 to 2015. The following ISIC sectors are excluded: 2, 5, 6, 16, and 17.

Source: Produced by the author based on CEDLAS (2018).

The link between informality and low productivity is a two-way street. On the one hand, informal establishments are frequently unable to serve demanding clients who would require high standards in production, because such clients usually require the support of a contract or invoice; they cannot access business loans or government training programs; and they cannot grow to a size that would put them on the radar of tax inspection authorities, which discourages certain investments in productivity tied to firm growth. On the other hand, many

resources are trapped in the informal sector because their productivity is so low that it does not compensate for the remuneration that would have to be paid in the formal sector. If productivity in the region is a child with growing pains, informality is a backpack full of heavy old manuals. At the same time, the texts are dated and burdensome, instead of modern and instructive, largely because the region is already engulfed in an environment of low productivity, which makes it difficult for it to access more useful, modern, and sophisticated knowledge.

## Final considerations

Taken as a whole, the calculations and analyses presented in this chapter indicate that the enormous productivity gap between Latin American countries and the United States reflects the combination of two main factors, both quantitatively significant. First, the average establishment in Latin America is much less efficient than its counterpart in the United States, seemingly in part due to the relative lack of “superstar” establishments. Second, within each sector, a large share of productive resources (labor and capital) are used in low-productivity establishments, in particular microenterprises and the informal sector. This is particularly salient in the commerce and agriculture sectors. In contrast, the region’s productive structure, defined in terms of the relative share of the different sectors of the economy, appears to be a relatively minor problem.

Informality is as much a symptom as a cause of low productivity, and it has harmful effects on other areas such as countries’ fiscal health and the coverage of the social security network. Being informality in part a cause of low productivity, public policies must focus on decisively reducing it. Even though in many Latin American countries this route will surely involve reducing the direct costs of formality, such as social security contributions, it also demands an important effort in strengthening state capacity. Capacity to monitor compliance with regulations associated with formality and to impose penalties for violations; capacity to manage the tax system preserving simplicity and transparency; capacity to provide high quality goods and services financed through taxes; and capacity not to squander these taxes through corruption.

Meanwhile, as a consequence of low productivity, the prevalence of informality in the region indicates the need to increase the productivity of individuals and firms. In terms of individuals, the coverage and, in particular, the quality and relevance of education –largely state-provided– is a promising front, in terms of not only primary and secondary education, but also vocational training and higher education.

Regarding productivity within firms, or equally, the productivity of an average firm, there are two groups of actions that naturally fall within the sphere of public policy. The first group includes the public promotion of investment in research and development (R&D), both to increase the efficiency of the production process and to create new products that increase the value that this process creates. This group encompasses

initiatives that promote access to financing for firms and projects, especially those with high potential for value creation, whose development is inefficiently restricted due to lack of access to funds. These include the direct financing of R&D with public resources and the provision of public-sector technical assistance for the improvement of processes or products, including those that disseminate information on international best practices. Chapter 6 explores some existing policy alternatives of this nature, and discusses the main challenges involved in their correct design and implementation.

The second group of public policy actions to improve the productivity of the average firm encompasses the protection of incentives for productivity investments and the efficient rotation of firms. This is probably the area where public policy has the most to offer, as nothing can replace the state in the protection of those incentives. Much of these incentives should be spontaneous: the search for profitability and competitive pressures should lead existing firms to innovate, new firms to enter the market, and those that are unable to increase their productivity to a competitive level to disappear. However, these mechanisms frequently fail for reasons that public policy can address. On the one hand, the protection of competition, both in the local market and through international trade, plays a fundamental role. On the other hand, it is crucial to address the obstacles created by public policy itself: the inefficiency of processes that firms must undertake with the state or on its behalf; the precarious provision of public goods that complement economic activity and that are key for firms' productivity; and regulations and policies which inadvertently encourage low levels of productivity. The first two obstacles again refer to the need to strengthen state capacities in Latin American countries. The final obstacle reminds us that many well-meant policies have harmful secondary effects on economies' efficiency, and that these contradictory effects must be carefully balanced when implementing a policy, or defining its duration and scope.<sup>43</sup> The following chapter discusses in detail the role that competition plays in increasing the productivity of the economy, and the existing tools to promote productivity on this front.

At the beginning of this chapter, a quote from the British physicist William Thomson (also known as Lord Kelvin) reminds us that it is difficult to improve what cannot be measured. This chapter provides a detailed measurement of the components of productivity in Latin America. Leveraging this effort, the rest of the report focuses on analyzing public policies to improve it.

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43. For example, some economists have found that establishments which invest in improving their productivity in Latin America do not grow as much as their investment should imply, while those that invest little achieve relatively high growth, despite their scant efforts in terms of productivity (Hsieh & Klenow, 2014, for Mexico; Eslava & Haltiwanger, 2018, for Colombia). Of course, this discourages investments in productivity improvements, as well as the efficient reallocation of labor and capital among establishments. The low returns on investments in productivity is partially explained by the existence of regulations and support programs designed to protect small establishments, or those at risk of collapse. Although such tools are appropriate in transitory circumstances (a recession, or the launch period of a firm), they may also contribute to perpetuating the existence of low-productivity firms, compromising the productivity of the economy as a whole. Therefore, the timeframe in which they are implemented should be limited, and their scope should be carefully focused.

# Appendix

## Firm-level microdata

The decomposition of productivity was implemented by Eslava, Hurtado, et al. (2018) using official microdata from different countries. These authors provide a detailed description of each data source and its processing. This appendix summarizes the main elements. For the non-microenterprise manufacturing sector, data from manufacturing surveys carried out by the respective statistics institutes in Chile, Colombia, and Mexico is used. In the cases of Chile and Colombia, these are non-microenterprise sector censuses that cover all establishments with 10 or more employees, or with fewer than 10 employees but production above a certain limit. In the case of Mexico, the survey covers microenterprises (firms with fewer than 10 employees), but these are excluded from the calculations reported; it also includes a change (in 2009) in the criteria with which the sample is designed. Its non-census nature means that the results for Mexico are less robust than those for Chile and Colombia, especially in relation to the allocative efficiency indicator, as the sample is not designed to capture adequately the correlations among variables in the population as a whole.

The information for Uruguay originates from the records of the Tax Administration Department (Eslava, Hurtado, et al., 2018). These only cover establishments that pay taxes, and report their employees to the social security system. Although results are only reported for establishments with 10 employees or more to improve comparability with data from other countries, the fact that this database does not include informal establishments (which are covered by the surveys in Chile, Colombia and Mexico), and the underreporting associated with tax statements, limits comparability.

With regard to the analysis in the section on service sector productivity, social security data is used for Argentina and Uruguay. The unit of observation is individual firms, defined as a tax unit. Although this data covers firms of all sizes, it has the problem that the veracity of the information is compromised because firms pay taxes in accordance with the data they provide. In Argentina, only salary measures, not production value measures, are available. Meanwhile, for Uruguay, given that the data are maintained by the Tax Administration Department, a sales measure is available. For Colombia, the Annual Service Survey is used, with similar characteristics to the Annual Manufacturing Survey, but only for some service subsectors, and with lower coverage of establishments with less than 50 employees. Further details are available in Eslava, Hurtado, et al. (2018).

## Decomposition of the manufacturing sector gap in its internal and external components

Taking an average of the three Latin American countries included in Table 2.2, the subsector external component adds 0.105 log points to the internal component. This is equivalent to saying that it increases the productivity of the sector by 11% (multiplying it by  $1.11 = e^{0.105}$ ). Similarly, in the United States this component multiplies productivity by 0.97. Meanwhile, the establishment external component for the average subsector multiplies productivity by 1.41 in Latin America and 1.66 in the United States.

As such, the component given by the productivity of the average establishment, known as the “internal” component, can be calculated from the following expression:

$$\frac{Total_{LA}}{Total_{US}} = 0.342 = \frac{Internal_{LA}}{Internal_{US}} \frac{1.41}{1.66} \frac{1.11}{0.97} .$$

The value of 0.342 for the ratio of output per worker in the manufacturing sector in Latin America compared to the United States corresponds to 2010, and is taken from Table 2.1. By calculating  $\frac{Internal_{LA}}{Internal_{US}}$  in the previous equation, we can verify that the internal component among Latin American establishments in the manufacturing sector is 35.4% of the value in the United States, that is:  $\frac{Internal_{LA}}{Internal_{US}} = 0.354$  .

This implies that the productivity ratio for the average manufacturing subsector is  $\frac{Total_{LA}}{Total_{US}} = 0.354 * \frac{1.41}{1.66} = 0.301$  and would reach 0.354 if the establishment external component were equal to that observed in the United States (the gap would fall from 0.699 to 0.646).

## Decomposition of the change in productivity of a subsector among periods

The change in total factor productivity  $P$  in a subsector  $S$  between two consecutive periods,  $(t - 1)$  and  $t$ , can be broken down in accordance with the following equation:

$$\begin{aligned} \Delta P_{St} = & \overline{\Delta P}_{St,cont} + \sum_{i \in st \& cont} [\Delta P_{iSt} (s_{iSt} - \bar{s}_{St}) + (P_{iSt-1} - \bar{P}_{St-1}) \Delta s_{iSt}] \\ & + \sum_{i \in st \& entry} s_{iSt} (P_{iSt} - \bar{P}_{St-1}) - \sum_{i \in st \& exit} s_{iSt-1} * (P_{iSt-1} - \bar{P}_{St-1}) \end{aligned}$$

where  $s_{iSt}$  refers to the share of employment used in establishment  $i$ , sector  $S$  and year  $t$ . The first term on the right-hand side of the equation is the average change in productivity in establishments present in both periods. The second term represents productivity gains through resource reallocation, whether because productivity growth is concentrated in establishments with greater market share, or due to previously more productive establishments achieving greater market share. The third and fourth terms capture productivity gains due to establishment turnover, which are positive if new establishments (or those that exit the market) are on average more productive (or less productive) than establishments in the previous period. Establishments that enter and exit the market affect both the productivity of the average establishment as well as the covariance between productivity and factor employment share.

**Table A 2.1** Components of manufacturing productivity, 2003-2007

	Excludes processing of basic non-ferrous metals				Includes processing of basic non-ferrous metals			
	Allocative efficiency among subsectors	Allocative efficiency among establishments	Internal component across establishments		Allocative efficiency among subsectors	Allocative efficiency among establishments	Internal component across establishments	
			No adjustments	Adjusted for PPP			No adjustments	Adjusted for PPP
<b>Output per worker</b>								
Chile	0.17	0.34	-1.30	-0.81	0.24	0.35	-1.25	-0.77
Colombia	0.02	0.42	-1.65	-0.91	0.02	0.42	-1.64	-0.90
Mexico	0.12	0.26	-1.27	-0.88	0.11	0.27	-1.26	-0.86
Uruguay <sup>a/</sup>	-0.02	0.18			-0.02	0.18		
United States <sup>b/c/</sup>	-0.03	0.51			-0.03	0.51		
<b>Wages as a proxy for output per worker</b>								
Argentina	0.02	0.25			0.02	0.25		
Chile	-0.07	0.22	-2.50	-2.01	-0.04	0.22	-2.48	-1.99
Colombia	-0.01	0.31	-2.52	-1.78	-0.02	0.31	-2.52	-1.77
Mexico	0.07	0.21	-2.35	-1.95	0.06	0.21	-2.35	-1.95
Uruguay <sup>a/</sup>	-0.06	0.15			-0.06	0.15		
United States <sup>b/</sup>	0.02				0.02			
<b>Total factor productivity</b>								
Chile	0.80	0.70	-0.62	-0.13	1.36	0.70	-0.59	-0.10
Colombia	0.58	0.66	-0.85	-0.11	0.58	0.65	-0.85	-0.10
Mexico	0.53	0.56	-0.77	-0.37	0.53	0.56	-0.76	-0.36
Uruguay <sup>a/</sup>	0.22	0.36			-0.06	0.15		
United States <sup>b/</sup>	0.35				0.35			

Note: The table shows three measures of productivity –output per worker, wages, and TFP– broken down into the following components: allocative efficiency among subsectors, allocative efficiency among establishments in the average subsector, and the internal component of the average establishment in the average subsector (both before and after adjusting for PPP). For TFP, allocative efficiency is calculated as the covariance between TFP and sales share (instead of employment). TFP is calculated with the assumption that the labor share in output is 0.7. All values are reported in logarithmic units, based on monetary values in thousands of 2014 dollars. The results are provided both including and excluding the processing of basic non-ferrous metals subsector, except for the United States, where its weight is minimal.

a/ The data for Uruguay is for the period from 2008-2012. Non-ferrous metal industry firms are not reported for Uruguay.

b/ For the United States, allocative efficiency among manufacturing subsectors is calculated using a similar procedure than that used for Latin America, and monetary values are expressed in the same unit (thousands of 2014 dollars), based on the National Bureau of Economic Research's manufacturing productivity database.

c/ Data on allocative efficiency among establishments within a subsector in the US is taken from Bartelsman, Haltiwanger, & Scarpetta (2009).

Source: Bartelsman, Haltiwanger, & Scarpetta (2009), and the productivity database produced by Bartelsman & Gray (1996) for the United States. The remaining data was obtained from Eslava, Hurtado, et al. (2018).

**Table A 2.2** Percentage of informal salaried employees by sector

	Latin America	United States <sup>a/</sup>
Manufacturing	45	
Commerce	57	
Other services	37	
Agriculture	80	
All sectors	53	20

Note: The table shows the Latin American average percentage of informal salaried employees by sector, and the approximate percentage of informal salaried employees in the United States manufacturing sector. The countries included in Latin America are Argentina, Bolivia, Colombia, El Salvador, Guatemala, Honduras, Mexico, Paraguay, Peru, and Uruguay. Informal salaried employees are considered to be those without the right to a pension.

a/ In a survey carried out by the United States Federal Reserve Board (Robles & McGee, 2016) 36% of salaried employees said that they worked in the informal sector, of which 56% also had parallel formal-sector jobs.

**Source:** Produced by the author based on CEDLAS (2018) for Latin America, and Robles & McGee (2016) for the United States.

**Table A 2.3** Country codes

Code	Country
ARG	Argentina
BOL	Bolivia
BRA	Brazil
CHL	Chile
COL	Colombia
CRI	Costa Rica
MEX	Mexico
PER	Peru
ESP	Spain
USA	United States

Note: Based on 3-character ISO codes.





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# Fostering competition

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## Chapter 3



## Chapter 3

# Fostering competition<sup>1</sup>

*“The best of all monopoly profits is a quiet life”.*

John Hicks

As Chapter 2 shows, the low productivity observed in Latin America is due to both low firm productivity and poor resource allocation within sectors. This chapter studies to what extent competition –or lack of it thereof– explains these phenomena.

Competition keeps firms in a continuous search for efficiency, encouraging them to offer better products at lower prices. In a competitive context this is how companies can survive and prosper. Thus, competition fosters innovation and encourages productive resources to be used and allocated more efficiently.

Unfortunately, there are many reasons why markets can lose competitive pressure, including market failures, problems in the regulatory and legal frameworks, and corruption. This implies that governments and, more generally, state institutions have an important role in supervising and protecting competition. Without constant vigilance, competition may fall due to, for example, the emergence of leading firms with monopolistic power, collusive agreements or the establishment of entry barriers by existing firms.

The chapter begins by describing the most relevant economic mechanisms that link competition to productivity, as well as the related empirical evidence. We particularly analyze how competition affects the allocation of resources, as well as the selection of firms that operate in the market (i.e. entry and exit). We also study the channels through which competition changes the incentives that determine innovation and efficiency within a firm.

In the second section, we study to what extent the lack of competition in product markets prevails in Latin American countries. To this end, we analyze indicators of both entry barriers and markups. Entry barrier indicators reveal how exposed the existing firms are to the entry of new producers. Markups, or price margins over costs of production, indicate the degree of profitability in a market or sector: the lower the competition, the higher the observed markup. These indicators suggest that overall the region has low levels of competition, especially in the service sector.

In the third section, we explore how the lack of competition in Latin America relates to the low levels of productivity in the region. Specifically, we present novel empirical evidence on the relationship between competition and productivity focusing on Latin America. The results do not only confirm both theoretical and

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1. This chapter was authored by Manuel Toledo, with research assistance from Ana M. Teresa Morales.

**The slow productivity growth in Latin America is linked to its low levels of competition, mainly through its link to low productivity gains within firms.**

empirical literature findings, but also indicate that increased competition can have a substantial impact on productivity via better resource allocation within sectors. Also, they indicate that the slow productivity growth in the region is associated with low levels of competition and that it is mostly explained by low productivity gains within firms and, second, by the sluggish reallocation of factors of production among them over time.

The last section focuses on three aspects of public policies that are very relevant for the region. We begin by analyzing the role played by institutions and competition policies. In this regard, Latin America as a whole clearly lags behind more developed countries, although there are also large differences among countries. In terms of policy, countries in the region, to a greater or lesser extent, must strengthen both the policies and the institutions that protect competition.

Next, we discuss international trade as a key determinant of domestic competition. We review several experiences of trade liberalization in Latin America from the late 70s to the early 90s. This period was marked by a widespread opening to trade throughout the region characterized by a substantial reduction of trade barriers, especially tariffs. Evidence shows that these trade reforms were associated with significant productivity gains.

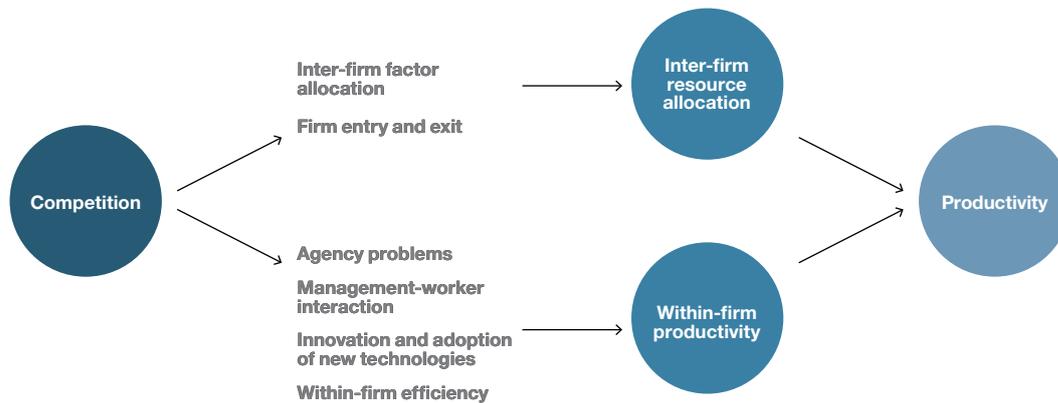
The most recent analysis of the evolution of tariffs in Latin American reveals that they have dropped in the last 20 years; however, there are large differences among countries in this regard. In general, countries in the region display higher barriers to trade than developed countries. This opens the door to further trade reforms aimed to reduce not only tariffs, but also non-tariff barriers. Regional integration can prove key to achieving both objectives.

Finally, we focus on innovation policies. Because of its adverse effects on competition, we pay special attention to intellectual property protection policies (e.g. patents). Empirical evidence shows that patents have very little or no impact on innovation and productivity growth. On the contrary, highly competitive environments are fertile ground for innovative activity. Thus, measures to protect competition should be a crucial part of innovation politics.

## Conceptual framework

Abundant academic literature, both theoretical and empirical, studies the impact of competition on productivity. What are the main channels through which competition affects productivity?

From a broad perspective, these channels can be classified into two types: those that act through the allocation of resources among firms, and those that directly affect firm productivity. The first type encompasses not only the allocation of factors of production among firms, but also the process of entry and exit of firms in a market which determines the firms that actually operate. The second type of channels includes efficiency within firms and innovation.

**Figure 3.1** Competition and productivity: Main channels

Source: Produced by the author.

Regarding the resource allocation channel, microeconomic theory suggests that anticompetitive practices lead to an inefficient allocation, which translates into lower productivity levels.<sup>2</sup> Empirical evidence supports this prediction. For example, industries with higher barriers to product substitution,<sup>3</sup> which reduce competition among producers, exhibit a worse allocation of resources and lower productivity (Syverson, 2004a, 2004b). This is because the restrictions that consumers face to switch among producers prevent more efficient companies from attracting the demand of their less efficient rivals. A similar argument applies to other forms of imperfect competition, among them, collusion. Cartelized industries suffer significant productivity losses due to the inefficient allocation of resources associated with the distribution of market shares among cartel members.<sup>4</sup>

In addition, barriers to competition allow low productivity firms to survive and even thrive in the market. In more competitive markets, however, these firms would not be able to produce at the same scale or they would find it more difficult to continue operating without incurring losses. Hence, an increase in competition leads to a resource reallocation process in which the most productive firms grow at the expense of the least productive ones. The latter could even be forced to exit the market and be replaced by more productive firms. This process results in an increase in aggregate productivity.

2. Technically, the loss in productivity is due to the fact that market power introduces distortions that generate differences both in markups and in marginal productivities among businesses (Peters, 2013).

3. Barriers to substitution can arise through product differentiation, be it spatial, physical, or as an effect of the brand.

4. This is shown by the evidence presented by Asker, Collard-Wexler, & De Loecker (2017), Bridgman, Qi, & Schmitz (2015), Singer (2014) and Monke, Pearson, & Silva-Carvalho (1987), Rucker, Thuman, & Sumner (1995); even though they also find productivity losses associated to the granting of fees, they are deemed to be small.

**An increased level of competition promotes better managerial practices. This is a key mechanism that accounts for the positive association between competition and productivity.**

Regarding the within-firm productivity channel, first of all, competition can affect their productive efficiency, also known as “X-efficiency”. We say that a firm suffers from “productive inefficiency” when profits are lower than the maximum it would earn if it minimized costs. In other words, a firm is inefficient if it is not producing everything it can with the resources at its disposal. The key question is how the level of competition can have an impact on the effort a company makes to achieve this goal. Are firms not supposed to always seek maximum efficiency regardless of the level of competition? The issue is that workers, managers, and owners of a particular firm sometimes have different objectives. Competition can facilitate the alignment of these objectives in pursuit of productive efficiency. In contrast, market power can distort the incentive structure within a company and trigger inefficiencies through various sources.

A first source of productive inefficiency is the “agency problem” between owners and the manager (or management). This problem arises because the manager’s actions, in particular his effort, are not directly observable, so the owners must provide adequate incentives for the manager to exert the optimum effort level. Although the main theoretical works in the subject show that more competition does not necessarily improve managerial performance (see, for example, Hart, 1983 and Scharfstein, 1988),<sup>5</sup> the available empirical evidence shows positive effects (Bloom & Van Reenen, 2010).

Other works suggest that firms not only adopt better managerial practices when they face greater competitive pressures, but that this is a key mechanism that explains the positive relationship between competition and productivity (see Nickel, Wadhvani, & Wall, 1992; Nickell, 1996; Hay & Lui, 1997; Van Reenen, 2011). Griffith (2001) and Rogers (2004) illustrate this effect very clearly, estimating the differential effect of the change in the level of competition on productivity in the presence of agency problems within firms. The authors find that an increase in competition leads to an increase in productivity only in firms where management and ownership are separated, that is, those with a principal-agent structure.

A second source of productive inefficiency may be the interaction between workers and firms. The literature highlights the role of union-imposed work regulations.<sup>6</sup> Theory predicts that low competition in an industry leads to more restrictive work practices and to a drop in productivity (Haskel, 1991; Bridgman, 2015). These restrictive practices aim to appropriate part of the rents associated with market power by increasing wages and employment, and tend to reduce work effort and to limit how efficiently workers can be used. The empirical evidence effectively points to the fact that more competition encourages the adoption of better –or less restrictive– work practices. Also, case studies of industries that have been subject to a significant increase in

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5. Other works that study how agency problems affect the relationship between competition and productivity are: Holmstrom (1982), Willig (1987), Hermalin (1992), Martin (1993), Vickers (1995), Meyer & Vickers (1997), Schmidt (1997), and Graziano & Parigi (1998).

6. See, for example, Killingsworth (1962), Parente & Prescott (2000), Holmes & Schmitz (2001), Galdon-Sanchez & Schmitz (2002), among others.

competition show that the elimination of restrictive work practices has led to significant productivity gains.<sup>7</sup>

Likewise, the tension between management and union objectives, which can be exacerbated by the firm's market power, could delay or prevent decisions at the managerial level. For example, in low-competition markets, where unions tend to increase their demand for better working conditions, the introduction of organizational changes that seek to reduce costs could encounter resistance from unions. This could lead to delays in the adoption of new and better organizational practices that would allow the firm to increase productivity. In competitive markets, however, such a delay could make the firm go into bankruptcy and, consequently, workers offer less resistance to the adoption of new practices.

Second, competition can also have an impact on firm productivity through innovation and the adoption of new technologies. From a theoretical point of view, however, competition can have both positive and negative effects on innovation.

On the one hand, the dominant position of a firm, when not threatened, can be a disincentive to innovation. This is the case of sectors where there are high entry costs or high levels of protection. Additionally, if the adoption of new technologies is disruptive for the firm's productive process, and is consequently accompanied by a transitory reduction in production, then the cost of adoption is higher the higher the firm's market power. This is because the opportunity cost of reducing production increases when the rents associated with such market power also increase. This implies that monopolistic sectors tend to innovate less (Holmes, Levine, & Schmitz, 2012).

Another effect that goes in the same direction is the "escape-competition effect" (Aghion, Harris, & Vickers, 1997). Higher competition reduces pre-innovation revenue and incentivizes innovative activity because, if successful, it allows firms to evade competitors and to obtain higher post-innovation revenues, at least temporarily. A similar effect can be seen regarding the degree of product substitutability among goods, which is associated with the level of competition (Vives, 2008). Specifically, as the degree of product substitutability rises, and therefore competition among varieties increases, firms have more incentives to invest in cost-reducing innovations. This is because when a product variety has closer substitutes, a reduction of unit costs and, therefore, of its price leads to higher profits because that allows the producer to gain a larger market share.

On the other hand, an effect of competition that goes in the opposite direction is the so-called "Schumpeterian effect". In simple terms, higher competition reduces the post-innovation revenues and, consequently, incentives to innovate are lower because the return on investment is lower. This is the main argument that justifies an intellectual property protection system like patents and copyright, which shall be discussed later in the chapter.

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7. Hoerr (1988), Schmitz (2005), and Dunne, Kilmek, & Schmitz (2016). For the case of Argentina, although not related with changes in the level of competition in the product market, Lamarche (2013) shows evidence that suggests that the reform of the industry-wide collective bargaining system in the 1990s lead to less restrictive work practices and to an increase in productivity.

### Low competition tends to reduce innovation.

Which of these effects dominates? Most of the many empirical works that address this question show that lack of competition tends to reduce innovation.<sup>8</sup> For example, Blundell, Griffith, and Van Reenen (1999), with company-level data from the United Kingdom, found that industries that are less competitive in terms of lower import penetration and higher levels of market concentration innovate less. This is consistent with Geroski (1990) who, based on innovation data at the industry level also from the United Kingdom, rejects the hypothesis that market power fosters innovative activity. Griffith, Harrison, and Simpson (2010) show that the reforms carried out within the framework of the European single market program in the early 1990's, which included the reduction of non-tariff barriers and trade liberalization, had a positive effect on competition in the product market, which in turn stimulated innovation and productivity growth. Based on data on the number of industrial patents in the United States, Boldrin, Allamand, Levine, and Ornaghi (2011) and Correa and Ornaghi (2011) also find a positive relationship between competition and innovation. Finally, in a recent work for Colombia, Pinzon (2018) comes to a similar conclusion.<sup>9</sup>

Another recent study that analyzes the relationship between institutions, innovation and economic growth finds that institutions that limit the influence of certain groups, strengthen property rights, increase contract compliance, reduce corruption and, in general, tend to balance opportunities for access to knowledge, also foster innovation diffusion and economic growth (d'Agostino & Scarlato, 2018). If these types of institutions are associated with more competitive product markets, then having better institutions not only encourages innovation, via greater competition, but also stimulates knowledge diffusion, which amplifies the positive effect of innovation on productivity.

In summary, there is ample evidence that higher levels of competition are related with productivity gains, due to both a better allocation of resources (including the exit of low productivity firms) and higher productivity within firms (due to improvements in productive efficiency and higher levels of innovation). With this in mind, the next section explores how competitive product markets are in the region.

## Competition in Latin America

Unfortunately, Latin America is characterized by low levels of competition in its product markets. Several data and indicators, both subjective and objective, show an important problem of lack of competition in Latin American economies.

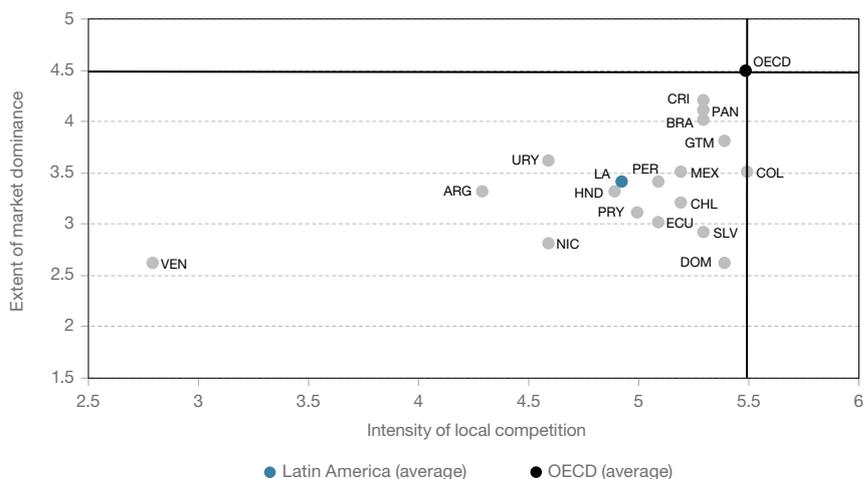
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8. Two opposite results are shown by Aghion, Bloom, Blundell, Griffith, & Howitt (2005) and Hashmi (2013). The first authors find evidence of a non-linear, inverted U relationship between competition and innovation. This means that starting from low levels of competition, the rise of competition would bring an increase on innovation. After a certain level of competition, more competitive pressure disincentives innovation. Hasmi, on the other hand, presents evidence of a weak negative relationship between competition and innovation. He labels it as weak because one can only observe a negative relationship for very low levels of competition while there is no relationship for the rest of the range of competition levels.

9. Correa (2012) also provides evidence for an increasing relationship between competition and innovation using the same data as Aghion, Bloom, Blundell, Griffith, & Howitt (2005), who found a relationship in the form of an inverted U as indicated in the previous footnote.

First, Graph 3.1 shows two subjective indicators that are part of the Global Competitiveness Index created by the World Economic Forum based on surveys to top business executives. These indicators reveal the perception that these executives have on the level of competition that their companies face in their respective local markets. The first indicator (horizontal axis) measures the intensity of competition while the second indicator (vertical axis) measures the degree of market dominance. In both cases, values closer to zero indicate low levels of competition. The graph shows these indicators for both Latin American countries and the OECD average for the period of 2016-2017. We observe that all Latin American countries in the sample appear below and to the left of the OECD average, which suggests that the region has lower levels of competition, or at least that's how executives perceive it.

**Graph 3.1** Perception of domestic competition levels in Latin America



Note: The values for each country are based on the following questions: In your country, how intense is the competition in local markets? (1 = not intense at all; 7 = extremely intense) and how would you describe corporate activity? (1 = dominated by a few business groups; 7 = distributed among many firms). The Latin American (LA) average includes the countries shown. The OECD does not include Chile and Mexico.

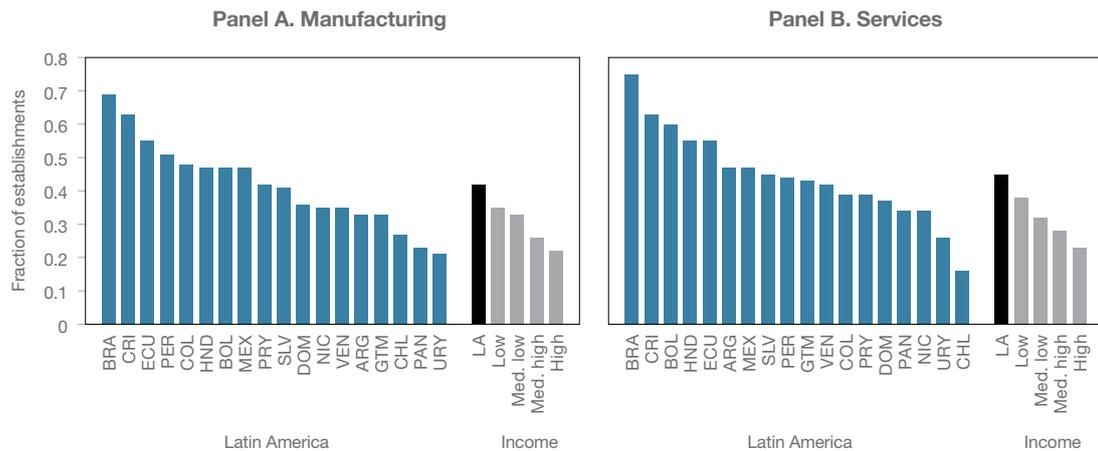
Source: Produced by the author based on data from the Global Competitiveness Index (WEF, 2017).

Second, Graph 3.2 presents indicators that measure barriers to competition, such as how expensive it is for a new firm to start operating, which constitutes another way to assess the level of competition in an economy.<sup>10</sup>

10. This approach was used by Djankov, La Porta, López-de-Silanes, & Shleifer (2002), who calculated the entry costs for 85 countries in terms of the number of procedures that are officially required for a firm to legally open and operate, and the time and costs associated with them. The data shows the average cost of entry for Latin America compared to other regions, revealing that in the late 1990s Latin America had the highest costs of entry in the world. On average, legally starting a business in the region costs 1.20% of its per capita GDP. In comparison, in Africa this cost was 1.18% of its per capita GDP, while for Asia, non-OECD European countries and OECD countries, these figures were 0.59%, 0.48% and 0.32%, respectively.

In particular, based on the data from the World Bank Enterprise Survey (WBES) for the period of 2006-2017, the graph shows the fraction of firms in the manufacturing (panel A) and services (panel B) sector which consider that permits and licenses are a moderate to very severe obstacle to their operation and growth, both for Latin American countries as well as for other regions on average. The first thing to notice is that Latin America seems to put more obstacles to competition in the form of permits and licenses than other countries, regardless of their income level, although this varies greatly within the region. On the one hand, in Brazil and Costa Rica around 72% and 63% of firms respectively consider that this obstacle is important. By contrast, in Chile and Uruguay less than 22% and 24% of firms respectively declare that this is a problem.

**Graph 3.2** Entry barriers: Permits and licenses (2006-2017)



Note: The values represent the fraction of establishments that consider "permits and licenses" a moderate to very severe obstacle to operate in the market. Simple averages of the information available for each country between 2006-2017 are shown. The Latin American (LA) average is based on the countries shown. Countries' income classification is due to the World Bank.

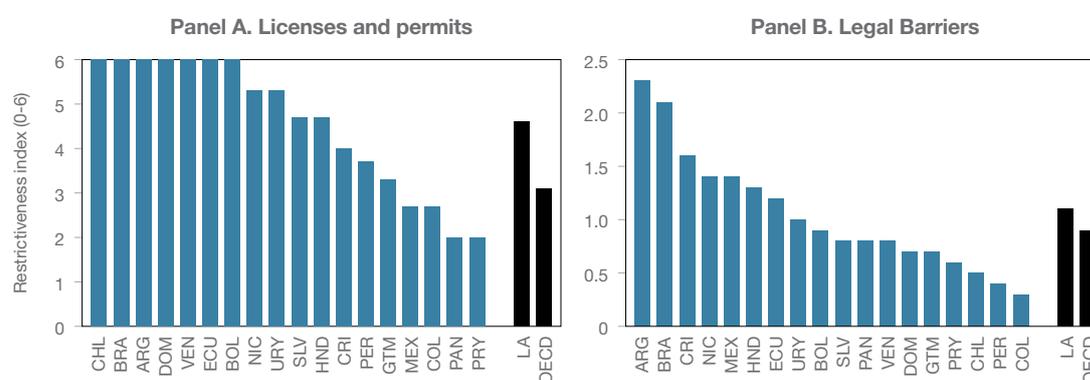
Source: Produced by the author based on data from Enterprise Surveys (World Bank, 2017b).

Third, Graph 3.3 shows two indexes that are part of another set of indicators developed by the OECD (2013a) to assess how restrictive entry barriers are in Latin American countries.<sup>11</sup> Unlike those previously presented, these indicators do not depend on the subjective appreciation of businesspeople but rather on a set of objective data on laws and regulations. Thus, they reflect *de jure* aspects of the regulatory framework. The first indicator (panel A) measures the ease of obtaining licenses and permits through the use of "one-stop shops" and the application of the "silence is consent" principle

11. These indicators are part of the product market regulation index that the OECD constructs.

for issuing licenses and accepting notifications. The second indicator (panel B) measures how pervasive are legal barriers to entry that explicitly limit the number of competitors. The graph shows the values of these indicators for countries in the region as well as for the averages of Latin America and the OECD. Latin America is below OECD standards in both aspects, especially regarding licenses and permits (consistent with the perception of businesspeople reflected in Graph 3.2).

**Graph 3.3** Entry barriers in Latin America



Note: Each panel displays an index with values between 0 and 6 from least to most restrictive. The indicator in panel A measures the ability to obtain licenses and permits from government offices through the use of "one-stop shops" and the application of the "silence is consent" or "tacit consent" principle. The indicator on panel B measures the prevalence of legal entry barriers that explicitly limit the number of competitors. The Latin American (LA) average is based on the countries shown. The OECD does not include Chile nor Mexico.

Source: Produced by the author based on data from Product Market Regulation Indicators (OECD, 2013a).

Fourth, Table 3.1 shows data on markups as a measure of market power. Theoretically, in a highly competitive market price tends to equal the marginal cost and, therefore, markups should be low.<sup>12</sup> The main difficulty with using this indicator is that costs, particularly the marginal cost, are not observable and, therefore, make it impossible to calculate markups. Despite this, there are indirect measurements such as those proposed by Hall (1988), Roeger (1995), and, more recently, De Loecker and Warzynski (2012). Table 3.1 summarizes estimates made by different studies for manufacturing sectors in Chile and Colombia as well as in the United States and the Euro Zone.<sup>13</sup> As the table shows, markups in the manufacturing sectors of Chile and Colombia are higher than those of developed countries, which suggest that firms in these two Latin American countries on average enjoy greater market power.

12. The marginal cost is defined as the cost of producing an additional unit of the good.

13. Lamorgese, Linarello, & Warzynski (2015) for Chile, Tortarolo & Zarate (2018) for Colombia, and Christopoulou & Vermeulen (2008) for the United States and the Euro Zone.

**Table 3.1** Price markups in manufacturing sectors

Sectors	Chile	Colombia	United States	Euro Zone
Food and drink	1.53	1.83	1.19	1.11
Tobacco products	-	-	1.51	1.41
Textile	1.58	1.62	1.10	1.16
Clothing	1.62	1.68	1.21	1.16
Leather	1.63	1.75	1.36	1.17
Timber production	1.50	1.68	1.24	1.21
Paper and paper products	1.62	2.01	1.28	1.24
Publishing, printing and media	1.54	1.98	1.39	1.20
Coke, petroleum	1.32	-	1.09	1.19
Chemicals	1.88	-	1.32	1.16
Rubber and plastic	1.64	1.72	1.26	1.15
Non-metallic mineral products	1.57		1.37	1.20
Base metals	1.56	1.82	1.20	1.27
Metal products	1.53	1.76	1.29	1.19
Machinery and equipment	1.60	1.79	1.28	1.15
Office, accounting and computing machinery	-	-	1.17	1.20
Electrical machinery and appliances	1.53	1.82	1.15	1.17
Radio, television, and communications equipment	-	-	1.37	1.18
Medical instruments; clocks	1.87	1.66	1.51	1.22
Motor vehicles	1.57	1.78	0.89	1.11
Other transport equipment	1.41	1.75	1.36	1.12
Furniture; manufacturing industries n.e.c.	1.55	1.77	1.26	1.15
All sectors	1.58	1.78	1.26	1.19

Note: For Colombia, averages between 2002-2012 are shown. For Chile, averages between 2001-2007. For the United States and Euro Zone, averages between 1993 and 2004. The Euro Zone includes Austria, Belgium, Finland, France, Germany, Italy, Spain, and the Netherlands.

Source: Tortarolo & Zarate (2018) for Colombia; Lamorgese, Linarello, & Warzynski (2015) for Chile; Christopoulou & Vermeulen (2008) for the United States and Euro Zone.

Fifth, Graph 3.4 and Graph 3.5 show estimates of the Lerner index, which serves as another markup indicator.<sup>14</sup> The first estimate (Graph 3.4) is based on the INDSTAT 2 database from UNIDO (United Nations Industrial Developmental Organization), which includes information on 172 countries at the manufacturing sector level.<sup>15</sup> Panels A and B show the results for Latin America (and, as a reference, the OECD average) for the 1990-2000 and 2000-2015 periods, respectively.<sup>16</sup> As the

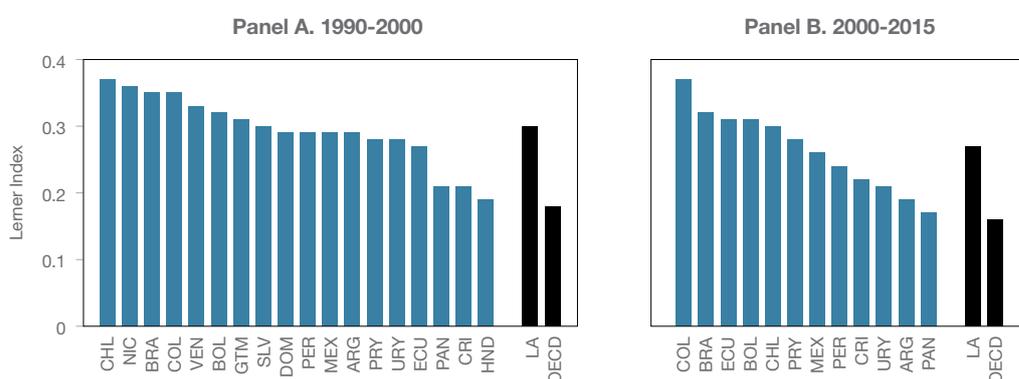
14. The Lerner index is defined as  $(P - CMg)/P$ , where  $P$  is the price and  $CMg$  represents the marginal cost. In the exercise presented, the quotient  $(VA - W)/PQ$  was calculated instead, where  $VA$  is the value added,  $W$  denotes the total of wages and salaries, and  $PQ$  represents the total sales. This is equivalent to calculating  $(P - CMe)/P$ , where  $P$  is the price and  $CMe$  represents the average or unit cost. In this way, the indicator can be interpreted as a markup or as a rate of return. In any case, a high indicator value is a sign of a low level of competition.

15. Sectors are presented at the 2-digit level according to the ISIC, Rev. 3 classification.

16. To obtain the value of each country, first a Lerner index approximation was calculated for each year and manufacturing sector. Afterwards, for each year, the average of this index among sectors was calculated, weighting by the size of the sector. Finally, given the index for each year, in each subperiod the simple average of the annual index was calculated. To obtain the index for a group of countries, the simple average among the corresponding countries was calculated.

graph shows, the markups in all Latin American countries approximated by the Lerner index are higher than the OECD average in both periods. The degree of competition in the region does not seem to have increased during the 2000-2015 period with respect to the 90s. This is consistent with the evidence presented above on entry barriers (see footnote 10).

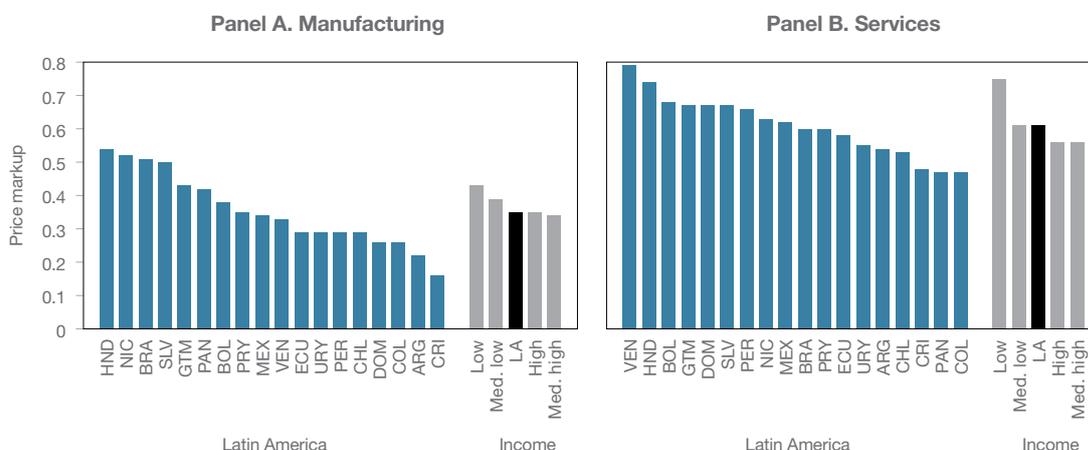
**Graph 3.4** Lerner Index: Manufacturing sector in Latin America and OECD



Note: Simple averages of information available for each country between 1990-2000 and 2000-2015 are shown. A high value means a low level of competition. The Latin American (LA) average is based on the countries shown. The OECD does not include Chile and Mexico.

Source: Produced by the author based on data from INDSTAT2 (UNIDO, 2017).

**Graph 3.5** Price markups: Latin America vs. other country groups (2006-2017)



Note: The average of Lerner Index estimates is shown for manufacturing and services sectors. Simple averages of information available for each country between 2006-2017 are shown. The Latin American (LA) average is based on the countries shown. Countries' income classification is due to the World Bank.

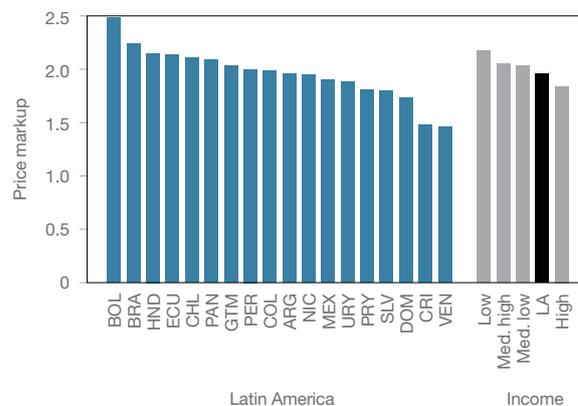
Source: Produced by the author based on data from Enterprise Surveys (World Bank, 2017b).

**On average, Latin America has relatively high price markups compared to middle- and high-income countries.**

The second estimate (Graph 3.5) is based on data from the WBES, which allows the Lerner index to be calculated for both the manufacturing and service sectors. The graph shows this indicator for Latin American countries and for the average of countries by income level.<sup>17</sup> Latin America has, on average, relatively high markups relative to the group of high and middle-high income countries.

Finally, Graph 3.6 shows the markup for the manufacturing sector calculated through the methodology of De Loecker and Warzynski (2012).<sup>18</sup> This indicator confirms that Latin America has higher markups than those observed in high-income countries.

**Graph 3.6** Price markup in manufacturing sector (2006-2017)



Note: The average of the price markup indicator for manufacturing sectors, calculated using the De Loecker & Warzynski (2012) method, is shown. The information available for each country between 2006-2017 is used. The Latin American (LA) average is based on the countries shown. Countries' income classification is due to the World Bank.

Source: Produced by the author based on data from Enterprise Surveys (World Bank, 2017b).

In short, the presented evidence suggests that Latin America has a problem of lack of competition in the product market. Indicators of different sources show that the region has high entry barriers that limit the competition at the domestic

17. To find the mark up of each sector (manufacturing and services) and country, we start from the markup at the firm level. For this, we use the elasticities of the production function estimated from the same Enterprise Survey, in addition to the information on total sales, expenses on intermediate supplies and labor costs that the survey provides for each firm. Before doing the calculation for each country, we discard extreme values of the entire sample. Afterwards, for each subsector (at the 3-digit level), country and year we discard cases with less than 5 observations, and for the remaining cases we obtain the median. Finally, we calculate markups for each country and sector, averaging across years and subsectors.

18. According to this methodology, the markup,  $\mu$ , can be calculated as the quotient between the production elasticity (net of intermediate supplies, that is, the added value) with respect to labor,  $\epsilon$ , and labor costs as a proportion of added value,  $W/VA$ . In perfectly competitive markets where companies are price takers, profit maximization implies that  $\epsilon = W/VA$  and, therefore,  $\mu = 1$ . With market power, these equalities are broken and we obtain that  $\mu > 1$ . The greater the market power, the higher the  $\mu$ . The intuition is that if labor is being paid below what the elasticity  $\epsilon$  dictates, then the firm is obtaining extraordinary economic benefits that are associated with non-competitive contexts.

level and that, also, it has higher markups than those observed in much of the rest of the world.

## Productivity and market power in Latin America

How does the lack of competition in Latin America affect its productivity levels? As it was previously described in the conceptual framework, competition can have an impact on productivity through various channels. The available empirical evidence shows that all these channels play an important part in Latin America.

This section examines particularly how competition affects the level of productivity within sectors through the degree of efficiency in the allocation of factors of production. It also explores how competition affects productivity growth through the reallocation of factors between existing firms and productivity growth within firms as well as firm entry and exit from the market.

To address these issues, both sector productivity and intra-sector competition data is needed. To this end, we use two data sources to measure these variables: the WBES from the 2006-2017 period, (already used above), and official microdata from Chile, Colombia, Mexico, and Uruguay (introduced in Chapter 2).

The WBES, in addition to allowing the calculation of markups as a measure of market power, provides an estimate of revenue total factor productivity (TFPR) at the firm level for the manufacturing sector, as well as data needed to infer total factor productivity in terms of physical units or quantities (also known as TFPQ).<sup>19</sup> Based on these firm-level measures of productivity, allocative efficiency within each sector can be measured through two methodologies.

First, the Olley-Pakes (OP) decomposition, mentioned in Chapter 2, allows sector productivity to be separated into two components: the average productivity of firms in the corresponding sector, and a term proportional to the sample covariance between productivity and firm size or its market share. This latter term captures allocative efficiency. The intuition is that the more factors are assigned to higher productivity firms, the higher the resulting covariance and, therefore, the productivity of the sector will also be higher.

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19. It is maybe necessary to explain the difference between TFPQ and TFPR. The first simply denotes how many physical units of a good a firm produces per unit of factor of production used, while the second represents the value of those physical units, that is, multiplied by the good's price. The TFPQ is obtained as the ratio between value added in physical units (Y) of a firm and a basket of inputs composed by capital and labor. With this purpose a production function is used, usually of the Cobb-Douglas type, with exponents  $\alpha$  and  $(1-\alpha)$  that represent the fraction of output that is destined to payments to capital and labor, respectively. The problem is that normally one does not have value added measured in physical (Y) units, but in monetary units instead (PY). Thus, this ratio can only be calculated by using the monetary value of the product, which is defined as TFPR. If one had access to prices by firm, then one could infer TFPQ, by dividing the TFPR by the price. Although this information is not available, the methodology of Hsieh & Klenow (2009) allows for an approximation of TFPQ from available information.

**Sectors with greater market concentration tend to have a worse factor allocation.**

Second, the intra-sector dispersion of TFPR also works as an indicator of allocative efficiency. Specifically, a higher dispersion is a symptom of a worse factor allocation within the sector. To understand this, it is useful to think of a distortion-free sector that produces efficiently. In this case, the price of each of the sector's goods is inversely proportional to the productivity of the firms that produce them. If within the textile sector, for example, the firms that produce T-shirts increase their productivity, then we should observe a drop in the relative price of T-shirts. This is because the higher the productivity of a firm, the more capital and labor should flow to those firms and, consequently, its production should increase. This higher supply should translate into a price drop, which tends to equalize the TFPR among the sector's firms. In contrast, with distortions, factors do not necessarily flow adequately to the most productive firms and, therefore, prices do not reflect the existing productivity differences between firms. That is, the presence of distortions weakens the negative price-productivity relationship, which implies a greater intrasectoral dispersion of TFPR.<sup>20</sup> Some of these distortions may come from a non-competitive market structure where the allocation of resources responds, to a large extent, to other factors, such as entry barriers and the type of strategic interaction among competing firms,<sup>21</sup> which result in inefficiencies.

With these indicators at hand, we carry out a regression analysis between market power and intra-sector allocative efficiency. Specifically, markups calculated using the methodology of De Loecker and Warzynski (2012) are used as a measure of market power. And four indicators of intrasectoral allocative efficiency are used: two terms of covariance of the OP decomposition (one that takes total sales as a measure of firm size and another that considers total labor costs) and two dispersion measures of TFPI (its standard deviation and the difference between the 90th and 10th percentiles). The exercise seeks to establish the degree of association among the variables once it is controlled by fixed effects related to sector, country, and year. Specifically, a linear regression is estimated for each of the four indicators of allocative efficiency as dependent variables, in which the markup is the relevant explanatory variable.<sup>22</sup> The sample of Latin American countries is used as well as all available countries.

Graph 3.7 shows the results, in particular, the regression coefficients associated to markups and the respective confidence intervals. In general, these results sustain the hypothesis that sectors with greater market power tend to have a worse factor allocation.

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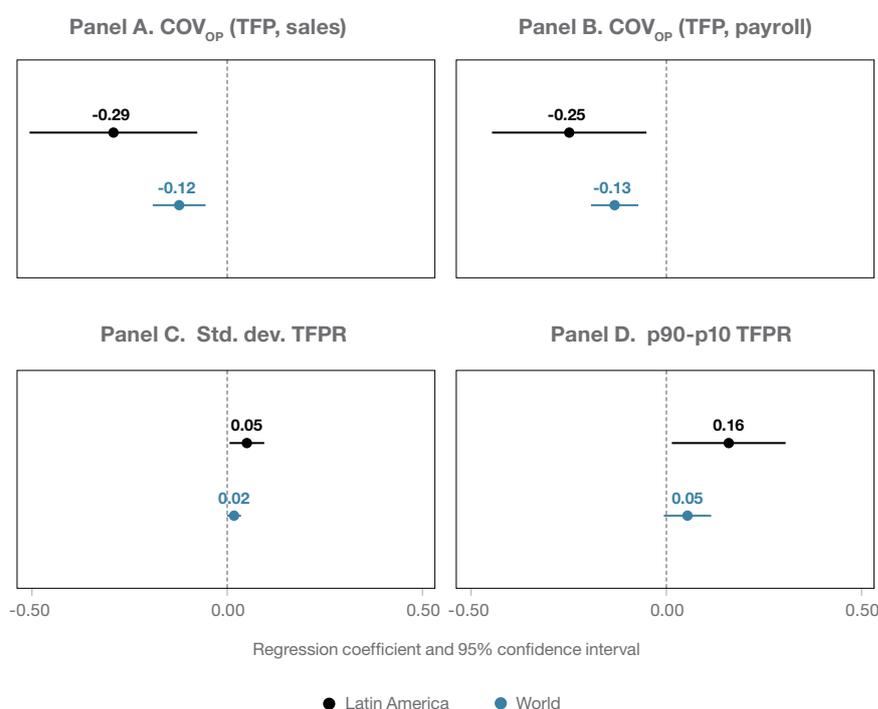
20. Hsieh & Klenow (2009) present a model with differentiated goods and monopolistic competition where the TFPR among firms is equalized in the absence of distortions.

21. In non-competitive markets, firms design business strategies that affect the decisions of the rest of the rival companies and vice versa. In this sense, firms interact strategically.

22. Specifically, the median markup is used at the firm level within each sector. The regressions also include the constant and fixed effects of the country-year and country-sector (2-digit aggregation) interactions. In addition, each observation corresponds to a sector, country and year. The sectors included in the sample are subsectors belonging to the manufacturing sector, at the 3-digit aggregation according to the ISIC Rev. 3.1 classification.

First, the two coefficients related to the OP covariance are negative and statistically different from zero, meaning a greater market power is associated to a lower productivity due to a worse allocation of intrasectoral factors. The magnitude of the coefficients for Latin America (-0.29 and 0.25) implies that a drop in the sectoral markups of the region by one standard deviation (0.76) would be associated with an approximate 20% increase in manufacturing productivity, only as a result of the intrasectoral factor reallocation.

**Graph 3.7** Allocative efficiency and market power: Latin America and the world



Note: Each panel shows, for two samples, ordinary least squares estimates of the coefficient for price markups, and its respective 95% confidence interval. The dependent variable in each regression is an alternative measure of intrasectoral allocative efficiency. The measurements are: covariances of the Olley-Pakes decomposition, TFPR standard deviation, and the difference between the TFPR 90 and 10 percentiles. The observation unit is a 3-digit sector from ISIC, Rev. 3.1, for each country and year. Each regression includes a constant, country-year interaction fixed effects, and country-sector interaction fixed effects at two digits. The samples include only manufacturing sectors and exclude sectors with less than five firms. Countries included in each region can be found in the Appendix.

**Source:** Produced by the author based on data from Enterprise Surveys (World Bank, 2017b).

Second, the TFPR dispersion indicators, both the standard deviation and the 90<sup>th</sup>-10<sup>th</sup> percentile difference, are positively related with the sectoral markup. In the case of Latin American countries both coefficients are significantly different from zero. These results confirm that the greater the market power, the greater the dispersion of firm's TFPR, and the worse the sectoral allocation of factors.

It is worthwhile to notice that the estimated coefficients for the sample of Latin American countries have a greater absolute value than the estimated coefficients for the entire sample of countries. This could suggest that the relationship between market power and allocative efficiency is not linear and, given the relatively high markups observed in Latin America, it could increase with market power. That is, in less competitive contexts such as the one observed in the region, changes in market power levels have a much stronger effect, on average, than in the rest of the world. The flip side of the coin is that the productivity gains that could be obtained from boosting competition in the region are substantial.

On the other hand, the sectoral data from surveys of manufacturing establishments in Chile, Colombia, Mexico and Uruguay allow for a similar analysis.<sup>23</sup> An important difference from this source relative to the WBES is that in this case only TFPR is available, not the TFPQ. Therefore, we only study the relationship between market power and TFPR dispersion with this data source. Another difference is that these data are available for multiple years, although with differences among countries: Chile 1995-2007, Colombia 1990-2012, Mexico 2003-2015, and Uruguay 2008-2015. The greater the number of observations per country makes it possible to replicate the analysis for each economy considered individually as well as for the set of four countries together.<sup>24</sup>

The results in Graph 3.8 show a positive and significant relationship between market power and TFPR dispersion (in its two variants), confirming the negative relationship between market power and allocative efficiency. Additionally, the result is robust among countries.

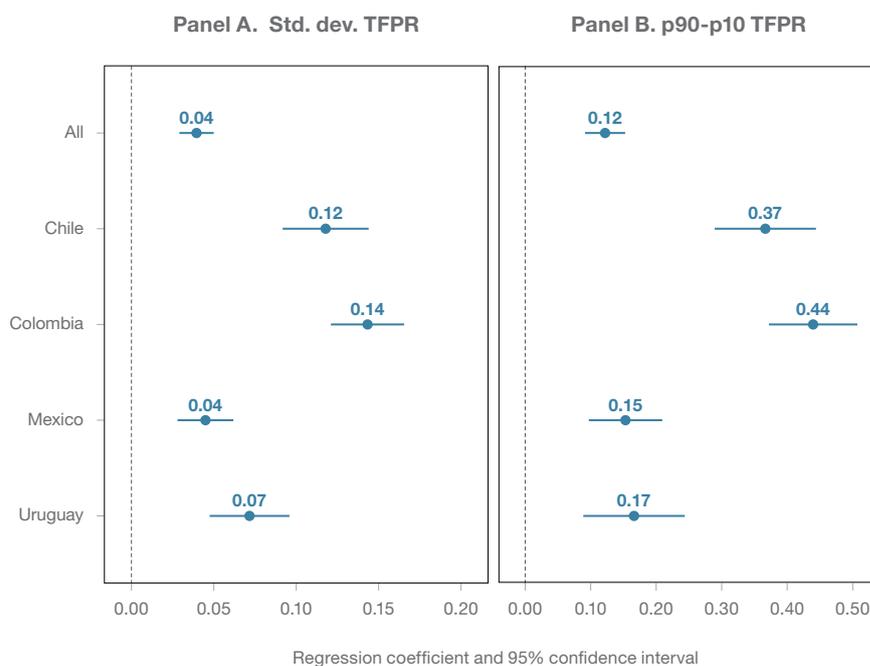
Given the longitudinal nature of this data, the problem can also be approached from a dynamic perspective, that is, how market power affects productivity growth. In particular, it explores the extent to which market power (measured through changes in markups) affects four components of productivity growth: the intrasectoral factor reallocation, the entry and exit of establishments, and the productivity gains within these establishments.<sup>25</sup>

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23. This analysis does not show causality, for which more information than is currently available would be needed. However, it does provide a simple way to present the relationship between these variables. Although it is possible that there is a third factor, different from market power, that simultaneously affects markups and allocation efficiency, the exercise presents sufficiently suggestive evidence about the sign and magnitude of the relationship.

24. An ordinary regression equation is estimated by OLS where the dependent variable is TFPR dispersion, and the explanatory variable of interest is the sector markup, which is calculated using the methodology of De Loecker & Warzynski (2012). For this, we use the median of the payroll as a proportion of the value added of the establishments in each sector. The output elasticity with respect to labor for each sector is taken from the WBES. In addition to the markup, each regression includes year and 2-digit sector fixed effects, and a constant. In the case of the joint sample, these fixed effect terms are interacted with the country fixed effect. Each observation corresponds to a 3-digit manufacturing sector (ISIC, Rev. 3.1) for a given country and year.

25. For the growth decomposition, we use the methodology of Foster, Haltiwanger, & Krizan (2006), as explained in the Appendix of Chapter 2.

**Graph 3.8** Allocative efficiency and market power: Selected countries

**An increased market power is linked to a lower contribution of factor reallocation to productivity growth.**

Note: Panel A shows the regression results when the dependent variable is the standard deviation of TFPR. Panel B uses the difference between the TFPR 90 and 10 percentiles as a dependent variable. The observation units are 3-digit ISIC, Rev. 3.1 manufacturing sectors. Each row shows the ordinary least square estimate of the coefficient associated with the sectoral price markup and its respective 95% confidence intervals for each country, as well as for the pooled sample that includes all countries (first row). Individual country regressions include year and 2-digit sector fixed effects; the pooled regression includes interacted country-year-sector fixed effects. All include a constant. Price markup observations with extreme values (outside the p1-p99 range) are excluded. Only establishments in the manufacturing sector with 10 or more employees are included.

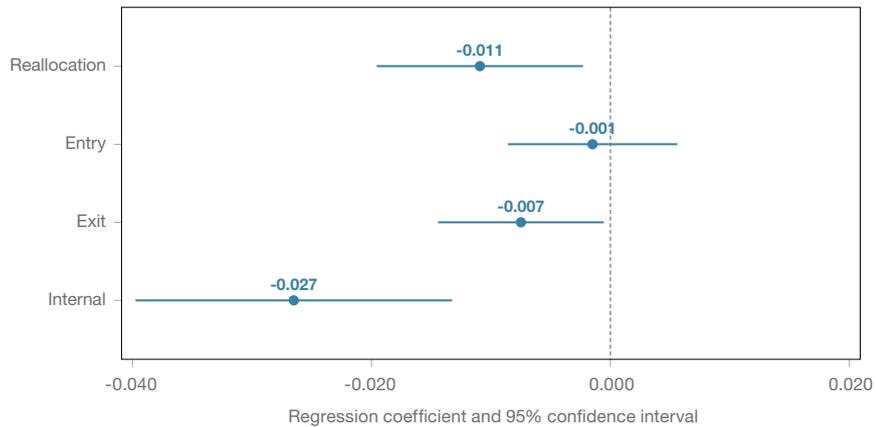
**Source:** Produced by the autor based on Encuesta Anual Manufacturera from Chile (1995-2007) and Colombia (1990-2012), Encuesta Industrial Anual (2005-2009) and Encuesta Anual para la Industria Mexicana (2009-2015) for México, and administrative records from Dirección General de Impuestos (2008-2015) from Uruguay.

Graph 3.9 shows the results of this exercise for the case of the linear regression with the joint sample of four countries. First, the coefficient corresponding to the reallocation component is negative and statistically significant, that is, an increase in market power is associated with a lower contribution of the reallocation effect on productivity growth. In particular, a drop in markups by one standard deviation (0.75) would result in an increase in the rate of productivity growth, via the reallocation effect, of 0.8 percentage points.

Second, the coefficients corresponding to firm selection (that is, entry and exit) are also negative, although the coefficient corresponding to entry is not statistically different from zero. This implies that an increase in market power is associated with lower productivity gains from the market exit of establishments, which occurs when less productive establishments exit.

**An increased market power is linked to lower productivity gains within establishments, this being the main factor explaining the low productivity growth.**

**Graph 3.9** Productivity growth and market power



Note: The graph displays the ordinary least square estimate of the coefficient associated with price markup, and its respective 95% confidence intervals. The dependent variable in each regression is a component of the Foster, Haltiwanger, & Krizan (2006) decomposition of the sectoral TFPR growth rate. These are, from top to bottom: the reallocation effect, the contribution of the establishments that enter and exit, and the internal component of existing establishments still in operation. The sample includes observations from Chile, Colombia, Mexico, and Uruguay. The observation units are 3-digit ISIC, Rev. 3.1 manufacturing sectors. Each regression includes a constant, country-year interaction fixed effects, and country-sector interaction fixed effects at two digits. Price markup observations with extreme values (outside the p1-p99 range) are excluded. Only establishments in the manufacturing sector with 10 or more employees are included.

**Source:** Produced by the autor based on Encuesta Anual Manufacturera from Chile (1995-2007) and Colombia (1990-2012), Encuesta Industrial Anual (2005-2009) and Encuesta Anual para la Industria Mexicana (2009-2015) for México, and administrative records from Dirección General de Impuestos (2008-2015) from Uruguay.

Finally, the coefficient corresponding to the internal component of productivity growth, which measures productivity gains within establishments, is negative and statistically significant. This implies that an increase in market power is associated with lower productivity growth rates through productivity gains within the establishment. The magnitude of this relationship is very strong: a drop in markups by one standard deviation is associated with an increase in the growth rate of productivity of 2 percentage points via this effect, which more than doubles the gains via the reallocation effect (0.8 percentage points). This result is consistent with evidence presented together with the conceptual framework and showed that more competition encourages innovation and productive efficiency from firms.

## Policies for competition

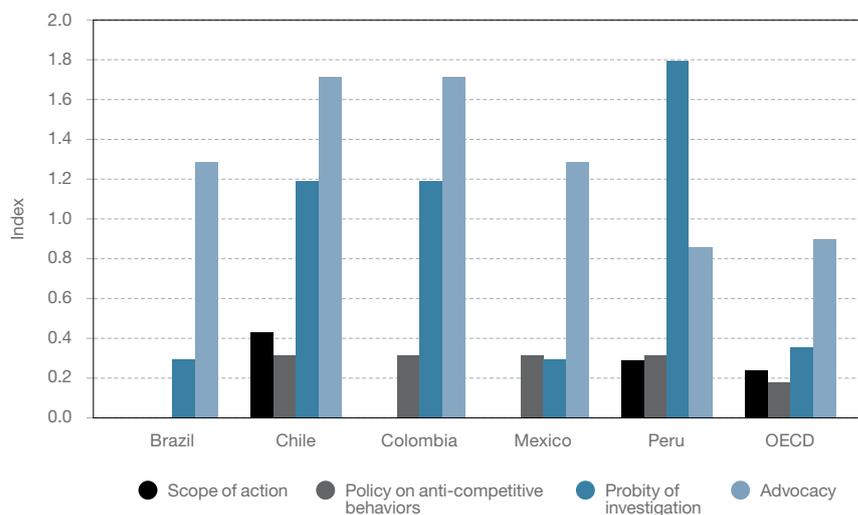
Having established the poor performance of Latin America in the competition indicators and the impact that this deficiency has on its productivity, it is time to discuss existing public policies and which could be improved or adopted to boost greater levels of competition in the product market. In particular, this section addresses competition and trade liberalization policies in the region. Additionally, due to its effect on competition, we discuss the role of policies for the protection of intellectual property within the framework of innovation promotion policies.

## Protection of competition

In recent years several Latin American countries have shown important advances in their institutions and competition policies. However, there is still much room to improve, as some indicators suggest.

First, Graph 3.10 shows indicators of the strength of competition policies and laws in five Latin American countries (Brazil, Chile, Colombia, Mexico, and Peru), built by the OECD in 2013. These indicators measure four aspects of competition policies and laws: i) their scope of action against anticompetitive practices; ii) whether they prohibit and how effective they are in sanctioning and blocking these practices; iii) the robustness of competition law enforcement investigations in terms of their transparency, independence and impartiality; and iv) the development of competition through activities other than the normal application of laws.<sup>26</sup> As one can observe in the graph, countries in the region show similar levels to those of the OECD in the first two indicators, because they have adopted, to a large extent, competition policies in line with what are considered good practices. However, they show a lag in the other two indicators, revealing deficiencies in both the application and the compliance with antitrust laws and in the ability of institutions to promote a more competitive environment. This suggests a gap with respect to the OECD in *de facto* (though not *de jure*) aspects of competition policies and laws.

**Graph 3.10** Competition law and policy indicators



Note: Indicators take values between 0 and 6, from most to least favorable for competition. Data corresponds to 2013. The OECD section excludes Chile and Mexico.

Source: Produced by the author based on data from OECD Competition Law and Policy Indicators (Alemani, Klein, Koske, Vitale, & Wanner, 2013).

26. Alemani, Klein, Koske, Vitale, & Wanner (2013) explain in greater detail these indicators.

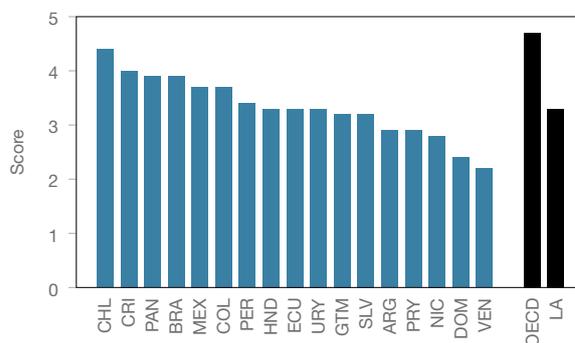
**Competition institutions and policies should be accompanied by sound economic of anticompetitive practices.**

In addition, the group of countries considered in Graph 3.10 is not representative of the entire region in terms of competition policies. These countries (together with Costa Rica and Panama) showed advances in the quality of their competition protection institutions and policies since the 2000s, after the first wave of pro-competition reforms in the 1990s. Other countries, on the other hand, showed an important setback in the effectiveness of their institutions, generating a situation of duality in Latin America in terms of competition policies.

Second, Graph 3.11 shows the value of an index that measures the effectiveness of anti-monopoly policies, built by the World Economic Forum,<sup>27</sup> for all Latin American countries, except Bolivia. As one can observe, Latin America presents a much lower average indicator than the OECD. That being said, Brazil, Chile, Colombia, Costa Rica, Mexico, and Panama, show values closer to the average of advanced countries.

How can the region strengthen its competition institutions and policies? The literature offers some important lessons. First, the reform of these institutions and policies should contemplate the adoption of an economic approach in the analysis of anti-competitive practices. That is, competition authorities should use economic analysis to assess market dominance and abusive practices rather than using a purely logistic analysis. This would improve the quality of decisions (Sokol, 2015) and increase the effectiveness of competition policies in general (Borrell & Jiménez, 2008).

**Graph 3.11** Effectiveness of anti-monopoly policy



Note: Each country's score is based on the following question: In your country, how effective are anti-monopoly policies at ensuring fair competition? (1 = not effective at all; 7 = extremely effective). The Latin American (LA) average includes the countries shown. The OECD does not include Chile nor Mexico.

Source: Produced by the author based on data from the Global Competitiveness Report 2017-2018 (Schwab, 2017).

Second, while competition policies are associated with a greater productivity growth, not all aspects of these policies have the same effect on productivity.

27. This indicator, although based on a subjective and possibly biased assessment by executives of interviewed firms, may reflect other characteristics, especially *de facto*, of competition policy that is not captured by the OECD indicator.

The impact tends to be particularly strong when institutional aspects are improved, such as the level of independence of the competition authority and the degree of separation between judges and the agency in charge of carrying out investigations. Similarly, anti-monopoly activities have a greater impact on productivity than the control of other anticompetitive practices, such as mergers (Buccirossi, Ciari, Duso, Spangolo, & Vitale, 2013).

Finally, it is important for a good legal system to complement the competition protection regime. In particular, the effectiveness of competition policies increases significantly when the judicial system is more efficient, the rule of law is stronger and the degree of law compliance is greater (Buccirossi et al., 2013).

## Trade liberalization

Latin America was historically characterized by restrictions on external competition in the form of high tariffs and high non-tariff barriers (NTBs). It was not until the 1990s, after the structural reforms implemented in the region in the late 1980s, that there was a significant reduction in barriers to external competition and a convergence to the levels of other regions of the world.<sup>28</sup> Table 3.2 shows precisely this evolution based on calculations of average tariffs by regions carried out by Melo and Rodríguez-Clare (2007) for 1985 (reported in Edwards, 1994) and the first five years of the 2000s. Indeed, while in 1985 Latin America exhibited the highest average tariffs in the world, which were complemented by high NTBs, by the beginning of the 2000s average tariffs in the region were almost the same, or even below those of other regions of the world.

**Table 3.2** Import protection in developing countries

	Tariff protection		Non-tariff barriers
	1985 <sup>a/</sup>	2000 <sup>b/</sup>	1985 <sup>c/</sup>
South America	51.0	10.4	60.0
Central America	66.0	5.9	100.0
The Caribbean	17.0	9.8	23.0
North Africa	39.0	20.7	85.0
Other African Countries	36.0	14.7	86.0
West Asia	5.0	13.8	11.0
Other Asian Countries	25.0	20.3	21.0

Note: The tariff and non-tariff data are weighted averages. All values are percentages. The group of countries in each region may vary slightly between 1985 and the 2000s.

a/ Includes tariffs and para-tariffs.

b/ The year varies per country, but all the data is from between 2000-04.

c/ Measures lines covered by non-tariff barriers as a percentage of imports.

Source: Melo & Rodríguez-Clare (2007).

28. Cole, Ohanian, Riascos, & Schmitz (2004) summarize the literature regarding the barriers to international competition in Latin America. Loayza & Palacios (1997) describe the process of trade liberalization in countries in the region within the framework of the structural reform process of the late 1990s.

What impact did this opening to external competition have over productivity? Several countries in the region reported positive impacts. In Chile, which liberalized international trade towards the end of the 1970s, manufacturing sectors most exposed to competition from imported goods experienced productivity growth of up to 10% above that of sectors not subject to external competition. In Mexico, something similar was observed following the trade liberalization episode of the late 1980s, that is, the sectors most exposed to external competition experienced significant productivity gains. In Colombia, the trade reform of the early 1990s had a positive impact on productivity in two ways: the increased exit of less efficient establishments and the productivity gains of the surviving companies. In Brazil, the trade liberalization process that started in 1990 also caused productivity increases at the firm level, not only because of the direct effects of competition but also due to the fact that domestic firms could access better and more varied imported supplies, incorporating better foreign technology.<sup>29</sup>

Given the productivity gains associated with the opening of trade in many Latin American countries during the 1990s, it is interesting to explore the current state of trade policy in the region. Table 3.3 shows the evolution of average tariffs in 18 countries in the region and in a group of advanced countries from 1995 to 2016. As can be observed, average tariffs in Latin America as a whole have continuously dropped since the year 2000 to the present. That said, there are great and highly nuanced differences among countries. On the one hand, Argentina and Venezuela maintain similar tariffs to the ones they had in 1995, and these currently are the highest in the region. On the other hand, Brazil lowered its tariffs by more than 5 percent on average between 2000 and 2008 (from 13.9% to 8.6%), but has experienced a setback since then and today has average tariffs well above the regional average. In the case of Chile, Costa Rica, Guatemala, Panama, and Peru, they have all lowered their tariffs constantly since the 1990s, placing them among the lowest in the region. The case of Peru is remarkable since it is the only country that currently has tariffs at the same level or even below those observed in the most developed countries. Finally, Colombia and Mexico have made significant progress since 2009 and 2010 respectively, bringing their average tariffs down from higher rates than the regional average at the beginning of the decade, to the relatively low levels seen today.

The last column of Table 3.3 shows the values of the Overall Trade Restrictions index (OTRI), which measures trade policy distortions on imports, taking into account not only tariffs but also the NTBs, which include sanitary and phytosanitary measures, technical barriers to trade, special measures of trade protection, among others. OTRI summarizes the whole framework of tariff and non-tariff measures in an “equivalent uniform tariff”, that is, the tariff that would

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29. This is based on conclusions of the studies of Paycnik (2002) for Chile; Tybout & Westbrook (1995) for Mexico; Eslava, Haltiwanger, Kugler, & Kugler (2013) for Colombia, and Schor (2004) for Brazil. Studies of other countries also provide evidence on the impact of trade opening on productivity. Among these are Levinsohn (1993) for Turkey, Trefler (2004) for Canada, Harrison (1994) for Ivory Coast, Amiti & Konnings (2007) for Indonesia, and Topalova & Khandelwal (2011) for India. These last two papers also study the role played by the reduction of tariffs on intermediate supplies and find that productivity gains in this way are greater than those attributed to the fall of tariffs on final goods.

produce the same volume of imports.<sup>30</sup> According to this indicator, in 2009, the most recent year for which data is available, Latin America imposed higher import barriers than more advanced countries.

**Table 3.3** Tariffs and Overall Trade Restrictiveness Index in Latin America

Countries	Tariffs (weighted average)					OTRI	
	1995 <sup>a/</sup>	2000	2005	2010	2016 <sup>b/</sup>	2009 <sup>c/</sup>	
Argentina	11.4	14.5	11.7	12.5	12.4	14.5	
Bolivia	9.5	8.5	8.7	9.0	8.8	15.5	
Brazil	12.7	12.7	8.5	10.1	10.5	23.4	
Chile	10.9	9.0	6.0	5.9	5.9	7.2	
Colombia	12.2	11.0	11.4	11.8	7.1	22.9	
Costa Rica	8.8	4.6	4.1	3.9	5.4	2.7	
Dominican Republic	7.9	15.9	8.6	6.6	8.1	-	
Ecuador	11.1	9.6	9.5	6.8	9.5	5.0	
El Salvador	9.2	6.8	7.5	6.9	7.4	10.4	
Guatemala	8.7	5.8	5.8	5.3	4.9	16.9	
Honduras	9.0	8.4	6.0	6.7	6.2	9.4	
Mexico	11.4	15.2	12.8	5.6	4.4	21.9	
Nicaragua	8.4	4.7	5.5	5.3	6.0	15.4	
Panama	10.6	7.2	7.2	6.9	5.4	7.5	
Paraguay	10.7	10.9	8.4	7.1	7.7	12.6	
Peru	15.3	12.8	9.1	2.8	1.9	10.0	
Uruguay	10.6	12.2	8.0	8.5	9.4	13.7	
Venezuela	13.1	13.4	13.6	12.0	14.5	21.2	
Latin America	11.7	13.4	10.7	7.7	6.9	13.5	
United States	4.3	3.4	3.0	2.8	3.0	6.5	
European Union	7.4	3.5	3.3	2.8	2.8	9.7	
OECD	6.2	5.2	4.4	3.7	3.5	8.2	

Note: The tariffs refer to the weighted average of MFN (most favored nation) tariffs. OTRI is the Overall Trade Restrictiveness Index. All values are percentages.

a/ The data reported for Dominican Republic from 1996, and for Panama, 1997.

b/ This is the latest year available for the majority of countries except for El Salvador, Guatemala, Honduras, and Peru for whom the data reported is from 2015.

c/ Due to data availability, the OECD average in the case of the OTRI indicator includes only the following countries: Australia, Canada, Iceland, Israel, Japan, New Zealand, Norway, Korea, Switzerland, Turkey, and the United States.

**Source:** Produced by the author based on data from UNCTAD - Trade Analysis Information System (UNCTAD, 2017) and Overall Trade Restrictiveness Index (World Bank, 2009b).

According to the recent study of Niu, Liu, Gunessee, and Milner (2018), the evolution of the global protection level in Latin America—considering both tariff and non-tariff barriers—has been growing since the late 1990s thanks to an increase

30. For further details, see Kee, Nicita, & Olarreaga (2009)

**Regional economic integration may be a mechanism for the reduction of tariff and non-tariff barriers; this would increase competition in domestic markets.**

in NTBs, despite the continuous drop in tariffs. NTBs have been used as tariff substitutes in the design of the trade policy (Niu, Milner, Gunessee, & Liu, 2018). Thus, as it can be seen in the table, some countries in the region with low tariffs already showed relatively high NTBs in 2009. For example, Peru, despite having an average tariff below the 3% in 2009, showed an equivalent tariff (OTRI) of 10%. Similarly, Guatemala and Nicaragua had both low tariffs and high NTBs at the same time, with an equivalent tariff of 16.9% and 15.4% respectively. Mexico, with a tariff of 8.2% in 2009, slightly below the regional average, revealed high NTBs at an equivalent tariff of almost 22%, well above the Latin American average. And Brazil, Colombia, and Venezuela not only imposed relatively high tariffs but also high NTBs, with an equivalent tariff of over 21%.<sup>31</sup> On the other hand, countries like Chile, Costa Rica, and Panama imposed relatively few obstacles to international competition, simultaneously showing low tariffs and NTBs.

In summary, despite the advances that Latin America has undoubtedly shown in the last decades in terms of trade liberalization, the region remains relatively closed to international competition when compared with the more developed countries. While this is a problem, it is also an opportunity: in most countries in the region there is room to lower tariffs and, above all, to reduce the use of NTBs. Regional economic integration can be a mechanism through which the use of these barriers is limited while at the same time tariffs are reduced.<sup>32</sup> This, in turn, would lead to a reduction of the market power of domestic firms and to an increase in productivity.<sup>33</sup>

In addition to these tariff and non-tariff barriers, imported goods may face other types of obstacles to compete in the domestic market: barriers in logistics. Graph 3.12 shows the World Bank's Logistics Performance index (LPI). This indicator measures the performance of the logistics system associated with international trade in each country, based on the efficiency of its customs and the quality of their transport infrastructure. As the graph shows, despite the fact that most Latin American countries have experienced improvements in the LPI in the last 10 years, the region is still lagging behind the OECD.

To boost trade, then, in addition to eliminating trade barriers, governments of the region could implement policies to improve customs processes and procedures, and improve trade infrastructure. The empirical evidence is promising in regard to the impact these policies could have.<sup>34</sup> For example, an increase in the LPI

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31. Starting from 2010, as discussed above, Colombia reduced its tariffs. However, according to Garcia, López, & Montes (2018), this was not accompanied by a drop in the use of non-tariff measures.

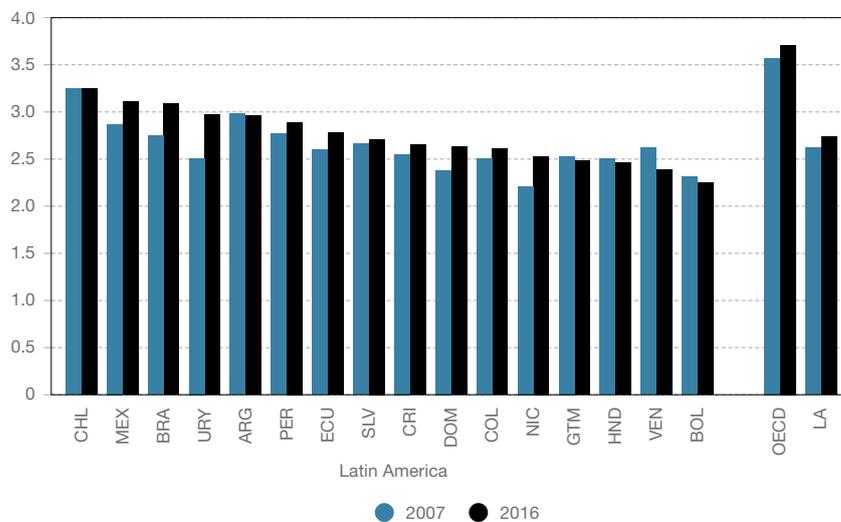
32. Estevadeordal, Freund, & Ornelas (2008), within the framework of preferential trade agreements in Latin America, show evidence that the reduction of preferential tariffs in a sector leads to a drop in the common external tariff in that sector. Bohara, Gawande, & Sanguinetti (2004) obtain a similar result for the case of Argentina and Mercosur. Calvo-Pardo, Freund, & Ornelas (2011), in the case of the ASEAN free trade agreement, also find evidence in favor of a positive relationship between internal and external tariffs.

33. Bottasso & Sembenelli (2001) offer evidence in this regard within the framework of the European single market. The authors find that the market power of firms in industries subject to high NTBs decreased significantly during the implementation period of the single market, when a large part of the NTBs were removed. In other industries, the single market did not have a clear effect on market power, perhaps because the level of competition in these industries was already relatively high before the implementation period.

34. See Devlin & Yee (2005); Dee, Findlay, & Pomfret (2008); and, more recently, Gani (2017).

from the average level in low-income countries to the average level in middle-income countries is associated with around a 15% increase in trade (Hoekman & Nicita, 2010). Other authors show that measures that facilitate trade increase not only imports but also exports, due to better access to imported supplies and a greater participation in global and regional value chains (OECD, 2013b; Portugal-Pérez & Wilson, 2012).

**Graph 3.12** Logistics Performance Index in Latin America



Note: The general score of the Logistics Performance Index reflects the perception of a country's logistics based on the efficiency of the customs clearance process, quality of infrastructure related to trade and transport, ability to organize competitive priced shipments, quality of logistic services, consignment tracking capacities, and frequency with which shipments arrive at their destiny within the programmed time. The index ranges from 1 to 5, with the highest scores representing the best performances. The Latin American (LA) average includes the countries shown. The OECD excludes Chile and Mexico.

Source: Produced by the author based on World Development Indicators (World Bank, 2018).

## Innovation policies: intellectual property versus competition

From a theoretical perspective, competition policies could be complemented with intellectual property protection policies to promote innovation.<sup>35</sup> As seen in the conceptual framework, on the one hand, greater competition encourages firms to innovate to escape their rivals, given that the leader position has greater associated benefits. This is called the “competition escape” effect. On the other hand, more competition reduces the incentives to innovate when the innovators

35. Aghion, Howitt, & Prantl (2015) and Qian (2007) offer evidence in this direction.

**Policies that facilitate the diffusion of ideas and foster competition are important drivers of innovation. Innovative industries usually arise in highly competitive environments.**

cannot appropriate post-innovation rents. In this context, an intellectual property protection system could raise the incomes obtained by innovative firms, which would stimulate the ex-ante investment that innovation requires. That is, it could enhance the “Schumpeterian effect”.

Intellectual property protection and, in particular, the patent regime as an incentive mechanism for innovation, is justified in that knowledge is a public good that disseminates rapidly, which makes the appropriation of profits associated to the production of knowledge difficult. Thus, the intellectual monopoly tries to solve this problem by rewarding innovative activity. However, restrictions on the free use of knowledge have a social cost, since they hinder or restrict the diffusion of knowledge over the rest of the economy, which may delay new innovations. Therefore, a good intellectual property protection system must weigh in the private gains that encourage innovation with the social losses that such protection implies.

Does the current intellectual property system have an adequate balance between the freedom to use existing ideas and the incentives to create new ones? Some authors believe it does not and argue that patents and copyrights are an “unnecessary evil” because the social costs of intellectual monopolies exceed its social benefits (Boldrin & Levine, 2008). These authors also argue that the property rights of innovators, authors, and creators can be well protected without the need for intellectual property protection.

Moreover, from the theoretical perspective it is hard to assert with certainty that patents stimulate innovation. As suggested above, monopolistic revenues associated with patents could promote innovation. However, patents impose costs on subsequent innovations given the licenses that must be acquired to bring a new product to the market.<sup>36</sup> What does the empirical evidence say? A large number of papers find little or no evidence that introducing or strengthening a patent system causes an increase in innovation.<sup>37</sup> On the contrary, historical evidence suggests that the patent system can even discourage it (Moser, 2013). Some authors also conclude from sectoral data that there seems to be no relationship between patents and productivity (Boldrin et al., 2011), while others point out that the positive effect of innovation on aggregate productivity dissipates when the patent system is very strong (Duverger & van Pottelsberghe, 2012). In summary, the patent protection system does not seem to encourage innovation and productivity growth.

In contrast, policies that facilitate the dissemination of ideas and foster competition are important determinants of innovation. Innovative industries often emerge from highly competitive environments in which the patent protection system is of little importance. In these environments, the advantages of taking

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36. For example, see Heller & Eisenberg (1998).

37. See Boldrin & Levine (2008) and Hall (2014), for an exhaustive revision of this literature. Mansfield (1986) asks which would be the innovation rate in the absence of patent protection and finds that in most industries studied, it would be too small. However, in a few sectors such as the pharmaceutical and chemical industries, the impact of the patent system seems to be substantial.

the initiative or being a pioneer in introducing a new product or technology are generally sufficient to encourage innovation. On the other hand, patents seem to be used more as instruments for market defense or income capture in mature industries with low growth potential, so that, far from fostering innovation, they block and discourage it instead.<sup>38</sup>

Thus, competition policies should be an integral part of innovation development policies. In contrast, intellectual property protection policies should be relaxed and limited in scope. Patents should be awarded only when there is a solid economic justification; for example, when the innovation has high fixed costs or when there really are problems of appropriability (Boldrin et al., 2011). The challenge lies in finding an adequate balance between intellectual property protection and competition policies. The experience of Asian countries such as Korea and Singapore are salient examples. In these countries, the initial stages of the industrialization process were largely based on imitation, with no resort to patents (Hall, 2005).<sup>39</sup>

## Final considerations

Competition is one of the core drivers of productivity. This happens through several mechanisms. It promotes a more efficient allocation of resources within sectors, allowing firms with higher productivity to grow more. In addition, in a competitive market, less productive firms tend to disappear while the entry of new competitors challenges the position of existing ones. This competitive pressure also encourages firms to increase their productive efficiency and boost innovation.

Latin America, unfortunately, suffers from low levels of competition in product markets, which results in high markups, especially in the services sector. This is explained by several factors. First, barriers to entry of new firms are high. Second, the region places obstacles to international trade, not only in the form of relatively high tariff and non-tariff barriers, but also because of the poor performance of the logistics system associated with trade, at least when compared to more advanced countries. Finally, competition protection policies and institutions are below the standards observed in developed countries.

The lack of competition in Latin America is related to its low productivity. In particular, lack of competition is associated with a more inefficient factor allocation within sectors. It is also related to low productivity growth due mainly to the low productivity growth within existing firms, but also, to a deficient intrasectoral factor reallocation.

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38. See Boldrin, Allamand, Levine, & Ornaghi (2011) and Boldrin & Levine (2013) for more details.

39. Patents in these countries started being used more intensely starting from the 1990s, when they had already achieved a relatively high development level.

Given the competitive landscape observed in product markets in Latin America, countries in the region should adopt a series of policies to promote it. First, they should strengthen competition protection institutions and policies. Although there is no single recipe to achieve this objective, these reforms should ensure that antitrust authorities are able to exercise their duty free of political influence or pressure and based on not only legal but also economically sound principles.

Second, countries in the region should encourage greater trade openness. They should reduce or remove their barriers to international trade, including tariff as well as non-tariff barriers. In addition, they should promote improvements in their trade-related logistics system (for example, their customs and transport infrastructure) to prevent it from functioning as a restriction on imports and exports.

Finally, in the framework of policies to encourage innovation, countries should limit the scope of the patent system and, instead, should strengthen policies to protect competition.

# Appendix

## Details of the composition of regions used in graphs

The samples used in Graph 3.7 Efficiency in allocation and market power: Latin America and the World, are grouped as follows:

Latin America: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela.

World: Afghanistan, Albania, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, Bahamas, Bangladesh, Barbados, Belize, Benin, Byelorussia, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burma, Burundi, Bhutan, Cambodia, Cameroon, Chile, China, Colombia, Congo, Costa Rica, Croatia, Czech Republic, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Gambia, Georgia, Ghana, Granada, Guatemala, Guinea, Guinea-Bissau, Guyana, Honduras, Hungary, India, Indonesia, Iraq, Israel, Ivory Coast, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyzstan, Kosovo, Laos, Lesotho, Latvia, Lebanon, Lithuania, Macedonia, Madagascar, Malaysia, Malawi, Mali, Morocco, Mauritius, Mauritania, Mexico, Moldova, Mongolia, Montenegro, Mozambique, Namibia, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Palestine, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Rwanda, Romania, Russia, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Saint Lucia, Salomon Islands, Senegal, Serbia, Slovakia, Slovenia, Sri Lanka, Swaziland, South Africa, South Sudan, Sudan, Sweden, Suriname, Thailand, Tanzania, Tajikistan, East Timor, Togo, Trinidad and Tobago, Tunisia, Turkey, Ukraine, Uganda, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Djibouti, Zambia, Zimbabwe.

**Table A 3.1** Country codes

<b>Code</b>	<b>Country</b>
ARG	Argentina
BOL	Bolivia
BRA	Brazil
CHL	Chile
COL	Colombia
CRI	Costa Rica
DOM	Dominican Republic
ECU	Ecuador
GTM	Guatemala
HND	Honduras
HTI	Haiti
JAM	Jamaica
MEX	Mexico
NIC	Nicaragua
PAN	Panama
PER	Peru
PRY	Paraguay
SLV	El Salvador
TTO	Trinidad and Tobago
URY	Uruguay
VEN	Venezuela

Note: Based on 3-character ISO codes.





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# Access to inputs and cooperation among firms

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## Chapter 4



## Chapter 4

# Access to inputs and cooperation among firms<sup>1</sup>

*“Alone we can do so little; together we can do so much.”*

Helen Keller

The simplest car in terms of the number of component parts is the Formula 1 race car. Even so, it is made up of around 60,000 pieces. The number of parts in a conventional vehicle can reach 100,000. In addition to parts, manufacturing a vehicle requires services for its design and marketing. In the paradigmatic vision of Henry Ford, the father of mass automobile production, most of an automobile's parts were produced in self-sufficient plants. His industrial complex near Detroit, of almost 1,500 square meters and more than 90 buildings, was the largest factory in the world at the time. After his death, it began a continuous process of decentralization, more in line with the realities of a globalized world. In contrast to Ford's vertical integration model, the productive paradigm of the last few decades has migrated towards an extensive division of tasks among different plants specialized in specific inputs, which can frequently be a part of global value chains.<sup>2</sup>

Indeed firms do not operate alone. Their productive process involves intense relationships, not only with households in the goods and services or factors markets, but especially with other firms. This is relevant for economic analysis in general and for productivity analysis in particular: the quality and intensity of these relationships matter. This chapter deals precisely with the subject of inter-firm relations and their connection with productivity.

One type of business relationship that is of great importance is customer-supplier relationships. These relationships determine access to the amount, quality and variety of inputs needed to achieve high levels of productivity. Certain public policies play a critical role in promoting this type of relationships and facilitating access to inputs. This chapter highlights the role of international trade as well as the role of the regulatory-institutional framework in the service sector, a key provider of inputs, as will be seen below. In addition, the chapter explores how productivity shocks in a specific sector propagate through customer-supplier linkages and how, because of their role as input providers, some sectors are key for productive development.

The diagnosis of customer-supplier relationships based on input-output matrices indicates that intermediate consumption is relatively low in Latin America,

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1. This chapter was authored by Fernando Álvarez, with research assistance from Roberto Ferrer and Carolina Bockmeulen.

2. Based on Bartelme & Gorodnichenko (2015), [www.desguaces.net](http://www.desguaces.net), and [www.thehenryford.org](http://www.thehenryford.org).

**Modern economies are characterized by strong firm-to-firm relationships. These are key to understanding the productivity problem.**

especially in the primary and services sectors and for imported inputs. This could point to sectoral distortions that reduce aggregate productivity.

Finally, inter-firm relations encourage technology diffusion, cooperation, and coordination among firms. These are arguments in favor of the development of clusters, where customer-supplier relationships as well as other horizontal and vertical relationships emerge. The last section of the chapter deals with the phenomenon of clusters as well as with public policies to promote them.

## Conceptual framework

Modern economies are characterized by strong relationships among firms. One of them are “customer-supplier” (or vertical) relationships determining access to inputs. These relations are substantial<sup>3</sup> and have intensified, at least in certain industries, with a tendency towards “vertical disintegration” (Herrigel & Wittke, 2005; Desyllas, 2009)<sup>4</sup>. In addition, there are “horizontal” interactions that arise for various reasons, such as the joint financing of infrastructure, internationalization efforts, joint innovation projects, and even State lobbying.

Relationships among firms are key to understanding the productivity problem. To begin with, vertical disintegration can contribute to productivity by allowing firms to focus on the tasks in which they have the greatest advantages and to gain flexibility to adapt to the changing business world (Desyllas, 2009). From the point of view of firms, this can result in greater efficiency, and from the aggregate point of view, in a better resource allocation. At the international level, vertical disintegration leads to global value chains. Some studies find that increased participation in global value chains (at least in OECD countries) has been an important driver of exports (Hummels, Ishii, & Yi, 2001) and labor productivity (Constantinescu, Mattoo, & Ruta, 2017).

From the point of view of firms, relationships among them are important for productivity because producing goods and services requires other goods and services obtained from other firms. The ease of access to inputs in the required quantity, quality, and variety is fundamental to achieve high levels of productivity (see for example Ethier, 1982, for the role of variety). Important evidence in this regard comes from international trade experiences that have reduced the cost of

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3. Latin America's average intermediate consumption expenditure (purchase of inputs) is 36% of the value of production when considering only domestic inputs and 48% when considering both foreign and domestic inputs.

4. “Vertical disintegration” is a phenomenon whereby firms move from a production process in which much of the work is carried out within firm, toward a production process one that exploits cooperation with other firms as suppliers of specialized inputs. In a seminal paper, Stigler (1951) presents vertical disintegration as the natural trend in expanding industries. However, in certain contexts vertical integration may emerge as a substitute for good business environment (e.g. where a legal framework does not guarantee the enforcement of business-to-business contracts). In fact, there is evidence that firms in developing countries appear to be more vertically integrated (Khanna & Palepu, 1997, and 2000). Acemoglu, Johnson, & Mitton (2009) have explored how certain institutional characteristics (contractual costs and financial development) affect the degree of integration in 750,000 firms in 93 countries: they find that countries with high contractual costs and simultaneously higher financial development have firms with greater vertical integration.

inputs and increased their quality and variety, thereby increasing firm productivity as well as the variety and the quality of the goods they produce. There is also evidence that trade in intermediate goods favors technology transfer (Keller, 2000).

From an aggregate perspective, an economy's customer-supplier relationships are synthesized in input-output matrices. Their analysis is essential to identify how productivity shocks and distortions at the sectoral level spread throughout the entire productive fabric. In other words, the architecture of firm-to-firm relationships acts as a transmission mechanism that affects aggregate productivity.

Leontief (1936) was a pioneer in incorporating the sectoral structure of customer-supplier (or input-output) relationships into economic analysis. Input-output linkages are also part of real business cycle models<sup>5</sup>. Recent work along these lines reveals that due to these linkages idiosyncratic shocks may have aggregate impacts, especially if the structure of the relationships is asymmetric, with some units working as essential suppliers (Acemoglu, Carvalho, Ozdaglar, & Tahbaz-Salehi, 2012). The U.S. input-output structure, for example, shows such asymmetry (Tweedle, 2016 and Acemoglu et al., 2012). As will be seen below, the same diagnosis arises from input-output matrices in Latin America, where some sectors stand out in terms of their forward linkages. In these cases, the underlying structure of input-output relationships can contribute significantly in explaining the volatility of the economy.

Another branch of the literature, more relevant for this report, incorporates input-output relationships in the analysis of productivity and economic growth.<sup>6</sup> A first idea highlighted in these studies is that intermediate consumption operates as a multiplier mechanism, analogous to capital in the neoclassical growth model. A productivity shock that increases output leads to more capital and more intermediate consumption, which in turn results in a higher output, and so on. The magnitude of the multiplier effect depends on intermediate consumption expenditure as a proportion of total output, and since this proportion is significant in most economies, the multiplier effect of intermediate consumption is generally noteworthy. Thus, differences in total factor productivity (TFP) among countries –rooted in the various causes explored in this book– can lead to significant differences in per capita GDP.<sup>7</sup>

A second idea in this literature refers to the fact that, under high complementarity among inputs in the production process of goods and services, the success of firms and industries requires a correct functioning of the entire value chain. Like metal chains, value chains are as strong as their weakest link: bottlenecks or

**The structure of firm-to-firm linkages helps explain how productivity shocks and sectoral distortions propagate across the entire productive fabric.**

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5. See for example Long & Plosser (1983) and Basu (1995), as pioneers in this area.

6. See Jones (2011a, 2011b), Bartelme & Gorodnichenko (2015), Leal (2015), and Acemoglu, Carvalho, Ozdaglar, & Tahbaz-Salehi (2012).

7. In a simple Solow-type economic growth model (1956) without intermediate goods and with a capital participation of 1/3, doubling productivity implies an increase in income by a factor of 2.8 times. In a similar model with intermediate goods, where the share of intermediate consumption is 0.5 (as suggested by the data), doubling productivity would imply an increase in income by a factor of 8 times. In more complex models that combine intermediate consumption and input complementarity, the effect of a change in productivity (or distortions) is up to 6 times greater than when these mechanisms are disabled (see Jones, 2011b).

**Firm-to-firm relationships affect productivity also by favoring the diffusion of knowledge and ideas.**

the lack of key inputs can compromise the production of goods and services. Thus, distortions and/or low productivity in a particular sector may strongly affect aggregate productivity if that sector has a high “degree of influence”, which depends on the input-output architecture (see Text box 4.5). Not all sectors have the same importance as input suppliers and, as will be seen below, the degree of influence is important in identifying key sectors.

Relationships among firms also affect productivity by enabling the spillover of knowledge and ideas. For example, Carvalho and Voigtländer (2014) have documented that producers are more likely to use inputs that are already used (directly or indirectly) by their suppliers: input-output relationships have a lasting and quantitatively significant effect on the likelihood of adopting certain inputs in the future.<sup>8</sup> Likewise, in the context of a cluster, firm proximity favors innovation spillovers (see the section “Clusters”).

Along these lines, Cay and Szeidl (2016) suggest that the recurrent and systematic interaction among managers of different firms favors the flow of information relevant to their business and/or increases the probability of forming strategic alliances. By favoring these channels, business associations may increase productivity.<sup>9</sup> This study is based on a sample of 2,800 micro, small and medium-sized enterprises (MSMEs) in China. From this sample, 1,480 were randomly selected and their managers/owners were invited to participate in meetings of 10 members, on a monthly basis, for one year.<sup>10</sup> The authors find that participation in the meeting program increased sales by 8.1% and produced significant increases in profits, use of inputs, and quality of management practices. Those effects last even one year after the treatment. The authors highlight peer learning (especially in the absence of market rivalry) and the creation of more business associations as the channels that drive these findings.

Anecdotal experience also indicates that relationships among firms can affect productivity by fostering synergies and coordination in decision-making. For example the case of Pronaca (in Ecuador) illustrates how, within value chains, cooperative strategies can be developed –supported by a leading firm– to favor access to credit and the diffusion of technology (see Text box 4.9).

In short, relations among firms affect the division of labor, access to inputs, innovation, dissemination of productive knowledge and cooperation. In addition, they operate as a mechanism that can amplify distortions, productivity problems and reforms.

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8. The authors find that the proximity of two sectors in 1967 affects the probability of adopting inputs in the following four decades and that a one standard deviation increase in the distance, reduces the probability of adopting inputs between 30% and 50%. In this paper, proximity is measured as the lowest number of direct connections separating a potential adopter of inputs from a potential supplier. Two sectors or firms are said to be directly connected if one supplies inputs to the other.

9. Employer associations also seem useful in the context of clusters since they favor and articulate private-private (among actors within the cluster and between the cluster and other private entities) and public-private (among the public sector and the cluster) coordination/cooperation.

10. The meetings were linked to business activities. They typically included visits to other members' firms and extensive discussions on aspects relevant to the business.

What shapes relationships among firms? First, technological factors. Oberfield (2018), for example, models the input-output structure and finds that a high elasticity of the firm's output with respect to the use of intermediate goods induces the emergence of "star" suppliers, i.e. suppliers whose inputs are used by a large group of producers.

Second, the structure of relations among firms conditions its own dynamics. It was discussed above that producers tend to adopt inputs that are already used (directly or indirectly) by their current suppliers (Carvalho & Voigtländer, 2014). More generally, the current structure of customer-supplier relationships determines the formation of new ties in the future.

Third, and perhaps most relevant, the quality of institutions, market failures and other distortions affect the intensity of relationships among firms. In fact, links among firms are not exempt from failures such as information asymmetries and commitment and coordination problems. The absence of appropriate regulatory frameworks and legal systems can aggravate the impact of such failures.

A customer-supplier link may suffer the hold-up problem, in which once the relationship is established, the supplier firm may find itself locked-in and lose its bargaining power. Under this risk, the supplier firm may refrain from establishing a (potentially mutually beneficial) relationship with the customer firm. This problem may be more serious in certain industries, depending on the nature of the required inputs. If inputs are fairly homogeneous and interchangeable in a market with many buyers and sellers, the hold-up problem is reduced, because in the event that a customer demands a reduction in the price of a supplier's input, the supplier could simply sell it to another producer at market prices. On the other hand, if the input is "tailor-made" it is unlikely to be of use to another customer: once such an input has been developed, the supplier has little bargaining power vis-à-vis the customer and the hold-up problem becomes a latent threat.

A reliable legal system can alleviate this problem. For example, Boehm and Oberfield (2018) analyzed a database of manufacturing establishments in India<sup>11</sup> and found that in industries with greater dependence on non-homogeneous inputs, intermediate consumption (as a proportion of production value) is lower and more variable, especially in regions with low-quality judicial systems as measured by the average age of cases pending in courts. Specifically, an increase in the duration of cases from 1 to 4 years is associated with an intermediate consumption ratio 3.6 percentage points lower in industries that depend on non-homogeneous inputs, compared to industries that depend on standardized inputs. In addition, based on estimates from a structural model, the authors found that reducing court congestion in the least efficient regions to the level of the most efficient increases TFP by 6%.

Nunn (2007) found that, since some industries are more dependent on homogeneous inputs and others on specialized inputs, the quality of the judicial system explains a

**Industries with more dependency on non-homogeneous inputs display lower intermediate consumption, especially in regions with low-quality judiciary.**

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11. The database contains information for all establishments in the manufacturing sector with more than 100 employees and for 20% of establishments with between 20 and 100 employees. It covers the period 2001-2010 and has information on approximately 25 thousand establishments.

larger extent of trade patterns than physical capital and the quality of human capital combined. The trade pattern, on the other hand, determines which inputs are produced and demanded, and hence influences the architecture of relationships among firms.

Finally, Acemoglu, Antràs, and Helpman (2007) found that the quality of the institutions that regulate the relationship between producers and their suppliers can have an important impact on technological choice, with effects on productivity, especially when inputs are strongly complementary. Technology with a wider range of inputs could be more productive but imply higher costs in environments with lower institutional quality, requiring more contracts with suppliers. The lower institutional quality then reduces the variety of the inputs used, the intermediate consumption and the productivity of economies.

Unfortunately, there is little information that can systematically capture the different ways in which firms relate to each other. This is why an important part of the empirical analysis in this chapter is based on input output matrices and focuses on customer-supplier relationships with a sectoral aggregation.

Perhaps the simplest indicator that can be extracted from input-output matrices to synthesize the intensity of customer-supplier relationships is intermediate consumption. Input-output matrices can also be used to compute forward (push) and backward (pull) linkages that capture the recursive nature of these relationships. These indicators allow sectors to be ranked according to their importance as suppliers or buyers of inputs (see Text box 4.1).

#### **Text box 4.1** Input-output matrices and production linkages

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Intermediate consumption represents a first approximation to the degree of interconnection of the input-output matrix. However, input-output matrices allow a richer analysis, which considers, among other things, the recursive nature of relations among sectors. This makes it possible to identify the most influential sectors.

The starting point is the matrix of technical coefficients  $\mathbf{A}$ , whose typical element  $a_{ij}$  indicates the “direct” requirement of input  $i$  in the production of good  $j$ . In practice, this element is obtained by dividing the expenditure on input  $i$  carried out by sector  $j$  by the production value of sector  $j$ . Table 1 depicts a very simple input-output matrix as an example. In the hypothetical economy represented by this matrix, to produce one unit of  $S1$ , 0.4 units of  $S2$  (and 0.6 units of value added) are required. Similarly, producing an additional unit of  $S2$  requires 0.6 units of  $S1$  and 0.1 units of  $S2$ .

That said, technical coefficients do not reflect the recursive nature of the production process. More precisely, to produce  $S1$  requires  $S2$ ; but to produce  $S2$ , inputs from  $S1$  and  $S2$  are required, and so on. Leontief’s  $\mathbf{L}$  multiplier matrix addresses this problem and reflects the “direct” and “indirect” input requirements. Table 2 displays the corresponding multiplier matrix.<sup>a</sup> Now, to produce one additional unit of  $S1$ , the economy must produce 1.4 units of  $S1$  and 0.6 units of  $S2$ ; to produce one unit of  $S2$ , 0.9 units of  $S1$  and 1.5 units of  $S2$  are required. While  $S1$  does not require itself directly, it is indirectly required when the entire production process is considered.

**Table 1** Technical coefficient matrix **A**

	<b>S1</b>	<b>S2</b>
S1	0.0	0.6
S2	0.4	0.1
Value added	0.6	0.3
<b>Total</b>	<b>1.0</b>	<b>1.0</b>

**Table 2** Leontief multiplier matrix **L**

	<b>S1</b>	<b>S2</b>	<b>Push</b>
S1	1.4	0.9	<b>2.3</b>
S2	0.6	1.5	<b>2.1</b>
<b>Pull</b>	<b>2.0</b>	<b>2.4</b>	

**Source:** Produced by the author.

The intensity of inter-sectoral connections has traditionally been measured from the “linkages” generated by input-output relationships. Two types of effects are highlighted: (i) “pull”, or backward linkages and (ii) “push”, or forward linkages. A sector’s pull reflects its (direct and indirect) role as an input consumer while its push reflects its role as input provider. Sector  $j$ ’s pull is obtained by adding the different rows of the Leontief matrix for column  $j$ , while sector  $i$ ’s push is obtained by adding the different columns of row  $i$ .

In the example in Table 2, the pull of sector  $S1$  is 2 and that of sector  $S2$  is 2.4. This means, for example, that an initial increase in the production value of a unit of  $S1$  requires an increase in the total production value of 2 units (1.4 of  $S1$  and 0.6 of  $S2$ ). In this case,  $S2$  has a stronger interconnection with the rest of the productive sectors as a buyer of inputs.

Similarly, the push of sector  $S1$  is 2.3 and that of sector  $S2$  is 2.1. A simultaneous increase in the production value of  $S1$  and  $S2$ , equivalent to one unit, implies a demand for inputs of 2.3 units of sector  $S1$  and 2.1 units of sector  $S2$ . It can be said that  $S1$  has a stronger interconnection with the rest of the productive sectors as a supplier of inputs. It will be seen below that a similar notion is used to identify a sector’s degree of influence.

Intermediate consumption and linkage measures can be established at the sectoral level or for the economy as a whole. In particular, the average total multiplier is the sum of the backward linkages (or equivalently of the forward linkages) divided by the number of sectors.

The inputs used can be local or imported and therefore, the calculation of Leontief multipliers can be carried out for local inputs or including also foreign inputs. The appropriateness of one or the other approach depends on the circumstances: if sectoral policies are to be adopted in order to affect domestic demand, the calculations for local inputs are relevant; if key inputs are to be identified, regardless of their origin, all inputs, including imported inputs, should be considered.

a. The Leontief matrix is computed as  $L = (I-A)^{-1}$  where  $I$  is the identity matrix.

The input basket varies between industries, but also between establishments within industries.

## Inputs and productivity

The secret of a good ceviche is good ingredients. Likewise, a firm's productivity as well as the quality of the goods and services it produces depend on its inputs. The availability of inputs –in sufficient quantities, quality and variety– is an essential component of a country's business environment, without which it is very difficult for firms to increase their productivity and penetrate international markets. These inputs include not only goods that can be traded internationally, but also services such as trade, transport, electricity, telecommunications and business services, among others.

Obviously, the mix of required inputs varies for each sector and may also vary across firms within industries. This can be seen in the case of Colombia, for which information regarding the use of physical production inputs at the establishment level is available.<sup>12</sup> Table 4.1 displays the value of the 10th and 90th percentiles of two indicators of the complexity of the input basket: (i) the number of materials used, and (ii) the fraction of expenditure on materials destined to foreign materials. (For comparative purposes, wages and TFP values are also included for these percentiles.)

**Table 4.1** Dispersion in the use of inputs within industries: Colombian manufacturing sector

Variable	Percentile		Quotient/Difference <sup>a/</sup>
	P10	P90	
Wage index	0.23	0.76	3.34
Total factor productivity	0.48	3.67	7.71
Number of materials	2.69	21.16	7.86
Fraction of expenditure on materials dedicated to foreign materials	0.00	0.39	0.39

Note: The percentile calculations are made at three-digit ISIC, REV. 3, industry levels. The table shows averages among all industries. Total factor productivity is estimated using a Cobb Douglas specification and a capital margin of 0.7. Only material inputs are considered due to information availability. Data corresponds to the period 1997-2012, with the exception of the foreign inputs/expenditure ratio, which corresponds to 2001-2012.

a/ This column displays the P90/P10 quotient for each variable, with the exception of the foreign inputs/expenditure ratio, which shows the difference between P90 and P10.

**Source:** Produced by Marcela Eslava and Álvaro Pinzón in the context of this report, based on the Annual Colombian Manufacturing Survey (DANE, 2012).

12. The data corresponds to the Annual Manufacturing Survey of Colombia prepared by DANE. These are censuses of the non-microenterprise universe, including all firms with more than 10 workers or those with less than 10 but with sales larger than a certain threshold. Sectors are classified using the ISIC Rev. 3, at the 3-digit level. The information corresponds to the period 1997-2012, except for the percentage of foreign materials, which corresponds to the period 2001-2012.

Within industries, there is great dispersion in the complexity of firms' input mix. For example, while the number of materials used is about 11 on average, it ranges from 2.69 for the firm in the 10th percentile to more than 21 for the firm in the 90th percentile. Similarly, the average percentage of spending on foreign materials is around 10%, but varies from practically 0 for firms in the 10th percentile to almost 40% for firms in the 90th percentile. The 90th/10th ratio for the number of materials is comparable to the same ratio for TFP and considerably higher than the ratio for the wages index.<sup>13</sup>

**There is a positive association between establishment-level productivity and the complexity of its input basket.**

Simple statistical exercises based on the same database indicate a positive association between firm-level productivity and these input complexity measures. Table 4.2 presents the results of six ordinary least square estimations. In all cases, the variable to be explained is TFP at the establishment level. For each of the complexity measures considered, 3 specifications are presented: i) without controls, ii) with fixed effects at industry and year level, and iii) with fixed effects at plant and year level. In all cases the coefficients are positive and statistically significant, i.e. establishments (or industries) with more complex input baskets have higher productivity. This positive and significant association persists, although with lower coefficients, if fixed effects at the plant level are included, which is equivalent to controlling for unobservable time-invariant characteristics (column 3).<sup>14</sup>

**Table 4.2** Productivity and complexity of Colombian manufacturing industry's input bundles

Variable	Model		
	(1)	(2)	(3)
Number of inputs	0.013	0.007	0.004
Fraction of expenditure dedicated to foreign inputs	0.213	0.263	0.068
Establishment fixed effects	no	no	yes
Industry fixed effects	no	yes	no
Year fixed effects	no	yes	yes

Note: The table shows ordinary least square regression coefficients. The dependent variable is the logarithm of total factor productivity at the establishment level. The independent variables reflect two alternative complexity measures. Only physical inputs are considered due to information availability. For "Number of inputs" the data corresponds to the period 1997-2012. For the foreign inputs/expenditure ratio, the data corresponds to the period 2001-2012.

**Source:** Produced by the author based on data from Annual Colombian Manufacturing Survey (DANE, 2012).

13. There is also a significant dispersion in the price firms pay for similar inputs. In principle, this could indicate differences in the quality of the input, but also other factors, such as higher transport and logistics costs or higher market power of input suppliers.

14. For example, according to these last specifications, moving from the 10th percentile to the 90th percentile in the number of inputs is associated with an approximately 8% higher productivity.

**International trade is a major ally to increase access to inputs.**

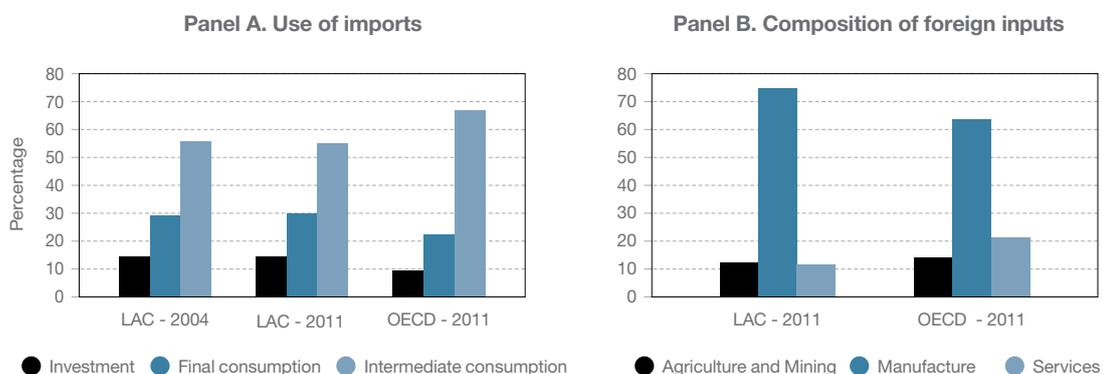
These results highlight the importance of inputs for firms' productivity. What can be done to improve access to inputs? The rest of this section addresses two strategies: (i) strengthening international trade and (ii) improving the regulatory-institutional framework for the service sector. The development of clusters and value chains is another promising strategy for improving access to inputs, as we argue below.

## International trade

A significant fraction of an economy's total imports corresponds to intermediate consumption, that is, goods and services that firms use in their production processes. Hence, international trade is a first ally in improving access to inputs.

Graph 4.1 illustrates the composition of imports by purpose and the composition of foreign inputs by sectors. In both cases, the Latin America data is contrasted with that of the OECD. As can be seen in the graph, for the last year reported, 55% of the region's imports are used as intermediate consumption and almost 15% as capital goods; around 30% of imports are used for final consumption. The stability of these measures over the period under review stands out. However, the share of imports for production purposes is lower in Latin America than in OECD countries, where the share of imports for intermediate consumption exceeds 67%. When focusing on imports destined to intermediate consumption, in Latin America only 12% correspond to services, compared to more than 20% in the OECD. Trade in services has been very dynamic over the past 20 years and is undoubtedly an important channel for improving access to inputs and thus firms' productivity (see Text box 4.2).

**Graph 4.1** Use of imports and composition of foreign inputs



Note: Both graphs report simple averages of countries in the corresponding regions. LAC refers to Latin America and the Caribbean. Countries included in each region can be found in the Appendix.

Source: Produced by the author based on data from GTAP v9.2 (Aguiar, Narayanan, & McDougall, 2016).

#### Text box 4.2 Trade in services and its modes<sup>a</sup>

The General Agreement on Trade in Services (GATS) of the World Trade Organization (WTO) entered into force in 1995 with the main goal of progressively achieving greater openness in the services market. The treaty identifies four modes of trading services:

- **Mode 1 - cross-border supply:** a supplier from one member country provides the service in another country without being present (by mail, telematics, etc.), as in the case, for example, of a designer sending a drawing by email.
- **Mode 2 - consumption abroad:** the consumer moves from one country to another to receive the service, as in the case, for example, of a patient who moves to another country to receive medical treatment.
- **Mode 3 - commercial presence:** a service provider from one member country physically establishes itself in another country in order to provide its services, as in the case, for example, of a film transmission firm which establishes residence in some of its customers' countries.
- **Mode 4 - presence of natural persons:** similar to commercial presence but for persons rather than entities, as in the case, for example, of an economist travelling to give a conference on productivity.

According to WTO information, modes 1 and 3 are the most important, accounting for 30% and 55% of trade in services, respectively. Mode 2 represents 10% and mode 4 represents the remaining 5%.

After GATS, trade in services has been very dynamic, surpassing even the growth of trade in goods. Thus, the contribution of services exports to total trade rose from 1/4 to 1/3 in 20 years. Moreover, the developing world was one of the protagonists of that expansion.

a. This text box is based on WTO (2015).

Chapter 3 highlighted how trade can improve productivity through increased competition. This section highlights another channel: access to more, and potentially better, intermediate consumer goods. Amiti and Konings (2007) have explored the impact of trade on productivity through this channel in Indonesia, comparing it with the impact through the competition channel.<sup>15,16</sup> To this end, they computed a TFP measure at the establishment level, as well as average tariff measures applicable to final products and inputs, for almost 300 industries.<sup>17</sup> The

15. As discussed in Chapter 3, competition can discipline firms and encourage innovation. It also operates, however, through the selection (eliminating inefficient firms) and allocation (concentrating more resources in more productive firms) channels. These general equilibrium effects should be of first order and are not usually picked up by these empirical studies, whose focus is on effects at the establishment level.

16. The study uses data from the Indonesian manufacturing census, which contains information for all establishments with 20 or more employees. The period of analysis covers the years 1991-2001, when Indonesia experienced a significant tariff reduction: tariffs fell from an average of 21% to 8%, with significant variation between and within industries.

17. The product tariff is calculated as the simple average of the tariff on goods belonging to the specific industry. On the other hand, the tariff on the input is calculated as the weighted average of all tariffs on the product, where the weight corresponds to the fraction used for each input. This last information is computed at the establishment level using information from the 1998 survey (and only for that year), which includes information on the use of imported inputs.

**Trade in inputs also favors the transfer of technology.**

study concludes that a 10% reduction in input tariffs leads to productivity gains of 12% at the establishment level, at least doubling the gains associated with a reduction in final product tariffs.

Halpern, Koren, and Szeidl (2015) have reviewed Hungary's experience during the period 1993-2003 and found that  $\frac{1}{4}$  of productivity growth in that period can be attributed to the import of inputs. In turn, at least half of this contribution can be attributed to imperfect substitutability between domestic and imported inputs. The effects are greater for importing and foreign firms, suggesting an interesting complementarity among policies: The reduction of tariffs leads to greater profits when the fixed costs of importing (licenses and non-tariff barriers) are low and when there is greater openness to foreign direct investment.

Other authors have found similar gains from access to inputs in the case of India's trade liberalization in 1991.<sup>18</sup> For example, Khandelwal and Topalova (2011) found important productivity gains and, additionally, that improved access to inputs due to lower tariffs on intermediate goods is a quantitatively more important channel than the greater competition due to liberalization in final goods. The authors have also highlighted the importance of the environment: gains are higher in less regulated industries and in industries with more foreign direct investment.

Goldberg, Khandelwal, Pavcnik, and Topalova (2010), also in relation to the Indian experience, highlighted another positive effect of access to international inputs: the emergence of new products in the domestic market (a form of innovation). They found that the reduction in tariffs explains the emergence of about one-third of the new products created by local firms, mainly thanks to the access to varieties of inputs that did not exist in the domestic market before the opening.

Keller (2002) has argued that trade in inputs also favors technology transfers. This author proposes that countries that import inputs will receive more technology when those inputs come from countries at the technological frontier. Using industry-level data for OECD countries over the period 1970-1991, he found that input trade patterns account for about 20% of the variation in productivity growth.

In Latin America there is also interesting evidence on the importance of access to imported inputs for productivity. For example, Gopinath and Neiman (2014) have studied the economic adjustment during the Argentine crisis of the early 2000s, with particular attention to what happened in trade. During the period 2000-2002 imports fell 69% (with 45 percentage points explained by the reduction of varieties within firms)<sup>19</sup> and TFP in surviving manufacturing firms fell 11%. The authors found that the reduction in the varieties of imported intermediate goods, at the enterprise level, played an important role in the fall in productivity.

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18. India's trade reform is part of a program imposed by the International Monetary Fund. Since the reduction was drastic, comprehensive and imposed, it is often argued that changes in the level of protection are not correlated with the level of productivity of different industries (Khandelwal & Topalova, 2011).

19. Although the number of importing firms fell from around 15,000 to less than 7,000, this explains less than 8 percentage points of the fall in imports, as they were concentrated in large firms.

Schor (2004) has explored the impact of trade liberalization on the productivity of the manufacturing sector in Brazil. Like Amiti and Konings (2007) in their work on Indonesia, she has assessed tariff reductions on both final and intermediate goods.<sup>20</sup> The work confirms that the reduction of both tariffs affects productivity through the channels of greater competition and access to intermediate inputs, respectively. In this case the author finds that both channels are of comparable levels.<sup>21</sup>

Finally, Kasahara and Rodríguez (2008), studying the case of Chile, also found that the use of foreign inputs has a significant and substantial effect on firms' productivity.

Trade liberalization can have a very important effect on productivity by improving the quality of production. First, it favors the growth of importing and exporting firms (typically high-quality producers). Second, it favors economies of scale, with a particular impact on high-quality goods. Third, external demand may be biased toward higher quality products, encouraging the domestic production of these products. Finally, access to higher quality inputs favors the production of higher quality goods.

Fieler, Eslava, and Xu (2017), in a paper on the case of Colombia that models the decision on the quality of products/inputs, revealed how these quality gains are magnified through input-output relationships.<sup>22</sup> The amplified effect is explained as follows: the production of high-quality goods is intensive in high-quality inputs; consequently, the increase in quality in both exporters' and importers' production (through some of the channels described) increases the demand and supply of high-quality inputs; the increase in supply reduces the relative costs of producing higher quality goods; the increase in demand, on the other hand, increases the benefits for producers of increasing their quality. In other words, the amplification mechanism arises because these changes introduce incentives for all firms, including those not involved in international trade, to increase the quality of their inputs. In fact, firms not involved in international trade can take advantage of domestic input-output relationships and climb up the quality ladder.

In short, access to foreign inputs through international trade improves the productivity of local firms as well as their ability to create new and/or higher quality products. Part of the explanation is linked to the absence of perfect substitutes for these inputs in domestic markets, as well as to the transfer of technology. Productivity gains associated with better access to intermediate inputs are at least as large as those associated with higher external competition. They are greater when they are accompanied by other reforms such as a reduction in non-tariff barriers, an opening to foreign investment or an improvement in domestic markets. In addition, they are amplified by input-output relationships.

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20. The work used information from manufacturing firms for the period 1986-1998. During that period, there was a significant tariff reduction, with the average tariff going from 77% in 1987 to 13.6% in 1994, followed by a slight setback in the second half of the 1990s. During this decade, total imports increased 170% and imports of capital goods and inputs increased 196% and 259%, respectively.

21. This discrepancy with the study by Amiti & Konings (2007) could be due to the fact that the level of disaggregation considered by Schor is much lower.

22. The model is estimated with information from the Annual Survey of Manufacturing Establishments for the period 1982-1988. Between 1985 and 1991 the average nominal tariff fell from 32% to 12%. The reductions were particularly large in 1991.

**Latin America shows a marked quality deficiency in some services that are essential for the operation of firms.**

## The services sector

Latin America has a marked deficiency in the quality of some services that are essential for the operation of businesses. For example, in 2016,<sup>23</sup> there were no Latin American countries in the top 39 places in the World Bank Logistics Performance Index, which captures the efficiency of logistics services. These are key for increasing trade and the international penetration of firms. The two best ranked countries in the region, Panama and Chile, are placed 40 and 46 respectively, out of 160 countries considered in total, while several Latin American countries are placed in the lower half of the ranking (for example, Colombia in 94th place and Venezuela in 122nd place).

Problems in provision extend to other services, such as electricity, transport and customs. Table 4.3 presents the percentage of firms that mention problems associated with each of these services as a major constraint to their operations in the World Bank Enterprise Surveys. In all cases, this percentage is higher in Latin America and the Caribbean than in OECD countries. In the case of electricity, the sector with the most problems, more than a third of the firms surveyed report problems in this sector as a limitation to their operations.<sup>24</sup>

**Table 4.3** Quality of essential services

Percentage of firms that find a significant obstacle in:	OECD	Latin America and the Caribbean
Transport	9.5	22.9
Customs and trade regulations	4.1	20.4
Electricity	19.1	36.0

Note: Countries included in each region can be found in the Appendix.

Source: Produced by the author based on data from Enterprise Surveys (World Bank, 2017b).

There are multiple explanations for the low quality in the provision of services. To begin with, some of these services are in the hands of the public sector and/or subject to price controls. While this is not problematic in itself, in practice, public-sector management tends to have significant levels of inefficiency (CAF, 2012; CAF, 2015) and price controls are not always adequate to stimulate a high-quality service provision. In addition, some of these services face less competition, either because they are less tradable, because they are natural monopolies or because of entry barriers imposed by the Government.<sup>25</sup>

23. The most recent year available.

24. Electricity failures have significant effects on businesses. For example, according to the World Bank Enterprise Survey, the estimated losses from this concept are, on average, more than 2% of sales. Moreover, a simple statistical exercise based on this information source finds that having reported failure frequencies more than 8 times a month is associated with an average 13% lower TFP at the firm level. The exercise controls for firm size. However, the correlation is statistically different from zero with 11% significance.

25. Christopoulou and Vermeulen (2012) have found that the average price margin for manufacturing and construction was 1.18 in a sample of European countries and 1.28 in the United States, while for services it was 1.56 and 1.36, respectively. Similar patterns are found in Latin American countries (Chapter 3).

Finally, some services may be, by nature, more susceptible to corrupt practices.<sup>26</sup>

A strategy to improve the quality of services, then, could be based on four pillars: first, promoting competition, international trade, and foreign investment; second, fostering public-private partnerships; third, fighting corruption; and fourth, establishing appropriate regulatory frameworks for all of the above. Text box 4.3 illustrates a successful anti-corruption case applied to customs services. The rest of the section explores the quality of regulatory frameworks.

**Increasing the quality of services requires fostering competition, international trade and foreign investment; favoring public-private partnerships; fighting corruption; and establishing adequate regulatory frameworks.**

#### **Text box 4.3** Corruption, customs reform, and business growth in Colombia

In countries with low state capacities, customs are often prone to corruption. The problem stems, in part, from the discretionary power of customs officials to hinder different processes, with high costs in terms of time and money for firms. The inclusion of information and communication technologies (ICT) into customs procedures could limit corruption by reducing direct interaction between businesses and officials. Laajaj, Eslava, and Kinda (2017), in a paper developed in the context of this report, explore this issue on the basis of a customs reform carried out in Colombia.

The reform consisted of automating the customs procedure: importers would start declaring their imports online rather than in person. In line with the explicit objective of the reform, this reduced the opportunities for officials to use their position of power to obtain bribes. The reform was carried out sequentially at the country's customs between 2000 and 2005. Laajaj and co-authors carry out a quasi-experimental approach that takes advantage of this gradual implementation and exploit the fact that there was heterogeneity across establishments in the exposure to the reforms, according to their importing propensity.

The authors combine panel information for about 6,000 manufacturing establishments with administrative customs records for the period 2000-2005 and with reports of corruption cases. They found positive effects of the reform on imports, the level of capital, and the value added of firms. They also found a reduction in the number of corruption cases related to the National Tax and Customs Directorate (DIAN, for its acronym in Spanish) registered in the Office of the General Attorney of the Republic. The effects are quantitatively important. For example, increases in the value added of importing firms in the first, second, and third years after the reform reached 6.4%, 9.2%, and 20.7%, respectively. The value of imports increased by 81%.

The authors concluded that corruption in customs can negatively affect the productivity of firms that demand their services and that reforms based on the use of ICT can be very cost-effective.

26. A recent paper (prepared by García-Santana, Pijoan-Mas, Moral-Benito, & Ramos, 2016) documents the role of this type of problem in Spain's growth during the period 1995-2007. Although in this period product growth was 3.5%, there was a 7% decrease in TFP. A deterioration in allocation efficiency has been pointed out as responsible, which was considerably more pronounced in sectors where the bribery rate reported by Transparency International was higher. This index explores the view of how often firms (i) engage in bribery of public officials to facilitate/speed administrative processes or obtain licenses, (ii) use contributions to political parties to improve their influence, or (iii) pay or receive bribes to other private firms. From this index, the authors identify 11 sectors with high values, among them: electricity supply, construction, telecommunications, and air and sea transport.

Text box 4.4 describes three indicators that allow assessing the quality of regulatory frameworks affecting services sectors; Graph 4.2 presents information on each of these indicators.

#### **Text box 4.4** Three indicators to measure the quality of regulatory frameworks for services

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Three indicators can be used to assess the quality of regulatory frameworks that affect the operation of the service sector: (i) the OECD Product Market Regulation index; (ii) the World Bank's Services Trade Restrictions index; and (iii) the Infrascopes index that captures the quality of the regulatory-institutional framework for promoting public-private partnerships (PPPs) in infrastructure.

The Product Market Regulation (PMR) index contains information on regulatory frameworks and public policies. The index reflects how friendly these regulations and policies are for promoting competition. Information is available for 34 OECD countries and 22 non-OECD countries for the years (on or around) 1998, 2003, 2008, and 2013. Information is collected through a questionnaire and covers regulatory provisions; it therefore reflects the *de jure* situation. The PMR indicator is complemented by "network sectors" (NMR) indicators that provide information on the quality of regulatory frameworks in the following network sectors: electricity, gas, mail, telecommunications, air, rail, and land transport.

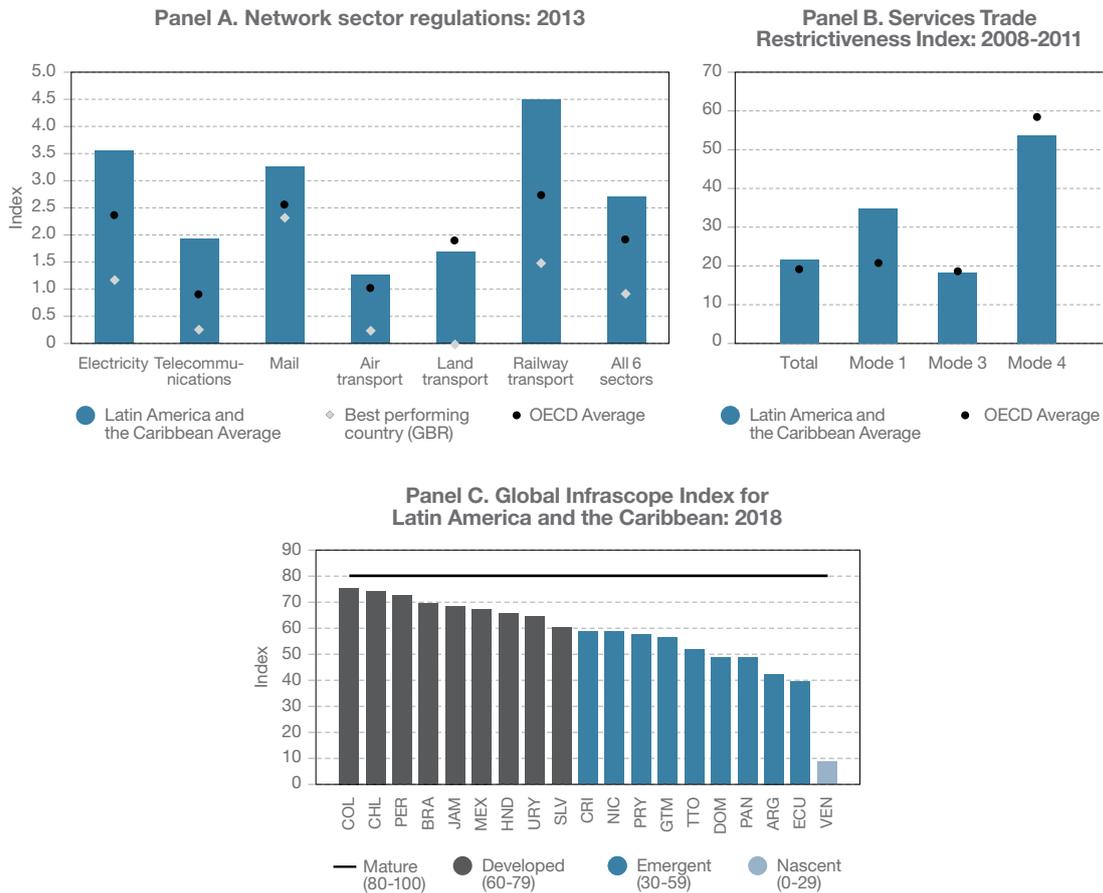
Depending on the sector, the indicator at a sectoral level is built from the aggregation of institutional quality in some of the following 5 dimensions: i) entry barriers, ii) public ownership share, iii) market structure (market shares of large firms), iv) level of vertical integration within the industry (integration of firms in activities related to the same production cycle), and v) presence of price controls (Koske, Wanner, Bitett, & Barbiero, 2015).

The Services Trade Restrictions Index (STRI) has information for 103 countries and focuses on 5 sectors: financial services, telecommunications, retail trade, transport, and professional services. In addition to a global index, separate indicators are presented for different modes of trade in services. While this indicator displays some overlap with the PMR of the OECD, both have a different focus. While the PMR focuses on regulations that can limit the growth of both domestic and foreign firms, the STRI captures regulations that fundamentally limit trade in services, including discrimination against foreign services or suppliers as well as certain key aspects of the regulatory framework that have a considerable impact on trade in services (see Koske et al., 2015, for details).

Finally, the Infrascopes index assesses the ability of countries to mobilize private investment in infrastructure through PPPs, especially in sectors such as electricity, transport, water, and solid waste management. The indicator brings together 19 indicators of a quantitative and qualitative nature, grouped into six categories. The first category (with a weighting of 25%) is associated with the regulatory and legal framework, and includes dimensions such as the consistency and quality of regulations governing PPPs and how fair and transparent the auction processes and conflict resolution mechanisms are. The second (20%) is associated with the institutional framework and considers factors such as the risk of hold-up and expropriation.

The third (15%) refers to operational maturity and considers elements such as public sector capabilities, and methods and criteria for selecting winning projects. The fourth (15%) refers to the investment climate. The fifth (15%) captures the financing facilities. And the last (10%) is an adjustment factor that assesses whether infrastructure concessions can be carried out successfully and consistently at a subnational level.

**Graph 4.2** Regulatory quality indicators for competition, services trade, and public-private partnerships



Note: In Panel A, the index ranges from zero to six, with zero reflecting the least amount of restrictions. In Panel B, Mode 1 refers to cross-border supply of services, such as, the purchase of software by a consumer from country A, which is provided by an agent from country B. Mode 3 refers to services provided in a country by a locally based partner, affiliate, subsidiary, or branch that is owned and controlled by a foreign company. Mode 4 refers to services provided by foreign individuals who are in a country temporarily, with the purpose of providing services directly to firms and consumers, or for employment in service-providing companies. Countries included in each region can be found in the Appendix.

**Source:** Produced by the author based on data from Network Sector Regulation Indicators/Product Market Regulation Indicators (Koske, Wanner, Bitetti, & Barbiero, 2015) for panel A; Services Trade Restrictiveness Index (Borchert, Gootiz, & Mattoo, 2012) for panel B; and Infrascopie Index (TEIU, 2018) for panel C.

**Despite the advances between 1998 and 2013, the region still enacts regulatory frameworks that are less favorable to competition.**

Panel A displays the OECD Product Market Regulation index. The bars indicate the average value of the indicator for Latin American countries in 2013 and the points reflect the average value of the OECD and the United Kingdom (the country with the best practices on average). Lower values are associated with a more competition-friendly environment. Although the region improved in all sectors between 1998 and 2013, the graph illustrates that it still has less competition-friendly regulatory frameworks than the reference countries in most sectors, especially in electricity, telecommunications and rail transport. In the case of land transport, regulatory frameworks appear to be slightly higher than the OECD average, but far below best practice.<sup>27</sup> It is worth noting that this index reflects the *de jure* situation; lack of state capacities could imply even greater differences between Latin America and more developed regions.

Panel B presents the World Bank's Services Trade Restrictiveness Index (STRI). Again, lower indicator values reflect a less favorable regulatory environment, in this case for trade in services. Thus, the global indicator exhibits a slight disadvantage vis-à-vis OECD countries, mainly explained by a considerable lag in Mode 1 (cross-border supply without the presence of the supplier), one of the most important forms of trade in services (recall Text box 4.2).

Finally, Panel C displays the indicator of the institutional framework around PPPs. In this case, some countries in the region, such as Colombia and Chile, are in the forefront, although they do not reach the score associated with a completely mature framework (80-100). While there has been progress in recent years, there is still much room for further improvement: approximately half of the countries in the region are in the "developed" category, with the other half in the "emerging" category and Venezuela in the "nascent" category.

What are the main regulatory restrictions in different sectors and countries? Although answering this question requires detailed research for each country, some databases contain information in this regard. In particular, the STRI database includes information on "key restrictions" that play a significant role in scoring the index by country, sector, and mode of trade.<sup>28</sup>

A first type of restriction is linked to firm ownership and entry barriers for foreign investors. For example, in some sectors and countries a cap of 49% applies to the shareholding of foreign firms. It can also happen that domestic groups have priority to acquire shares in privatization processes. In rail transport, in some countries foreign firms may participate in public tenders but only in partnership with residents. In air transport, some countries do not allow entry through a subsidiary to provide domestic services. Finally, in maritime transport, some countries give preference to domestic vessels for government cargo.

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27. The gas sector was excluded from the graph because it has information for only a few countries. In the countries for which information is available, the quality of the regulatory framework is below the OECD average.

28. The list of restrictions is exploratory and intended to be referential. Some of these regulations even have a valid justification and may also be present in developed countries.

The list of restrictions includes other aspects. On the one hand, in some cases domestic employment quotas ranging from 2/3 to 90% are imposed. In air transport, quotas are usually higher and domestic crews may be required for domestic flights. In other cases, the majority of the board of directors must be in the hands of nationals. On the other hand, the repatriation of dividends is usually subject to a tax of up to 35% and subject to the availability of foreign currency. Finally, there are other legal limitations, such as that firms must have more than one partner or, as in the case of maritime transport in some countries, applicants must be locally established to provide services and purchase at least one domestic merchant vessel.

**Increases in regulatory frameworks may bring productivity gains through the access to better service inputs.**

Just as it was established that trade opening favors productivity through the import of intermediate consumption goods, there is growing evidence that improvements in regulatory frameworks can imply productivity gains through access to better service inputs. For example, Arnold, Javorcik, and Matto (2011) explored the impact of services liberalization on the productivity of manufacturing firms in the Czech Republic and found a positive relationship between service sector reforms and the performance of domestic manufacturing firms, with the most important channel being openness to foreign competition in the services sector. Similarly, Arnold, Javorcik, Lipscomb, and Matto (2016) have found, for the case of India, that reforms in banking, insurance, telecommunications, and transportation services have important effects on the productivity of both domestic and foreign manufacturing firms (although slightly higher in the latter).<sup>29</sup>

Javorcik and Li (2013) have explored the impacts on the manufacturing industry of opening up the retail trade sector in Romania.<sup>30</sup> Conceptually, the reform of this sector can affect productivity through a variety of channels. On the one hand, it reduces distribution costs and stimulates the use of economies of scale among firms that supply goods through retail trade; on the other hand, it increases competition by improving the penetration of products of external origin. In fact, the authors have found an important effect of openness in industries that supply goods through retail trade: for example, the presence of these international chains in a region increased their TFP between 3.8% and 4.7%. The authors have further found that these TFP gains are associated with improvements in farm-level productivity and better allocation, and in comparable magnitudes.

In Latin America, Fernandes and Paunov (2011) have explored how the penetration of foreign direct investment in services in Chile affected TFP in manufacturing during the period 1995-2004, finding a positive and significant effect. They also suggest that the forward linkages of foreign direct investment

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29. The work uses data from approximately 4,000 firms for the period 1993-2005. An increase of one standard deviation in a composite variable that captures the liberalization of services results in productivity gains of 11.7% for domestic firms and 13.2% for international firms.

30. Between 1999 and 2005, the retail sector in Romania received significant penetration from international groups. The number of points of sale was multiplied by more than 17 and the area devoted to trading activities was multiplied by more than 10.

in services explain 7% of the growth of Chile's manufacturing industry in that period and that part of the profits are associated with an increase in innovation in that same industry. Finally, they have demonstrated that even the firms that are lagging behind the most in terms of productivity, benefit from foreign direct investment in services.

## Input-output relationships in Latin America

This section explores input-output relationships at the sectoral level to address three issues. First, it explores how those input-output relationships are in Latin America compared to other countries. Second, it discusses which sectors are key to improving aggregate productivity, based on their degree of influence and their level of productive lag. Finally, the magnitude of sectoral distortions and their implications for productivity are explored.

### Input-output architecture

How do input-output matrices differ from country to country? How is the degree of connectivity among sectors associated with development? The answers to these questions are subject to debate.

On the one hand, Jones (2011b) has offered a first approximation to the problem from the OECD input-output matrix database (2006 edition), which contains information for 35 countries with a breakdown into 48 industries. His somewhat provocative and maybe surprising response: input-output structures do not differ much among countries.<sup>31</sup>

On the other hand, Barterlme and Gorodnichenko (2015) studied a sample of 106 countries with different income levels (from Uganda to the United States) for a considerable period (from 1950 to the present),<sup>32</sup> finding a positive association between the average multiplier (recall Text box 4.1) and productivity measures (even after controlling for institutional and openness factors). Their most conservative estimate indicates that an increase of one standard deviation in

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31. For example, Jones has documented that for the sample of countries used, the fraction of input-output matrix elements that differs by more than 2% from its corresponding entry in the United States matrix is, on average, 11% and reaches its maximum for China (16%). Expenditure on intermediate consumption (domestic plus imported) as a proportion of production value ranges from 0.38 for Greece to 0.63 for China, with the United States showing an intermediate value (0.46). This range seems considerable. China's value is approximately 65% higher than that of Greece. However, there does not seem to be a clear relationship between this indicator and per capita income.

32. The authors built this dataset by using various sources, such as local statistical agencies and central banks, international agencies (OECD, Eurostat and United Nations) as well as academic/commercial initiatives (GTAP). The authors argue that the breadth of the panel (both in number of countries and range of development, as well as in the time dimension) is essential to identify the systematic relationship between inter-sectoral relations and development.

the average multiplier is associated with a 15% increase in output per capita, primarily due to a higher TFP. The effect is even stronger for poorer countries.<sup>33</sup> The authors interpret these results as suggestions that there are distortions at the sectoral level that depress both the intensity of relations between firms or sectors and aggregate productivity, a subject that will be addressed at the end of this section.

What does the data say about Latin America and the Caribbean? The rest of the section explores the fabric of input-output relationships in the region by computing the measures described in Text box 4.1: intermediate consumption and productive linkages. The source of the data is the latest update (2011) of the Global Trade Analysis Project (GTAP) version 9.2 database, which contains information for 120 countries, 21 of which are from the region.

Graph 4.3 illustrates intermediate consumption, both local and imported, as a proportion of production. Panel A displays the Latin American and Caribbean and OECD averages, while panel B displays the data for several countries. As can be seen, the percentage of intermediate consumption in the region is, on average, 7 percentage points lower than in the OECD, mainly due to a difference of about 5 percentage points in the imported component. This could reflect distortions such as barriers to the purchase of foreign inputs or malfunctioning customs. In addition, there are marked differences within each group of countries. In the case of Latin America, Panama, Honduras, Nicaragua and Peru are among the countries with the highest intermediate consumption shares, while Mexico, Argentina, Colombia and Venezuela are among the countries with the lowest intermediate consumption shares. The composition also varies. For example, while both Panama and Peru have a high percentage of intermediate consumption, Panama displays a very high share of foreign goods and Peru a very low one.

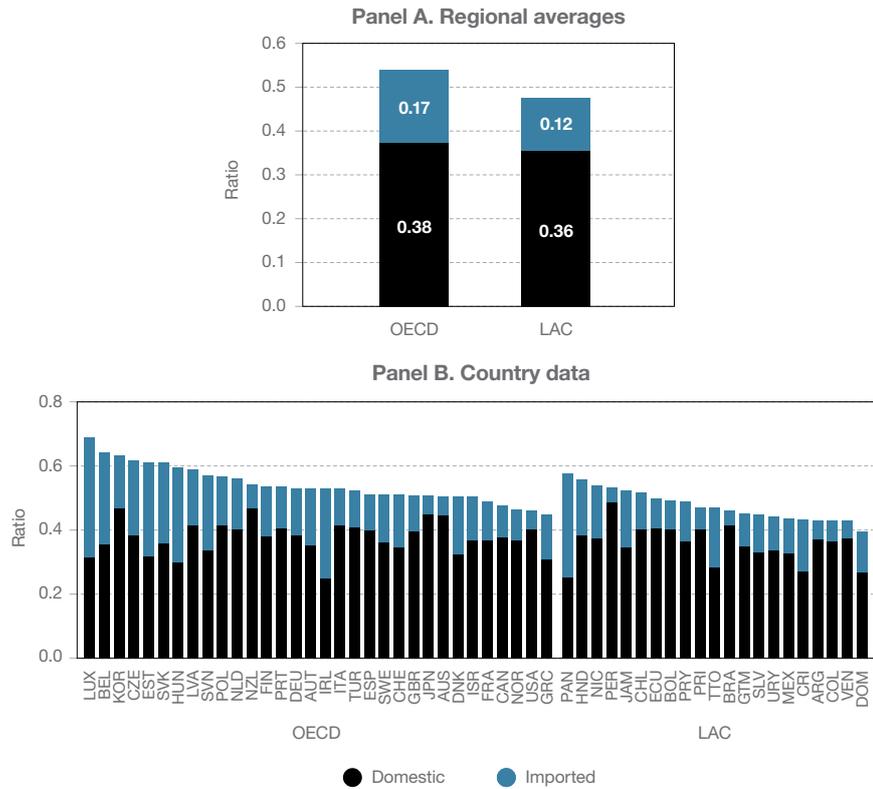
Interestingly, at the sector level, the values of intermediate consumption as a percentage of sectoral output vary considerably and are positively correlated among countries. That is to say, sectors that have a high percentage of intermediate consumption, such as the manufacture of textiles, have this characteristic both in Colombia and in Chile or Germany.<sup>34</sup> The correlation between the average sectoral intermediate consumption percentages in Latin America and the OECD is 0.87.

**Intermediate consumption in the region is, on average, 7 percentage points lower than in the OECD, mainly because of a 5 percentage points lower imported component.**

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33. As a robustness exercise, the authors estimated their models by restricting them to developed OECD countries, in which case the relationship between average multiplier and output per capita vanishes, in line with Jones (2011a) results. One interpretation of this result is that differences in input-output matrices among richer countries are not due to distortions but to technological factors, while differences in input-output matrices between rich and poor countries are due, at least in part, to the presence of strong distortions in the latter.

34. Colombia: 62.5%, Chile: 71.5%, Germany: 73.7%.

**Graph 4.3** Intermediate consumption as a fraction of production

Note: The graph shows the fraction of production value that corresponds to intermediate consumption, decomposed in its domestic and imported parts. LAC refers to Latin America and the Caribbean. Countries included in each region can be found in the Appendix. Data is from 2011.

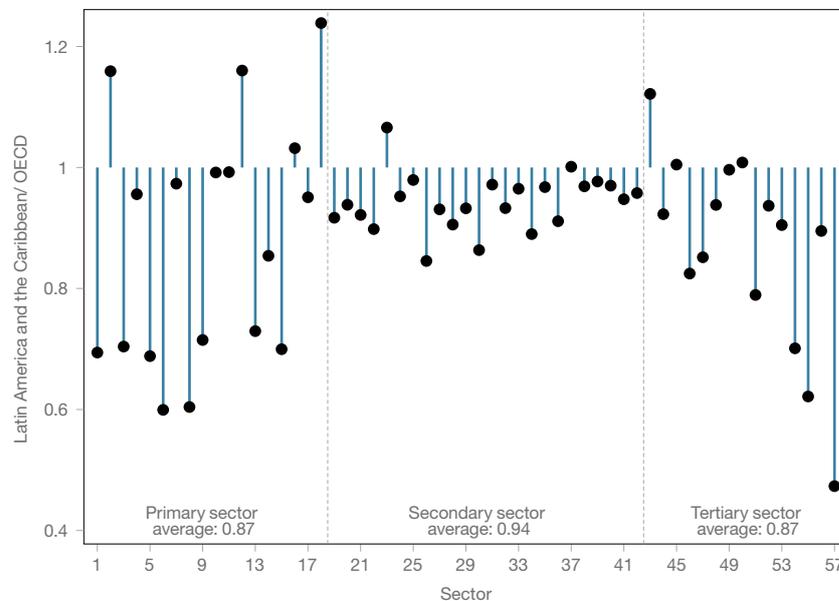
Source: Produced by the author based on data from GTAP v9.2 (Aguilar, Narayanan, & McDougall, 2016).

The analysis of relative intermediate consumption, sector by sector, displays interesting patterns. For example, Graph 4.4 illustrates the ratio between the average intermediate consumption percentages of each sector in Latin America and in the OECD, for each of the 57 sectors in the GTAP database. (Although the graph only depicts these ratios for the Latin American average, the Appendix has information for the different countries, along with the sector corresponding to each code.) The sectors are ordered on the horizontal axis in the traditional order of primary sector (left), manufacturing (middle) and finally services (right), separated by vertical dotted lines. What does it show? First, in most industries this ratio is below 1, i.e. the percentage of intermediate consumption in most sectors in the region is lower than that of the same sector in the OECD. As discussed below, under certain assumptions, these gaps in intermediate consumption may be associated with sectoral distortions. (That said, in all countries –including those with a relatively low level of intermediate consumption– some industries have an indicator greater than 1.) Second, and

perhaps more interesting, the largest intermediate consumption gaps with respect to the OECD are in the primary and services sectors. (This is true not only for the regional average but also for each country, and may reflect greater distortions in these sectors.)

**The largest gaps in intermediate consumption relative to the OECD occur in the primary and service sectors.**

**Graph 4.4** Sectoral intermediate consumption

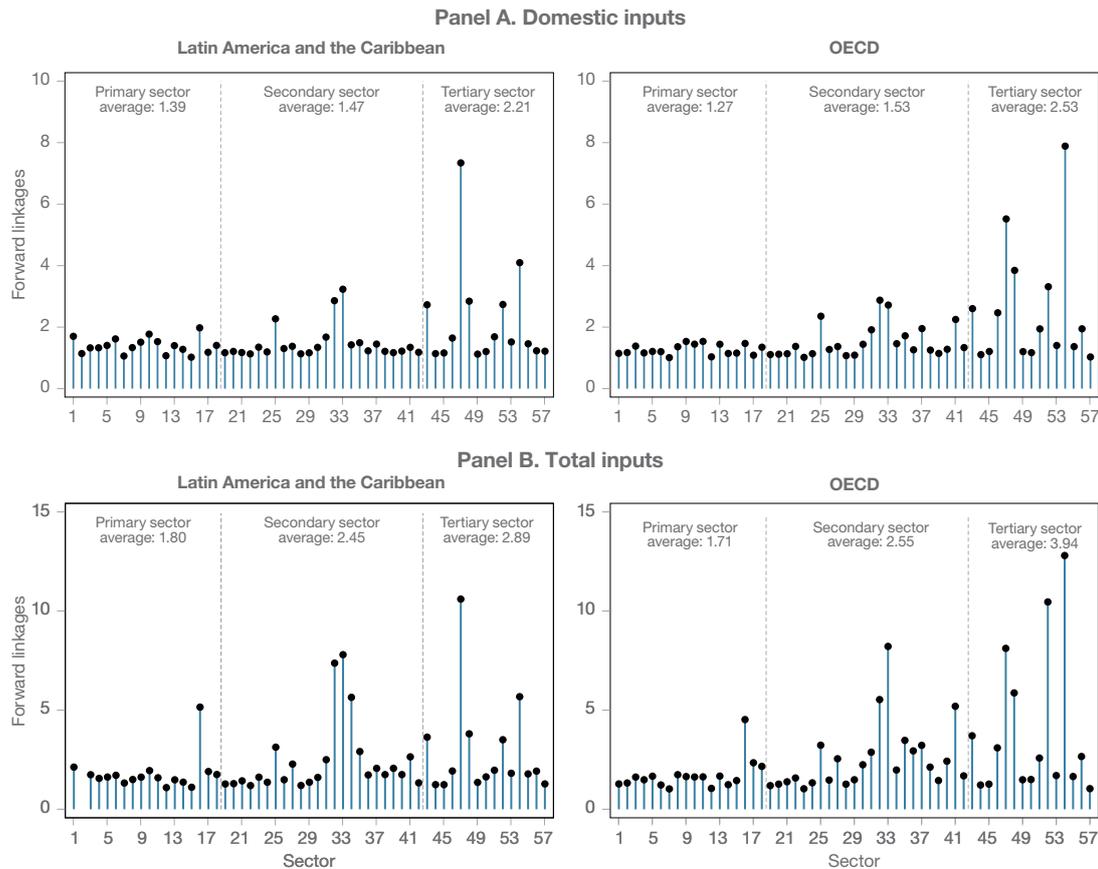


Note: The quotient of intermediate consumption (domestic + imported) and production is calculated for each country-sector. Simple averages are then calculated for Latin America and the Caribbean and OECD countries, for each sector. Finally, the ratio between Latin American and Caribbean over OECD is calculated for each sector. The dashed lines separate sectors into three major categories: primary activities, manufacturing, and services. Details of the regional and sectoral composition can be found in the Appendix. Data is from 2011.

Source: Produced by the author based on data from GTAP v9.2 (Aguilar, Narayanan, & McDougall, 2016).

With regard to productive linkages, the concept of push, which captures forward linkages, is of particular relevance to this chapter because it reflects the importance of each sector as an input supplier.<sup>35</sup> Graph 4.5 illustrates the level of push for each sector in Latin America and the OECD, taking into account only domestic consumption (Panel A) and including the external component (Panel B). The sectors are ordered on the horizontal axis in the same way as in Graph 4.4. What does this show?

35. It is interesting to explore how push correlates to pull at the sector level. The analysis does not point to a very strong correlation between these two measures and, in fact, few sectors have significantly more push and pull simultaneously than average. One exception is chemicals and plastic products. In general, the pull level is contained in a relatively narrow range, while some industries have extreme push values.

**Graph 4.5** Forward linkages

Note: Forward linkage is reported as defined in Text box 4.1. The dashed lines separate sectors into three major categories: primary activities, manufacturing and services. Details of the regional and sectoral composition can be found in the Appendix. The data is from 2011.

Source: Produced by the author based on data from GTAP v9.2 (Aguiar, Narayanan, & McDougall, 2016).

The top panel reveals that manufactures have, on average, more push than primary sector activities, and services have, on average, more push than manufactures. This trend (apparently more prominent in OECD countries) is due to certain sectors with particularly high levels of push, especially in services. Among the two sectors with the highest push in both groups of countries, business services (#54) is relatively more important in the OECD and trade (#47) is relatively more important in the region. The lower panel reveals that, by incorporating the external component, push levels increase, especially for tradable industries (manufacturing and some in the agricultural sector).<sup>36</sup>

36. In the case of Latin America, the wheat sector is excluded from the bottom panel, since for some countries in the region, forward linkages for the wheat industry acquire an extreme value when considering the imported component. This distorts the average value of the linkage at the regional level. When considering measures that rank industries according to the frequency with which they appear among the five industries with highest forward linkages (see Table 4.4), the wheat industry ranks 8th when imported inputs are also considered.

In general, there are important coincidences in the sectors that have largest forward linkages in the countries of both groups. Table 4.4 lists these sectors, indicating their position in the ranking according to the frequency with which each one appears among the five sectors with the greatest push in Latin American countries (left section) and in the OECD (right section), either taking into account only domestic inputs (first column of each section) or also considering imported inputs.

**Table 4.4** Sectors with highest forward linkages

Sector	Latin America and the Caribbean		OECD	
	Domestic inputs	Total inputs	Domestic inputs	Total inputs
47 Trade	1	1	1	2
54 Other business services	2	5	2	3
33 Chemical, rubber and plastic products	3	3	7	1
48 Other transport services	4	6	3	4
52 Other financial services	5	11	4	7
32 Oil and coal products	6	2	5	5
43 Electricity	7	7	8	.
16 Crude Oil	8	4	13	8
25 Other food products	9	9	9	12
10 Other animal products	10	.	.	.
2 Wheat	.	8	.	.
41 Other machinery and equipment	.	10	10	6
35 Ferrous metals	.	.	14	9
36 Other metals	.	.	.	10
46 Construction	.	.	6	.

Note: Forward linkages are reported as defined in Text box 4.1. The classification is based on the number of countries in which each sector appears among the five highest linkages in the corresponding region. To compare the four cases (columns), the ten sectors with the highest linkages in each case are always considered. Countries included in each region can be found in the Appendix. Data is from 2011.

**Source:** Produced by the author based on data from GTAP v9.2 (Aguiar, Narayanan, & McDougall, 2016).

When only domestic inputs are taken into account, four of the five sectors with the most push coincide in both groups of countries and correspond to the service sector: retail trade (#47), business services (#54), land transport (#48) and financial services (#52).<sup>37</sup> When considering also imported inputs, than ranking changes but coincidences remains. For example, out of the 10 sectors with the greatest push in Latin America and the Caribbean, eight remain in the top 10 when imported inputs are considered, including most services (except financial services), although they tend to lose relative position.

37. Business services include real estate, rentals and other business activities. Financial services include financial intermediation and its auxiliary activities, except insurance and pension funds.

**The input-output structure can provide useful criteria for the identification of key sectors for productive development, based on their degree of influence.**

## Key sectors

Chapter 2 explained that the problem of productivity in Latin America and the Caribbean transcends the sectoral dimension: within each sector, there are salient productivity problems when compared to more developed economies. This fact points to problems that cut across all sectors. Chapters 3, 5, and 6 address such problems in the goods, labor, and financial markets respectively. However, this does not mean an absence of sector-specific problems that merit a sectoral view. In this regard, it is useful to identify priority sectors for public policies.

The identification of priority sectors is often based on their direct contribution to employment, their export capacity, their complexity, or their potential comparative advantages. In some cases, it responds to a lobbying process that generates rents and harms productivity. Alternatively, the analysis of an economy's input-output structure can provide useful criteria for identifying key sectors for productive development, based on sectoral forward linkages or "degrees of influence", a concept presented in Jones (2011b) and developed in Text box 4.5.<sup>38</sup>

### Text box 4.5 Degree of influence of a sector<sup>a</sup>

The degree of influence is a key concept in the literature that incorporates intersectoral relations to the problem of economic development. This concept captures the extent to which an increase in the productivity of a sector increases the productivity of the economy as a whole because of its direct and indirect importance as an input supplier.

To calculate the degree of influence of a particular sector, a Cobb-Douglas type technology can be considered as a starting point, where  $b_{ij}$  represents the exponent in the production function of sector  $j$ , associated with input  $i$ . These technological parameters can be obtained from the input-output matrices, following the procedure detailed in Text box 4.6. If matrix  $\mathbf{B}$  is defined as one that groups the technological parameters  $b_{ij}$  and defines  $\mathbf{L} = (\mathbf{I} - \mathbf{B})^{-1}$ , where  $\mathbf{I}$  is the identity matrix, then the typical element  $l_{ij}$  of said matrix  $\mathbf{L}$  will be one of the known Leontief multipliers.<sup>b</sup> The degree of influence of sector  $i$ , denoted as  $m_i$ , is obtained by:

$$m_i = \left( \sum_j \beta_j l_{ij} \right) / \kappa$$

Where  $\kappa = 1 - \sum_u \left( \sum_v \beta_v l_{uv} \right) \delta_u$  and  $\delta_u$  is the percentage of intermediate consumption imported in sector  $u$ , multiplied by the value of distortion in sector  $u$  estimated according to Text box 4.6.

38. Although both terms are conceptually different, they are closely associated, as described in Text box 4.5. Moreover, the correlation coefficient between the two is, on average, 0.67, with a range between 0.4 for Panama and 0.84 for Paraguay. Likewise, the ranking of priority sectors arising from each indicator is similar. For example, if Table 4.4 were constructed using the degree of influence rather than push, four out of five sectors would remain in the top 5 (trade, land transport, other business services, and chemicals and plastics).

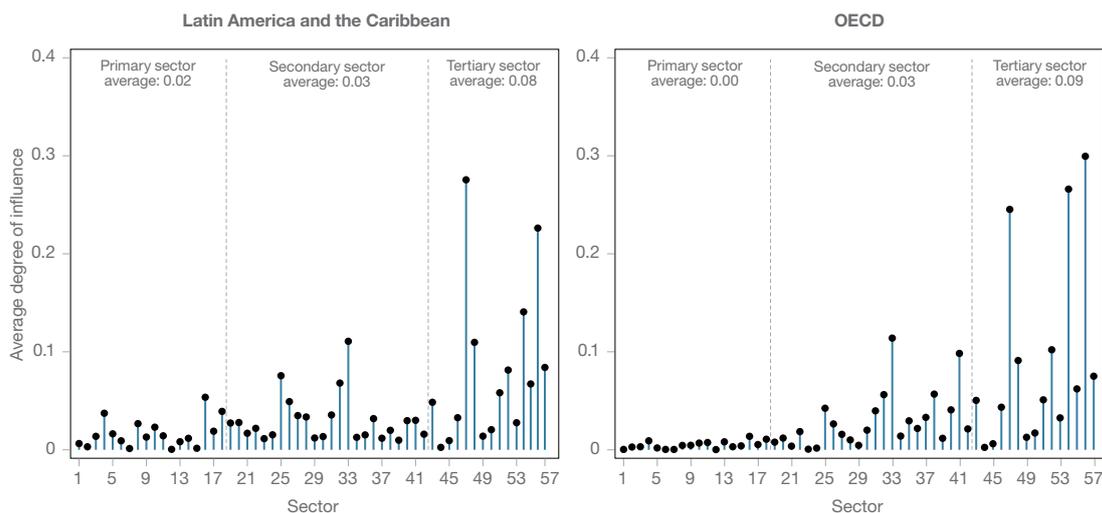
The concept of degree of influence is similar to that of push, although with two additions. First, it weights the Leontief multipliers according to the importance of sector  $j$  in value added,  $\beta_j$ , which is calculated as the output of sector  $j$  destined for final consumption as a proportion of the economy's value added. Secondly, it is normalized by the constant  $\kappa$  linked to the level of imports.

a. This text box was based on Jones (2011b).

b. To be more precise, Leontief multipliers are traditionally calculated using inputs from the input-output matrix without considering the possible existence of sectoral distortions. In this text box the Leontief multipliers are defined from the production function exponents. These two definitions coincide in the absence of sectoral distortions (see Text box 4.6).

Graph 4.6 shows the average degree of influence of each sector in Latin America and the OECD, estimated according to the methodology explained in Text box 4.5. In both cases, the services sectors tend to have the greatest degrees of influence.

**Graph 4.6** Sectoral degree of influence



Note: The degree of influence is reported as defined in Text box 4.5. The OECD is taken as the distortion-free region. The dashed lines separate the sectors into three major categories: primary activities, manufacturing, and services. Details of the regional and sectoral composition can be found in the Appendix. Data is from 2011.

Source: Produced by the author based on data from GTAP v9.2 (Aguiar, Narayanan, & McDougall, 2016).

However, in addition to the degree of influence, it is necessary to bear in mind that not all sectors have the same potential for productivity gains: the sectors with larger gap, it could be argued, have more room for improvement.<sup>39</sup> Thus,

39. This is less true if sectoral differences in productivity are due to comparative advantages generated, for example, by the presence of a natural resource or climatic conditions.

**Analyzing sectoral degree of influence and their productivity gap combined, some service sectors (other business activities, trade, transport, and electricity) and the agricultural sectors stand out.**

combining the degree of influence of the sectors with their productive lag may result in a more comprehensive criterion for identifying priority sectors for public policies from the point of view of their impact on productivity.

Leal (2017b) has adopted precisely this approach to identify key sectors in four countries of the region, extending a previous work on Mexico (Leal, 2015). Table 4.5 presents the ranking of sectors resulting from this approach. The sectors identified are those that would generate the greatest contribution to aggregate productivity if their productivity gap with respect to the OECD average were closed completely. The presence of several service sectors (other business activities, trade, transport, and electricity) and the primary sector (agriculture) is highlighted, which would probably not appear as a priority if other criteria were used.

**Table 4.5** Key sectors for development based on the degree of influence and productivity gap

Classification	Country			
	Argentina	Brazil	Chile	Mexico
1	Trade	Agriculture	Trade	Construction
2	Food and drinks	Other business services	Food and drinks	Real estate
3	Other services	Retail	Transport	Other business services
4	Agriculture	Other community, social, and personal services	Agriculture	Agriculture
5	Coke and refined petroleum products	Food and drinks	Other business services	Food and drinks
6	Education	Construction	Construction	Retail
7	Construction	Coke and refined petroleum products	Financial intermediation	Wholesale
8	Chemical products	Wholesale	Education	Coke and refined petroleum products
9	Transport	Real estate	Chemical products	Transport equipment
10	Hotel and restaurants	Land transport	Coke and refined petroleum products	Electricity

Note: The sectors shown are from a study that uses input-output matrices with a different sectoral classification than that of GTAP v9.2. The latter is used intensively in this section.

Source: Leal (2017b).

## Sectoral distortions

An emerging literature, based on input-output structures, explores the presence and magnitude of sectoral distortions and their costs in terms of productivity. This section addresses this issue. A first challenge faced by these studies is how to identify the magnitude of distortions at the sectoral level. Text box 4.6 outlines a strategy for this purpose.

### Text box 4.6 Input-output matrices and sectoral distortions

The entries of an input-output matrix are the result of multiple firms' decisions, affected by both the technology available in firms and the distortions that shape their incentives. How then to distinguish the distortions from the technological parameters on the basis of these matrices?

The identification strategy used often depends on the type of distortions considered and the functional forms utilized. For example, Bartelme and Gorodnichenko (2015) assume two types of sector-level distortions. The first,  $t_j^y$ , operates as a sales tax and introduces a gap between marginal income and marginal cost. The second,  $t_j^x$ , operates as a tax on the purchase of inputs. Both elements are specific to the sector defined by subindex  $j$  and represent, in summary form, a set of distortions of different nature.

For convenience, these models usually assume a Cobb-Douglas-type technology. In such cases, the entries of the input-output matrices are the ratio between the exponent of the input  $i$  in the production function of sector  $j$  ( $b_{ij}$ ) and a term  $t_j$  which combines both types of distortions and is defined as the quotient  $(1+t_j^y)/(1-t_j^x)$ . This implies that, the higher the value of either of the two distortions, the lower the elements of the input-output matrix and the lower the measure of the intensity of linkages, i.e. intermediate consumption.<sup>a</sup> In a world free of sectoral distortions ( $t_j = 1$ ) the elements of the input-output matrix corresponds exactly to the technological parameters of the production function.

Separating the distortions of the input-output matrices demands assumptions not exempt from criticism. For example, Leal (2015) obtains the distortion from sector  $j$  ( $t_j$ ) using two assumptions.<sup>b</sup> First, there is a distortion-free economy (in this case, and typically, the United States), so that some essential technological parameters can be extracted from its input-output matrix. Second, the sum of the exponents of the different inputs in the production function coincides among countries (a more flexible assumption than assuming that each  $b_{ij}$  coincides among countries).

From these assumptions, the distortions of a given country can be computed from the input-output matrix of that country and that of the distortion-free country. In essence, the sectoral distortion  $t_j$  corresponds to the ratio of the percentage of total intermediate consumption (local and imported) of sector  $j$  in the distortion-free country and the same percentage in the country of interest. In this section, it is assumed that the distortion-free country is the representative country of the OECD.

a. In alternative models and production functions it is also the case that the greater the distortions, the lower the intermediate consumption (Acemoglu, Antràs, & Helpman, 2007; Bartelme & Gorodnichenko, 2015).

b. Leal (2015), instead of a tax on the purchase of inputs, introduces a similar distortion in the labor market, whose identification demands an additional assumption. In particular, the coefficients of labor in the production function across sectors must be the same across countries.

**The benefits of removing sectoral distortions depend on the size and dispersion of these distortions, and also on how they relate to the sectors' degree of influence.**

How do sectoral distortions affect aggregate productivity? Leal (2015)<sup>40</sup> has identified three channels. In all cases, changes in sectoral distortions are mediated by the degree of influence of each sector. In other words, in order to assess the aggregate impact of sectoral distortions, the web of relationships among sectors must be explicitly considered.

The first channel is a direct effect linked to the supplier condition of the sector affected by the distortion. A reduction of that distortion acts in a similar way to a positive supply shock in the input that this sector produces, which spreads to all sectors through the input-output structure and generates changes in aggregate productivity depending on the degree of influence of the sector.

The second channel is linked to the allocation of factors across sectors:<sup>41</sup> an increase in the distortion of a given sector moves factors towards other sectors, but does not necessarily decrease overall productivity. Productivity will tend to decrease to the extent that the change in the distortion in the particular sector will tend to increase the dispersion among sectoral distortions.<sup>42</sup>

The third and final channel relates to the distribution of total production between intermediate consumption and final consumption (value added): an increase in the distortion in a given sector reduces the percentage of production destined for intermediate consumption in all sectors and increases that destined for final consumption. (This channel mitigates the effect of distortions on the value added of the economy.)

Thus, the gains from removing sectoral distortions depend on the size of these distortions, their dispersion and how they correlate with the degree of influence of the sector. Graph 4.7 provides information on these three statistics computed with the methodologies explained in Text boxes 4.5 and 4.6, and the input-output matrices from GTAP.<sup>43</sup> Panel A presents the average level of sectoral distortion for each of the sectors considered in Latin America and the Caribbean in 2004 (the first year with available data) and 2011 (the most recent). Panel B presents

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40. This paper omits an important channel linked to innovation and technological adoption. The same distortions that affect resource allocation also affect innovation. Endogenous innovation is already a common feature in productivity models with heterogeneous firms, but not in multisectoral models with input-output relationships.

41. In multisectoral models with input-output relationships, the allocation problem consists of distributing factors among industries until their marginal productivity is equaled in the production of the final good. For example, the marginal contribution to shirt production of a worker assigned to the fabric industry should be equal to that of a worker assigned to the button industry. Given the complementarity between these sectors, an increase in the productivity of one sector also increases the productivity of the others. Thus, in this type of model, the degree of influence of each sector plays a very important role in the assignment of productive factors (see Leal, 2015 and Leal, 2017a). This differs from the typical allocation problem addressed in models of heterogeneous firms that produce a homogeneous good (e.g., Restuccia & Rogerson, 2008). In these models, optimal allocation requires that marginal factor productivity be the same in different establishments. In the absence of distortions, the distribution of factors will depend exclusively on the relative productivity of each establishment.

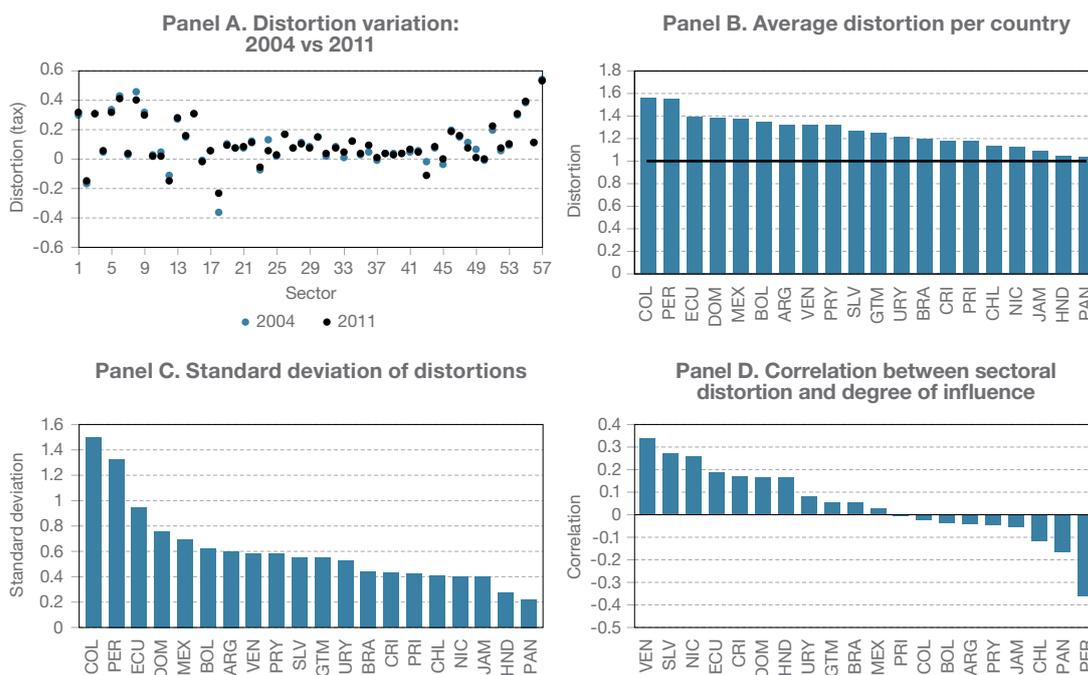
42. To the extent that the magnitude of the composite indicator of distortions is equal among sectors, there will be no problems of misallocation of resources. In such a situation, eliminating the distortion of a particular sector (and keeping the distortions of others unchanged) would attract resources to this sector and make it inefficiently large.

43. These results should be considered with caution. The identification of distortions from input-output matrices are valid within the context of a particular model and under assumptions that are free of criticisms. However, they represent an important reference to identify which sectors may suffer from severe distortions.

the average value of sectoral distortions in each country. Panel C presents the standard deviation of these sectoral distortions within each country. Finally, panel D presents the correlation between sectoral distortions and sectoral degree of influence in each country.

Panel A suggests that the greatest sectoral distortions in the region are concentrated in some industries in the primary and service sectors, with no major changes between 2004 and 2011. Within the region, panels B and C point to Peru, Colombia, Ecuador and Mexico as the countries with the highest average levels and the greatest dispersion of their sectoral distortions. Panel D shows that while in some countries the sectors with the greatest distortions are also the sectors with the greatest degree of influence, in other cases the correlation is negative. For example, within the group of countries with the highest levels of average sectoral distortion, sectoral distortions in Ecuador are positively correlated with sectoral degrees of influence (with a correlation of around 0.2), while in Peru the opposite occurs (with a negative correlation coefficient of around -0.4).

**Graph 4.7** Sectoral distortions



Note: Distortions are estimated using total inputs and under the assumption that the distortion-free country is the average country from the OECD. Panel A shows the simple average of sectoral distortions for the sample of Latin America and the Caribbean (LAC) countries. In Panel D, the degrees of influence include the international trade adjustment and are based on distortion-free input-output matrices. Trinidad and Tobago and sector 57 (dwellings) are not included in panels B, C, and D as they have atypical values that distort the moments of the distribution. Details of the regional and sectoral composition of LAC can be found in the Appendix. Data for panels B, C, and D corresponds to 2011.

Source: Produced by the author based on data from GTAP v9.2 (Aguiar, Narayanan, & McDougall, 2016).

**Sectoral distortions that affect input markets account for a non-negligible fraction of the productivity gaps between countries.**

How harmful are sectoral distortions to aggregate productivity? Bartelme and Gorodnichenko (2015) have explored this question for a wide sample of countries, finding heterogeneous effects of removing distortions according to country development level, with the greatest gains in the least developed countries (where greater distortions are expected). For the country with gains around the mean, they found that aggregate productivity increases between 4% and 10% depending on the method of identifying distortions;<sup>44</sup> for countries in the 75th percentile of the gains distribution, they found productivity increases between 13% and 20%. In general, they found the greatest gains come from eliminating distortions in the agricultural and service industries. They concluded that sectoral distortions affecting input markets explain a modest but not negligible fraction of the productivity gaps among countries.

Table 4.6 illustrates the output gains (caused by productivity changes) that would be realized by removing distortions in several Latin American countries, based on different exercises carried out by Leal (2017b). The first column displays the gains that would be achieved by removing all distortions (those that operate as a sales tax and those that operate as a wage tax) and the second column the gains achieved by removing only the distortion that operates as a sales tax. On average, the gains from removing distortions in the region amount to 14% and are largely explained by the removal of the distortion that operates as a sales tax (also called markup because it can be a sign of an uncompetitive market structure). These gains are quite heterogeneous within the region: While Mexico and Colombia would realize gains of 26% and 18%, respectively, if they eliminated all their sectoral distortions, Peru would obtain gains of 7%.

**Table 4.6** Output gains from removing distortions

Country	Distortions	
	Total	Sales tax type
Argentina	9	5
Brazil	10	6
Chile	15	11
Colombia	18	14
Costa Rica	15	10
Mexico	26	20
Peru	7	4
Average	14	10

Note: The table shows counterfactual exercises of distortion removals and their effects on output. The data refers to percentage variations.

Source: Leal (2017b).

44. Two alternative identification strategies are used in this study. The first is essentially as described in Text box 4.6. The second relaxes the assumption that the sum of input exponents in the production function is the same for all countries. To this end, the authors identify a set of (developed) countries assumed to be free of distortions and under this set, they estimate a statistical model that explains the percentages of intermediate consumption as a function of observable variables. This model is then used to predict the value of technological parameters in countries with distortions. With these technological parameters and using the input-output matrices entries, they compute sectoral distortions.

These results are consistent with those in Graph 4.7. Colombia and Mexico, the countries that exhibit the greatest gains from removing distortions, are among the countries with the highest average levels and dispersion of distortions. Peru, the country that would obtain the least gains, although it is among the countries with the greatest distortions, displays a negative correlation between distortions and degree of influence. In other words, it has the greatest distortions in less interconnected sectors and vice versa.<sup>45</sup>

The results suggest that sectoral distortions do harm productivity. But through which of the aforementioned channels? In calculating the gains that would be obtained from removing sectoral distortions, Leal (2017b) also performed decomposition exercises and has suggested that the relative importance of the supply and allocation channels varies among countries. One extreme is Argentina, where the mechanism linked to the role of each sector as an input supplier (“supply effect”) improves output due to changes in TFP by 13%, while the effect linked to factor allocation among sectors (“allocation effect”) improves it by 5%. The other extreme is Costa Rica, where the supply channel implies gains of almost 3% in output and the allocation channel, gains of 13%.<sup>46</sup>

In short, sectoral distortions and the resulting losses in productivity play a non-negligible role in the region’s productive lag. Removing these distortions leads to potentially significant productivity gains, especially when the focus is on the most influential sectors.

## Clusters

Taking interactions among firms –and between firms and other organizations– beyond a mere sporadic and anonymous relationship to a space of cooperation, in order to address matters of collective interest and exploit synergies, is fruitful from the point of view of productivity. Clusters and value chains are forms of organizing production that point in that direction.

### What are they and how do they arise?

Clustering refers to the phenomenon of geographic concentration of horizontally and vertically linked firms and institutional actors that specialize in related lines of business or operate in a particular field (see Möhring, 2005). They are usually comprised of firms that produce the “typical” goods or services of the cluster, together with input and service suppliers necessary

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45. Distortions presented in Graph 4.7 are our own, computed with data from GTAP v9.2 and using the average OECD country as the reference country. Although Leal (2017b) uses a different source and takes the United States as the reference country, the results are consistent.

46. The sum of these effects may exceed total gains because other effects move in the opposite direction; in particular, the allocation of production between final uses and intermediate uses.

**Productive clusters may stem from service and high-tech industries, but also in primary sector industries, as frequently occurs in the region.**

for their production. They may also include funding providers, educational and research institutions, and different levels of government.

Clusters relate to another concept, value chains. Value chains are the sets of activities required to produce a particular product or service, from conception through production and marketing, up to disposal (Kaplinsky & Morris, 2001). Value chains facilitate the creation of productive alliances and the flow of knowledge among participants. Understanding how they work allows for identifying bottlenecks and potentially improving their efficiency.

Clusters and value chains are closely related for several reasons. First, there are value chains within each cluster and it is common to identify, analyze and strengthen them as part of cluster promotion policies. Second, clusters (or more formally, their firms) are typically integrated into value chains external to the cluster (Rabelotti & Pietrobelli, 2006), especially when the firms or clusters are oriented to exports. Although this section concentrates on clusters and public policies related to clusters, many of these policies are applicable to value chains or firms that are not necessarily clustered.

The productive agglomeration around clusters has emblematic examples in the world, such as the entertainment industry in Hollywood, the technology industry in Silicon Valley, and the advertising industry in Manhattan. In Latin America, the salmon industry in Chile, agribusiness in Peru, the software industry in Mexico, the ceramics industry in Tambaú, Brazil, or the tourism industry in Colonia del Sacramento, Uruguay, can be cited as examples.<sup>47</sup> In general, clusters emerge spontaneously for a variety of reasons (such as the presence of certain environmental conditions, a historical tradition or a leading firm). Furthermore, as is clear from the list of examples, they may originate in service industries, in high-tech industries, but also and often in the region, in primary sector industries. Although supply policies have often tended to support non-traditional sectors that do not always have advantages, believing that these sectors generate the greatest spillovers, some authors stress that what is important is not what is produced, but how it is produced (Rodríguez-Clare, Rodríguez, & Fischer, 2005 and De Ferranti, Perry, Lederman, & Maloney, 2002).

Clusters host a myriad of public-private, private-private and public-public interactions. Achieving good coordination between these different instances is important for the productive development of the firms in a cluster. Text box 4.7 very briefly presents the experience of the fruit and vegetable cluster on the coast of Peru as an example of how many of the challenges of clusters demand coordinated actions among their main actors.

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47. Many authors have documented the experience of these and other clusters. For example, Rabelotti & Pietrobelli (2006) analyzed the experience of 40 clusters in the region.

#### **Text box 4.7** The fruit and vegetable cluster on the coast of Peru<sup>a</sup>

The agricultural sector has been one of the most dynamic sectors in Peru, especially in its non-traditional products. Since 2000, Peru's non-traditional agricultural exports have soared up to a twelvefold growth, surpassing the growth of total exports in the same period. Within this sector, the fruit and vegetable cluster on the coast of Peru stands out, identified as one of the 16 priority clusters in a study by the National Competitiveness Council of Peru at the end of 2013.

This cluster is comprised of firms, institutions and other agents involved in the production, marketing, distribution and export of four products: avocado, fresh asparagus, fresh grapes and citrus fruits. At the time of the study, the cluster was made up of 339 firms (178 micro and small, and 161 medium and large), employed more than 130,000 workers and exported more than 90% of its production.

The value chain of this cluster includes everything from the auxiliary industry that provides raw materials, packaging equipment and services, and phytosanitary control, to the firms that are dedicated exclusively to the export of fruit and vegetable products, through the key actors involved in production: this includes small artisanal producers as well as large producers and stockpilers that export. The set of actors also include related associations and guilds.

Part of the success of the cluster rests on the efficiency of its producers, who achieve a higher output per hectare than the international average. In some crops, such as asparagus, it also has the advantage of being able to produce throughout the year.

Part of their common challenges is overcoming phytosanitary restrictions for major destinations. Small producers have the challenge of achieving greater consolidation and coordination, which favors greater technology and training, and a better regularization and standardization of their production. Meanwhile, large producers and stockpilers face the challenge of reducing the seasonality of production, as in the case of asparagus, and working on post-harvest aspects to extend the duration of products.

a. This text box is based on Gaia & D'Avila (2013).

Beyond paradigmatic clusters, industrial agglomeration is frequent in the organization of production. For example, Ellison and Glaeser (1997) have documented how about 97% of U.S. manufacturing industries are more spatially concentrated than might be expected based on the spatial distribution of the population.<sup>48</sup> Chatterji, Glaeser, and Kerr (2014) have also found that spatial concentration occurs not only in production but also in innovation and firm creation. And Ciccone and Hall (1996) have related this concentration to higher productivity; in particular, they found that more than half of the

48. Similar results can be found for the United Kingdom (Duranton & Overman, 2005).

**Firms cluster spatially in order to access a common labor market, reduce transport and other transactional costs, and take advantage of the knowledge spillovers.**

variance in output per worker among states in the United States is explained by employment density.

Why is economic activity concentrated at the spatial level? A first reason is the spatial distribution of resources, especially natural resources and environmental factors. However, the level of spatial concentration of economic activity is too high to depend only this factor (Ellison & Glaeser, 1999; Ellison, Glaeser, & Kerr, 2010).

Alfred Marshall (1890) is responsible for one of the first explanations of the spatial concentration of economic activity and the formation of clusters. According to the “Marshallian” paradigm, firms are spatially agglomerated to take advantage of three non-excluding types of external economies of scale namely: i) those linked to access to a common labor market<sup>49</sup> (or shared public goods); ii) those linked to transportation and other transaction cost savings due to proximity among firms; and iii) those arising from spillovers in the dissemination of knowledge.

Ellison et al. (2010) provide evidence supporting these three types of Marshallian external economies to explain the agglomeration of economic activity in the United States. The authors found that, as a whole, these external economies are even more important to explain agglomeration than natural advantages. Within external economies, input-output relationships and access to a common labor market are the most important, while knowledge spillovers, though of more modest importance, are also both statistically and economically significant.

External economies are a source of productivity gains for clusters. However, it is the combination of these external economies with collective actions, associated with the coordination of cluster members, that determines the collective efficiency of a cluster, that is, its capacity to promote productive development for firms (Schmitz, 1999).

These collective actions can take different forms: between a producer and an input supplier, to identify appropriate channels and forms of marketing; among a group of competing firms, to develop a strategy of internationalization or joint innovation; or among firms in the cluster and a level of government, to coordinate important regulatory aspects or the provision of certain infrastructure. Rabelotti and Pietrobelli (2006) have highlighted that, in addition to these actions “inside” the cluster, exploiting the external dimension of the cluster (e.g. its connection to global value chains) is also important for promoting the productive development of its firms.

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49. The spatial concentration of firms belonging to related industries favors the accumulation of specific skills, which brings productive benefits due to specialization gains (see Text box 4.8 on coordination problems).

In short, clusters can potentially induce a number of phenomena that favorably affect the productivity such as the division and specialization of labor, the development of a broad and high-quality supply of inputs, the emergence of essential public goods and infrastructure, the creation of business associations, the connection with universities and specialized research and training centers, and greater knowledge spillover. However, taking maximum advantage of these forces often depends on the support of public interventions.

**The agglomeration of economic activity does not guarantee that firms reach their full potential, nor that their potential synergies are fully exploited.**

## Clusters and public policies

Even when it occurs spontaneously, the spatial agglomeration of economic activity does not guarantee that relationships among agglomerated firms will reach their maximum potential, nor that their potential synergies will be exploited to the utmost. Various situations may lead to an inferior result for individual firms than would be the case if firms acted in a coordinated manner. When this happens, it is said that there are “coordination failures” (see Text box 4.8).

### **Text box 4.8** Clusters and coordination failures<sup>a</sup>

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A firm’s productivity depends not only on its actions but also on the actions of other firms. Unfortunately, the actions of the stakeholders involved in the productive process (including the State) are not always aligned to achieve the best possible outcome. In other words, the market outcome could be suboptimal relative to what could be achieved if expectations and actions were ideally coordinated. When this happens, it is said that there is a “coordination failure”.

Although this problem arises in different contexts, it acquires particular relevance in the creation and performance of clusters. Rodríguez-Clare, Rodríguez, and Fischer (2005), for example, define clusters as “agglomerations of firms and organizations in related economic activities among which coordination failures are likely to arise”. These coordination failures can occur for a variety of reasons.

First, they may appear because of economies of scale. For example, let us consider a hypothetical industry producing with two technologies: a “traditional”, labor-intensive one, and a “modern” one, intensive in specialized inputs. If economies of scale exist in the production of specialized inputs, modern technology can be profitable only if a sufficient quantity of these inputs is produced, which would require many firms to opt for modern technology. In this context, there are multiple equilibriums: if firms do not coordinate to adopt the modern technology (good equilibrium), none of them would be better off adopting it individually and all of them would maintain traditional technology (bad equilibrium).<sup>b</sup>

Second, coordination failures may arise from the need for “thick markets”, i.e. markets with many buyers and suppliers. For example, consider an industry in which firms must decide whether to adopt a technology that requires workers with specific human capital. If the market for this specific human capital is not thick enough, a coordination problem arises: workers are unwilling to invest in the accumulation of this specific human capital because few firms demand it and few firms are willing to adopt the technology in question given the scarce supply of workers with such skill. Given the risk of separation and search frictions, firms do not have incentives either to invest in this specific human capital.

Third, knowledge spillovers can also lead to coordination failures. For example, consider again the case of a hypothetical economy with “traditional” and “modern” technologies, where modern technology is more expensive but allows for potentially higher productivity, which depends on the percentage of firms adopting it. In this context, it is possible to achieve an equilibrium in which all firms operate with modern technology (with a high level of productivity) or another in which all firms operate with traditional technology. If only a few firms operate with modern technology, there are no incentives for any of them to adopt it; on the contrary, if a large fraction of firms adopt it, due to the presence of spillovers, it becomes profitable for all of them to do so.

Finally, coordination failures may also occur in the supply of public goods. Given the nature of these goods (no rivalry and no exclusion), it is typically not desirable to produce them individually, as other agents will have incentives to use them without contributing to their financing (free riding). This can lead to a bad equilibrium in which the public good is not produced.

a. This text box is based on Rodríguez-Clare, Rodríguez, & Fischer (2005).

b. The claim that the “good” equilibrium is better, implicitly assumes that there are productive benefits to specialization. In addition, for the economy to be trapped in the bad equilibrium there must be certain restrictions on the possibility of trading these inputs internationally.

In some cases, firms can cooperate to overcome such failures. In fact, there are many successful private-private coordination experiences in Latin America (such as the Colombian Association of Flower Exporters).<sup>50</sup> In other cases, the role of public policies is fundamental.

In general, cluster promotion policies combine actions aimed at different objectives. These policies should be multidimensional, posed within a medium-term horizon and structured in stages. The first stage typically involves the identification of clusters and key actors in each case. The second stage includes a diagnosis of each cluster to identify its potentialities and challenges, and

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50. Due to their environmental conditions, some geographical areas of Colombia present ideal conditions for growing flowers. The main challenges to develop the exporting capacity of this industry were logistic, given the fragility of the product and the need to transport it. Asocolflores, created in 1973, played an important role in overcoming these challenges. Among other actions, it organized air transportation to have a viable scale, created a company responsible for logistics management in the United States and even hired lawyers and technical advisors to lobby when faced with pressure from American producers (see Crespi, Fernández-Arias, & Stein, 2014). Today, Colombia is a major exporter of flowers to the United States, in part due to private coordination.

postulate strategies. The third stage is the implementation phase and a final phase should encourage and favor the sustainability and independence of the clusters. (World Bank, 2009a).

Cluster promotion policies share some elements with other supply policies. Like development poles and special economic zones, clusters also have a geographic dimension. However, in these latter strategies the approach seems to be much more top-down, with the State leading in the spatial allocation of resources and implementing substantial tax incentives and/or a strong infrastructure provision from the onset. In contrast, the distinctive focus of cluster policies is to favor public-private and private-private cooperation, with a more gradual and market-based approach; they seek to activate an exploration mechanism that allows for the identification of spaces for intervention, with initial stages focused on coordination and subsequent stages that, in some cases, may involve the provision of public goods.

**Policies for the promotion of clusters should be framed within a medium-term, global productivity strategy.**

**Figure 4.1** A set of actions to support cluster development

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### Cluster identification and institutional capacity building

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- Develop cluster maps and identify key players
- Encourage the creation of sectoral associations and the development of their capabilities
- Encourage capabilities in cluster-promoting public institutions

### Promotion of external economies and strengthening of internal linkages

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- Promote specialized skill training centers
- Promote joint innovation
- Strengthen the local provision of essential services for the cluster (including infrastructure services)
- Improve scale and capabilities of suppliers, including their access to credit
- Create and promote trust among firms
- Promote the establishment of joint projects
- Strengthen business associations

### Strengthening of external linkages

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- Improve logistic infrastructure
- Develop brands and marketing strategies
- Support the development of distribution chains
- Attract value chain leaders and potential investors to the cluster
- Aid firms in their quest to meet international standards

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**Source:** Prepared by the author based on data from OECD (2010) and Rabelotti & Pietrobelli (2006).

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**Cluster support policies should aim for the identification of clusters, the creation of institutional capacities, and the strengthening of internal and external linkages.**

Figure 4.1 provides a list of typical actions to support clusters organized according to three objectives: i) cluster identification and institutional capacity building, ii) promotion of external economies and strengthening of internal linkages and iii) strengthening of external linkages. Clearly, some actions may favor more than one objective and it is common for interventions to include simultaneous actions with several objectives.

Priorities may also vary by sector. For example, for clusters linked to natural resources, especially in the agricultural and agribusiness sectors, adopting quality and sanitary standards and improving access to basic infrastructure (e.g. irrigation) may be a priority; for technology clusters, it may be more important to foster collaboration for innovation among firms, and between firms and research centers, as well as to facilitate highly skilled and specialized labor; for clusters linked to traditional manufacture, the most effective strategies may be to strengthen linkages between producers and suppliers, as well as to promote access to new markets and value chains outside the cluster (Rabelotti & Pietrobelli, 2006).

Strengthening internal linkages, and especially the development of input providers, is at the heart of many cluster (and value chain) interventions. On many occasions an anchor firm leads or supports these interventions, as is the case of the Supplier Development Program of CORFO (government agency of Chile). This program accepts proposals from leading firms to help improve the status of their suppliers, typically small businesses.<sup>51</sup> According to the quasi-experimental evaluation of Arráiz, Henríquez, and Stucchi (2013), this program produced an increase in sales, employment, and sustainability of suppliers, as well as higher sales and a greater likelihood of exporting by large firms that were their customers. CAF -development bank of Latin America- has also supported interventions that are based on anchor enterprises. Two examples in the Ecuadorian agribusiness sector are the case of Pronaca and the Agroinversiones trust (see Text box 4.9) and the case of Ecuaquímica, within the framework of the National Plan for High Yield Seeds (see Text box 4.10).

Strengthening the external links of local firms, particularly their integration into global value chains, also looks promising, as it allows for greater specialization, improves access to a greater variety of inputs, economies of scale and technological diffusion. Unfortunately, Latin America has a low level of integration into global value chains (see, for example, OECD/CAF/ECLAC, 2018).

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51. The leading company must have annual sales of at least USD 42 million and must postulate at least 20 small and medium-sized firms as suppliers (see Crespi, Fernandez-Arias, & Stein, 2014).

**Text box 4.9 Pronaca and the Agroinversiones Trust in Ecuador<sup>a</sup>**

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In Ecuador there are about 5,000 small and medium corn farmers, many of whom lack access to financing. Faced with this situation, the firm Pronaca,<sup>b</sup> the main client of local corn producers, began to offer credit facilities for corn producers to start their crop cycles and then pay with the harvest. In addition to access to financing for working capital, the support package includes technical assistance and crop purchases.

In 2002, Pronaca institutionalized the financing of producers through the creation of the Agroinversiones trust, with a model that offered direct credit to producers. Starting in 2014, the model evolved in such a way that once the trust approves the credit to the producer, this is materialized through the delivery of inputs (seeds, fertilizers, etc.). Once the producer delivers the crop to Pronaca, Pronaca reimburses the trust for the payment of the debt and transfers the cash to the producer to cover the differential between the value of the crop delivered and the inputs received. As an additional value added, the model relies on Pronaca's experience and knowledge in the agricultural sector, which is transferred to producers in technical assistance programs.

Agroinversiones, in addition to being financially sustainable, played an important role in covering a gap in access to financing and promoting the development of the production chain. Its independence facilitates the investment of new capital in the fund. In fact, in 2004, CAF approved resources for a patrimonial investment of up to USD 1 million in the trust, which increased to USD 1.4 million in 2014.

At the end of 2016, the contributions of CAF (USD 1.4 million) and Pronaca (USD 5.4 million) made possible a financing of USD 66.2 million for corn farmers between 2006 and 2016, with a portfolio value of USD 6.6 million at the end of 2016. The average financing has been USD 8 million per year for a total of 600 benefited producers, with an average profit of USD 187,000 per year.

The productivity of the farmers benefiting from the program has tripled since its inception, due to the combination of availability of better inputs, certified seeds and timely financing.

The Agroinversiones trust is a good example of how sustainable mechanisms can emerge within value chains that favor productivity by attacking problems of access to credit and promoting the dissemination of knowledge.

a. This text box is based on an internal CAF document (Armas & Vidal, 2017).

b. Pronaca is one of the main agroindustrial firms in Ecuador. It manufactures animal feed and its main input is local corn production

#### **Text box 4.10 Ecuaquímica: Increasing value creation in the corn chain<sup>a</sup>**

In 2013, Ecuador's Ministry of Agriculture, Livestock, Aquaculture and Fisheries (MAGAP, for its acronym in Spanish) implemented the National High Yield Seed Plan to provide agricultural packages to small farmers in the provinces of Guayas, Los Ríos, Manabí and Loja. MAGAP, in alliance with Banecuador, the Decentralized Autonomous Governments, and private firms, provided subsidized technology packages that included certified seeds, soil fertilizers and agrochemicals to producers with up to 10 hectares of rice, potato and corn crops. The aim of the program was to increase farmers' productivity, bearing in mind that at the start of the program very few producers used high-yielding seeds and there was a high dependence on imports.

The role of the participating firms was to provide the packages, including inputs, financing, training and technical assistance. One of them, Ecuaquímica, was a pioneer in adapting the packages to the needs of small producers.

In 2016, CAF -development bank of Latin America- granted Ecuaquímica a credit line to finance the purchase of corn from small and medium producers. This helped increase the program's scope, reaching 7,000 producers, of whom more than 2,000 benefited from CAF's contribution.

The program improved small farmers' access to financial credit and land titling, as well as access to better inputs and technical assistance in the field. Thus, it allowed generating an increase in average corn productivity from 3.8 ton/ha to 7.66 ton/ha. High-yielding seeds were key to this transformation: with previous seeds, an average of 65 quintals per hectare were collected, while after the program, 180 quintals per hectare were collected, i.e. 177% more. As a result, producers' net profit in 2017 ranged from USD 890 to USD 1,392 per hectare, while for farmers who did not participate in the program, the average net profit was only USD 102 per hectare.

The case of the Ecuaquímica program illustrates how a plan that involves public and private actors, and an anchor that firm addresses the critical elements of a productive chain (such as financing, the provision of inputs, the formalization of producers, the incorporation of technological packages and technical support), can promote important increases in productivity.

a. This text box was prepared for this report by Karina Azar.

### **What does the evidence say and what risks do these programs entail?**

While the anecdotal evidence emerging from case studies is encouraging and some evidence suggests that agglomeration is associated with productivity, there is still very little rigorous evidence on the effectiveness of cluster programs. The evaluation of their impact is complicated by the difficulty of implementing a credible identification strategy, the multidimensionality of the programs, and problems of external validity.

Some studies indicate that public policies seem to have only a moderate impact on the competitive success of clusters (Enright, 2000). Maffioli, Stucchi, and Pietrobelli (2016) have explored the challenges of this literature and have suggested more rigorous evaluation strategies. They have also compiled some of the studies with the best identification strategy on the subject; their work confirms that there is little clarity about the effectiveness of these policies and the channels through which they operate. Table 4.7 summarizes the studies reviewed by these authors.

**Cluster policies have important virtues. However, they are not risk-free.**

**Table 4.7** Assessment of cluster programs

Program	Methodology	Results
PROFO program to encourage joint cooperation and efficiency (Maffioli, 2005)	OLS, random effects, and probit models	Positive effects on firm productivity. This effect has a positive correlation with the firm's centrality and network density (objective of PROFO interventions).
Cluster policy in Germany (1999) aimed at increasing innovation and competitiveness, boosting cooperation between business, financial, and scientific stakeholders (Falck, Heblich, & Kipar, 2010).	Differences in differences	Positive effect on innovation probability, access to "external knowledge", and cooperation with scientific institutions. Negative effect on R&D expenses.
Cluster support program in Japan based on R&D support and network coordination (Nishimura & Okakumo, 2011).	Instrumental variables	Collaboration between universities and industries increases R&D investment productivity. Being part of a cluster in itself has no effects, while collaborating with distant partners increases quality and quantity of patents.
Cluster policy in France to increase cooperation among firms and competitiveness (Martin, Mayeres, & Mayenris, 2011).	Double and triple differences, and matching	No effects on productivity and no robust effects on employment or exports.
Basque cluster policy from the 90s (Aranguren, De La Maza, Parrilli, Vendrell-Herrero, & Wilson, 2014)	OLS and matching	Weak evidence suggesting an increase in association. Participants show higher productivity and productivity growth than non-participants.
<i>Arranjos Produtivos Locais</i> (Brazil): promote within-firm efficiency and cooperation capacities (Fidal Garone, Maffioli, de Negri, Rodriguez, & Vázquez-Baré, 2015).	Fixed effects with reweighting (entropy matching)	Positive effect on employment, export volume, and probability of exporting.

**Source:** Maffioli, Stucchi, & Pietrobelli (2016).

Cluster policies have important virtues. In particular, they can be justified on market failures and operate at an intermediate level between policies at the industrial scale and policies at the firm level, which favors the spillover effects of interventions.<sup>52</sup> Thus, they differ from other supply policies with unsatisfactory results, yet are not exempt from the same or similar risks. In essence, these risks are associated with the failures of the State.

First, the objectives of public policy decision-makers are not always aimed at achieving productive development. Thus, cluster policies can be geared towards private interests.

52. For example, a common argument for subsidizing/supporting innovation programs is the existence of spillover effects. These effects should be stronger the closer the firms are –both in the product space and geographically– and the more collaborative the innovation activities are. These favorable conditions are more likely when firms form part of a cluster.

**It is best for the State not to attempt forming a cluster from scratch. Instead, it should support sectors with known comparative advantages.**

Second, the State may not have the information or capacity to promote better coordination than the market or to identify the best opportunities for synergies. Thus, the selection of beneficiaries may be erroneous or the size of the intervention may be exaggerated, leading, for example, to excess infrastructure or sectoral and spatial distortions that undermine overall productivity.

In order to mitigate these risks, the State should not attempt to create a cluster from scratch, but rather to support sectors where comparative advantages have already been identified.

Even so, cluster policies have their limitations and should be designed with several aspects in mind. First, they are not a substitute to cross-cutting, horizontal policies to improve productivity, several of which are addressed in other chapters of this report (see Chapters 3, 5, and 6). Second, it should be borne in mind that the quality of the environment strongly conditions the results. Third, there should be a realistic time horizon; fourth, a strong commitment by the parties and knowledge of their role should be forged from the beginning; and finally, it should be recognized that cluster policies should be adapted to the context in which they are applied.

In short, cluster (and value chain) policies can be a promising instrument for promoting productive development. However, they are not risk-free. Therefore, it is advisable to implement them with caution, in a gradual manner, and to closely monitor its effects.

## Final considerations

Strengthening relations between firms and sectors is a key ingredient in Latin America's productivity agenda. In these lines, improving access to inputs (including services) is particularly relevant.

Indeed, businesses in the region are unlikely to move up the productivity ladder and penetrate international markets if they do not have access to the necessary amounts, quality and variety of inputs. International trade is a primary ally to improve this access. Removing tariffs, non-tariff barriers and reducing logistical costs are ways to foster it. Likewise, certain key services such as network services, retail trade and business services are of great relevance in the supply of inputs. Improving the institutional framework to promote competition, trade in services, public-private partnerships and the fight against corruption are some of the options to promote greater efficiency in these services sectors.

The comparative analysis of the input-output architecture across countries indicates that Latin America shows relatively low level of intermediate consumption, especially in the primary sector and service sector industries. This could suggest distortions in these sectors, which disrupt not only the allocation of resources, but also the supply of inputs. The productivity gains associated with the elimination of these distortions are relevant.

More generally, the development of clusters (and value chains) makes it possible to strengthen not only customer-supplier relationships but also other horizontal and vertical relationships aimed at exploiting synergies. Public policies can play an important role in promoting cluster development. Although these policies are not exempt from the risks of State failures (like most supply-side policies), they can be mitigated when focused on resolving coordination and other market failures. That said, cluster policies are unlikely to generate productivity gains unless they are based on the sector's comparative advantages; they cannot be implemented in disregard of the market and cannot be considered substitutes for comprehensive productivity-boosting policies. Finally, these policies demand capabilities not only in the public sector, but also in the private sector. Providing these capabilities is an essential part of cluster policies.

## Appendix

### Details of the composition of the regions included in graphs

The regions shown in tables and graphs that make use of the GTAP v9.2 database are the following:

Latin America and the Caribbean (LAC) by Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Trinidad and Tobago, Uruguay, and Venezuela. (21 countries)

The OECD by Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Latvia, Luxembourg, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. (32 countries)

**Table 4.3:** The regional composition is as follows:

Latin America and the Caribbean includes Argentina, Antigua and Barbuda, The Bahamas, Belize, Bolivia, Barbados, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, Grenada, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, and Venezuela.

The OECD includes Czech Republic, Estonia, Hungary, Israel, Latvia, Poland, Slovakia, Slovenia, and Sweden.

**Graph 4.2, Panel A:** Latin America includes Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. The OECD includes Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Luxembourg, New Zealand, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

**Graph 4.2, Panel B:** Latin America includes the same countries as Panel A except El Salvador and Jamaica. The OECD includes the same countries as Panel A except for the Czech Republic, Estonia, Hungary, Iceland, Israel, Latvia, Luxembourg, Poland, Portugal, Slovakia, Slovenia, Switzerland, and Turkey.

## Details of the GTAP v9.2 database

**Table A 4.1** Sectoral classification in the GTAP v9.2 database

Number	Description
1	Paddy Rice: rice, husked and unhusked
2	Wheat: wheat and meslin
3	Other Grains: maize (corn), barley, rye, oats, other cereals
4	Veg & Fruit: vegetables, fruit and nuts, potatoes, cassava, truffles
5	Oil Seeds: oil seeds and oleaginous fruit; soy beans, copra
6	Cane & Beet: sugar cane and sugar beet
7	Plant Fibres: cotton, flax, hemp, sisal and other raw vegetable materials used in textiles
8	Other Crops: live plants; cut flowers and flower buds; flower seeds and fruit seeds; vegetable seeds, beverage and spice crops, unmanufactured tobacco, cereal straw and husks, unprepared, whether or not chopped, ground, pressed or in the form of pellets; swedes, mangolds, fodder roots, hay, lucerne (alfalfa), clover, sainfoin, forage kale, lupines, vetches and similar forage products, whether or not in the form of pellets, plants and parts of plants used primarily in perfumery, in pharmacy, or for insecticidal, fungicidal or similar purposes, sugar beet seed and seeds of forage plants, other raw vegetable materials
9	Cattle: cattle, sheep, goats, horses, asses, mules, and hinnies; and semen thereof
10	Other Animal Products: swine, poultry and other live animals; eggs, in shell (fresh or cooked), natural honey, snails (fresh or preserved) except sea snails; frogs' legs, edible products of animal origin n.e.c., hides, skins and furskins, raw, insect waxes and spermaceti, whether or not refined or colored
11	Raw milk
12	Wool: wool, silk, and other raw animal materials used in textile
13	Forestry: forestry, logging and related service activities
14	Fishing: hunting, trapping and game propagation including related service activities, fishing, fish farms; service activities incidental to fishing
15	Coal: mining and agglomeration of hard coal, lignite and peat
16	Oil: extraction of crude petroleum and natural gas (part), service activities incidental to oil and gas extraction excluding surveying (part)
17	Gas: extraction of crude petroleum and natural gas (part), service activities incidental to oil and gas extraction excluding surveying (part)
18	Other Mining: mining of metal ores, uranium, gems, other mining and quarrying
19	Cattle Meat: fresh or chilled meat and edible offal of cattle, sheep, goats, horses, asses, mules, and hinnies. raw fats or grease from any animal or bird.
20	Other Meat: pig meat and offal. preserves and preparations of meat, meat offal or blood, flours, meals and pellets of meat or inedible meat offal; greaves
21	Vegetable Oils: crude and refined oils of soya-bean, maize (corn), olive, sesame, ground-nut, olive, sunflower-seed, safflower, cotton-seed, rape, colza and canola, mustard, coconut palm, palm kernel, castor, tung jojoba, babassu and linseed, perhaps partly or wholly hydrogenated, inter-esterified, re-esterified or elaidinised. Also margarine and similar preparations, animal or vegetable waxes, fats and oils and their fractions, cotton linters, oil-cake and other solid residues resulting from the extraction of vegetable fats or oils; flours and meals of oil seeds or oleaginous fruits, except those of mustard; degreas and other residues resulting from the treatment of fatty substances or animal or vegetable waxes.
22	Milk: dairy products
23	Processed Rice: rice, semi- or wholly milled
24	Sugar
25	Other Food: prepared and preserved fish or vegetables, fruit juices and vegetable juices, prepared and preserved fruit and nuts, all cereal flours, groats, meal and pellets of wheat, cereal groats, meal and pellets n.e.c., other cereal grain products (including corn flakes), other vegetable flours and meals, mixes and doughs for the preparation of bakers' wares, starches and starch products; sugars and sugar syrups n.e.c., preparations used in animal feeding, bakery products, cocoa, chocolate and sugar confectionery, macaroni, noodles, couscous and similar farinaceous products, food products n.e.c.

Continued >

<b>Number</b>	<b>Description</b>
26	Beverages and Tobacco products
27	Textiles: textiles and man-made fibres
28	Wearing Apparel: Clothing, dressing and dyeing of fur
29	Leather: tanning and dressing of leather; luggage, handbags, saddlery, harness and footwear
30	Lumber: wood and products of wood and cork, except furniture; articles of straw and plaiting materials
31	Paper & Paper Products: includes publishing, printing and reproduction of recorded media
32	Petroleum & Coke: coke oven products, refined petroleum products, processing of nuclear fuel
33	Chemical Rubber Products: basic chemicals, other chemical products, rubber and plastics products
34	Non-Metallic Minerals: cement, plaster, lime, gravel, concrete
35	Iron & Steel: basic production and casting
36	Non-Ferrous Metals: production and casting of copper, aluminum, zinc, lead, gold, and silver
37	Fabricated Metal Products: Sheet metal products, but not machinery and equipment
38	Motor vehicles and parts: cars, lorries, trailers and semi-trailers
39	Other Transport Equipment: Manufacture of other transport equipment
40	Electronic Equipment: office, accounting and computing machinery, radio, television and communication equipment and apparatus
41	Other Machinery & Equipment: electrical machinery and apparatus n.e.c., medical, precision and optical instruments, watches and clocks
42	Other Manufacturing: includes recycling
43	Electricity: production, collection and distribution
44	Gas Distribution: distribution of gaseous fuels through mains; steam and hot water supply
45	Water: collection, purification and distribution
46	Construction: building houses factories offices and roads
47	Trade: all retail sales; wholesale trade and commission trade; hotels and restaurants; repairs of motor vehicles and personal and household goods; retail sale of automotive fuel
48	Other Transport: road, rail ; pipelines, auxiliary transport activities; travel agencies
49	Water transport
50	Air transport
51	Communications: post and telecommunications
52	Other Financial Intermediation: includes auxiliary activities but not insurance and pension funding (see next)
53	Insurance: includes pension funding, except compulsory social security
54	Other Business Services: real estate, renting and business activities
55	Recreation & Other Services: recreational, cultural and sporting activities, other service activities; private households with employed persons (servants)
56	Other Services (Government): public administration and defense; compulsory social security, education, health and social work, sewage and refuse disposal, sanitation and similar activities, activities of membership organizations n.e.c., extra-territorial organizations and bodies
57	Dwellings: ownership of dwellings (imputed rents of houses occupied by owners)

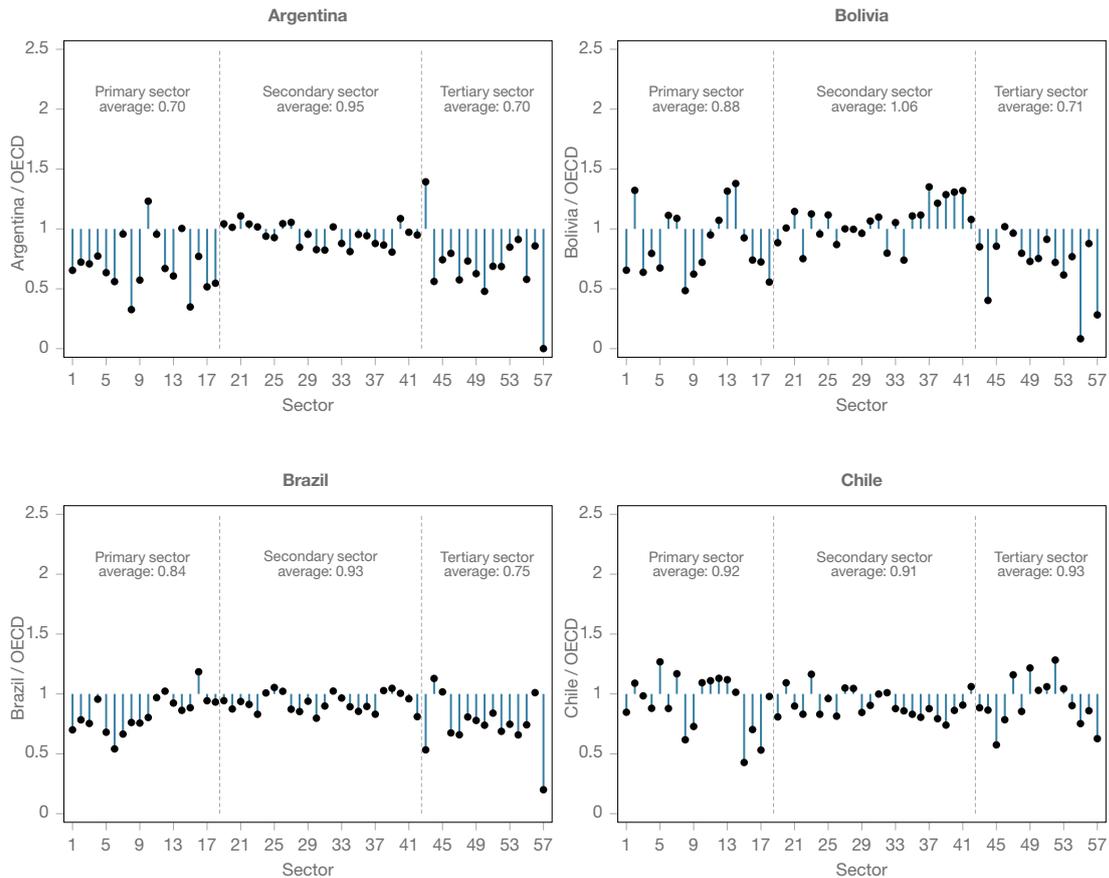
Note: In chapter 4 we consider sectors 1-18 as primary activities, 19-42 as manufacturing, and 43-47 as services.

Source: Aguiar, Narayanan, & McDougall (2016).

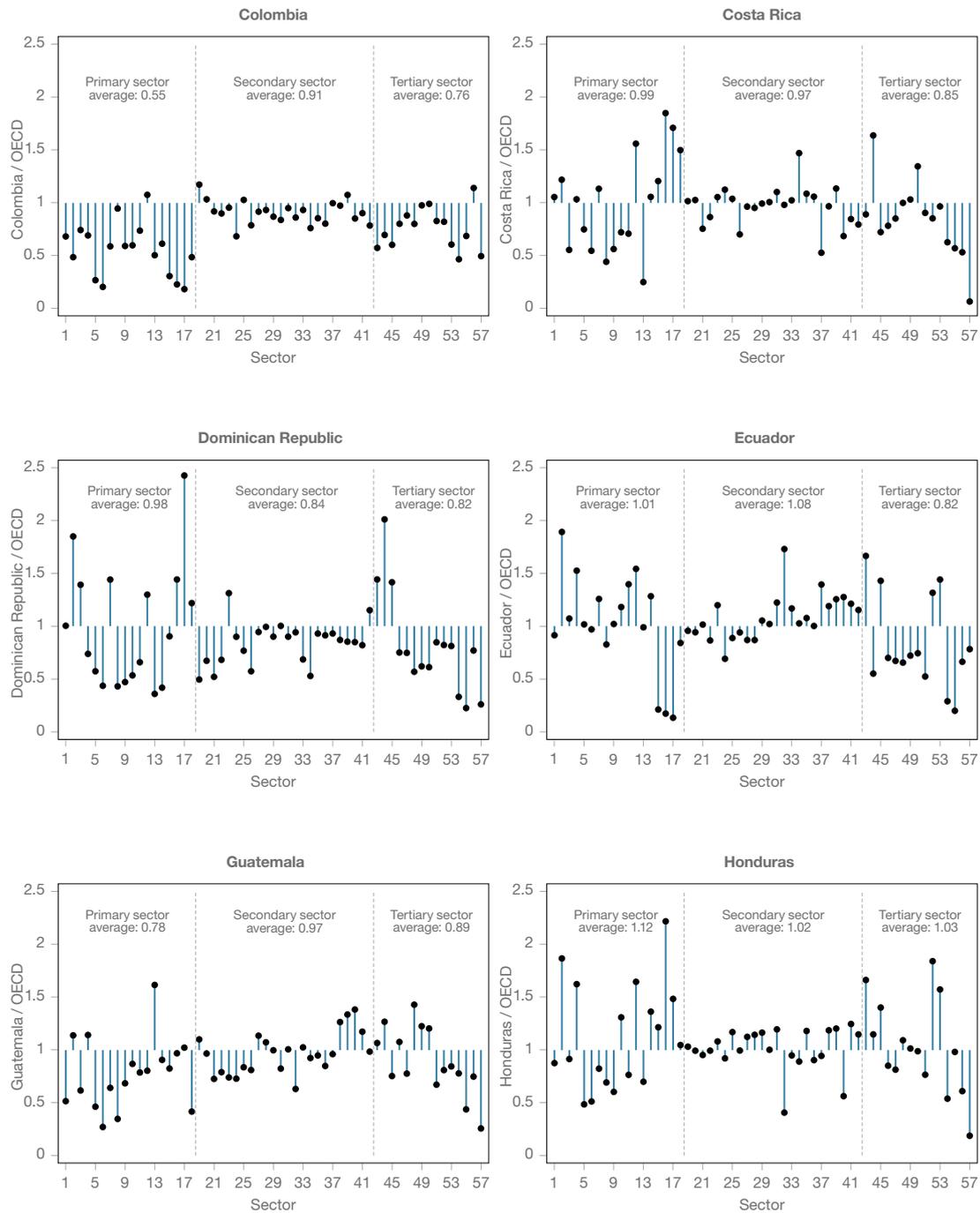
## Sectoral intermediate consumption graphs for Latin American and Caribbean countries

In the following group of graphs we compute the ratio of total intermediate consumption (domestic + imported) over production for each sector-country. Simple averages are then computed for each sector of the OECD countries. Finally, we compute the ratio for each non-OECD country over OECD for each sector. The dotted lines separate sectors into three broad categories: primary activities, manufacturing, and services. Details of the regional and sectoral composition can be found in this appendix. The computations are based on the GTAP v9.2 dataset and corresponds to the year 2011 (Aguiar, Narayanan, & McDougall, 2016).

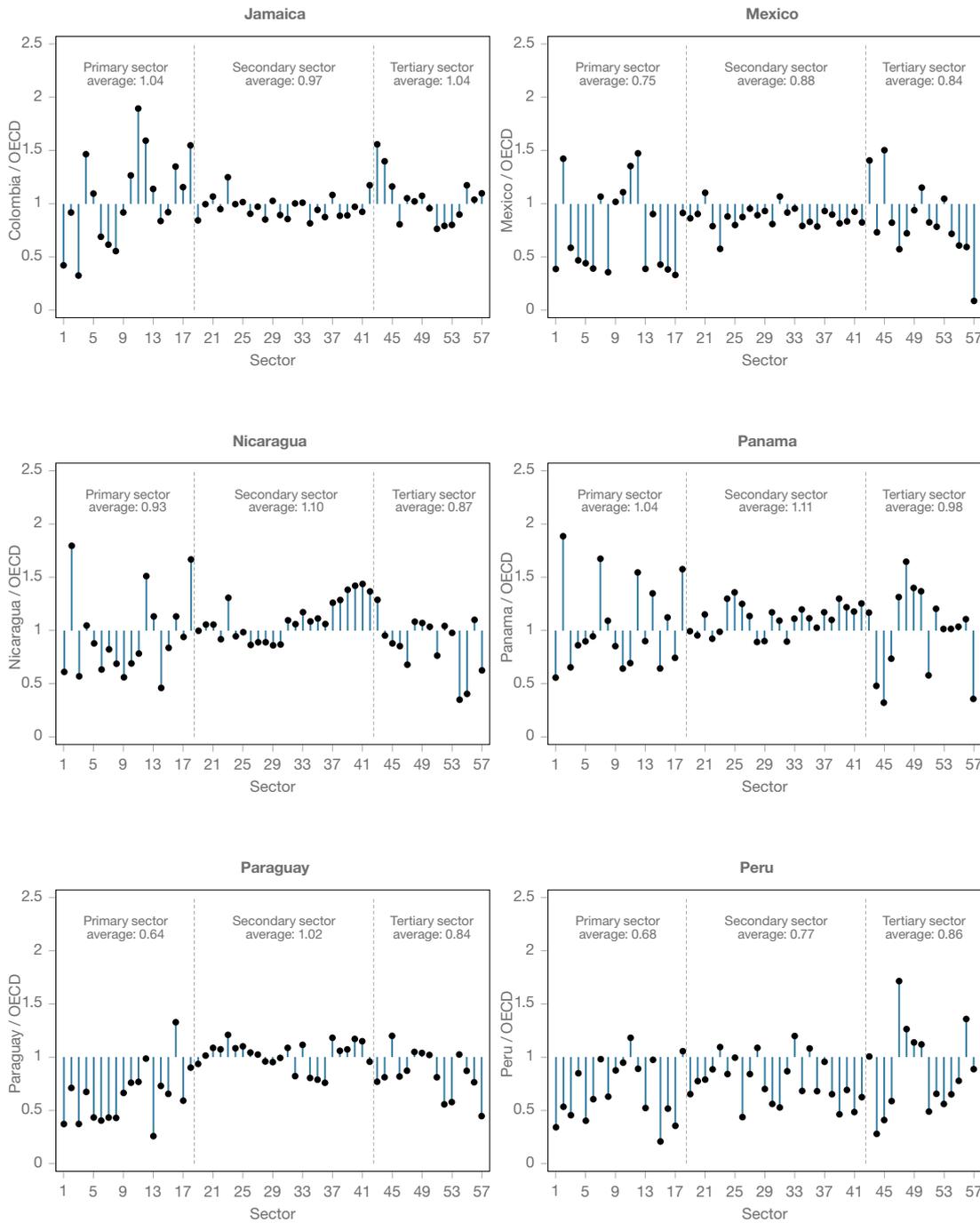
**Graph A 4.1** Sectoral intermediate consumption: Latin American and the Caribbean countries



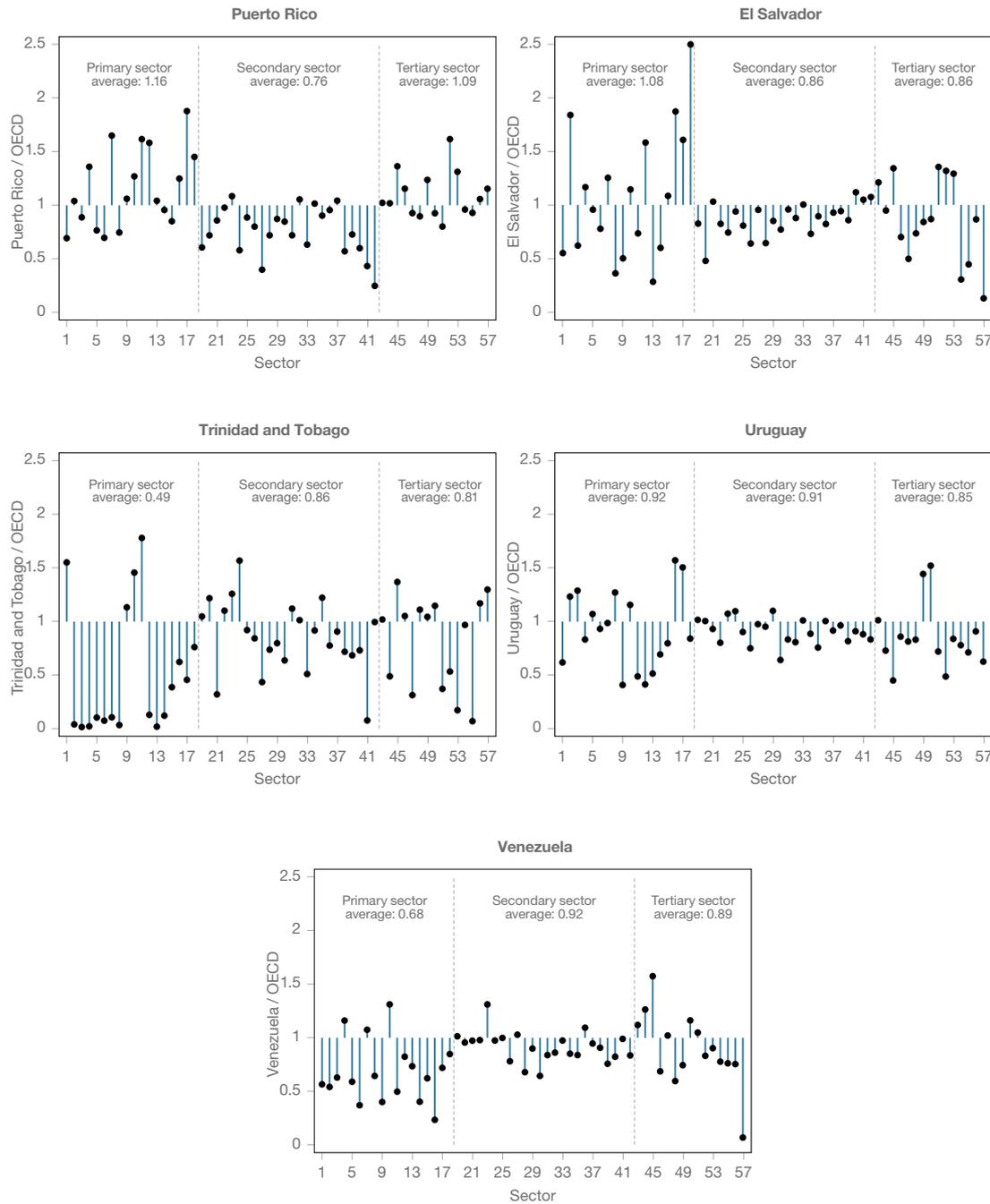
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**Table A 4.2** Country codes

<b>Code</b>	<b>Country</b>	<b>Code</b>	<b>Country</b>
ARG	Argentina	ITA	Italy
AUS	Australia	JAM	Jamaica
AUT	Austria	JPN	Japan
BEL	Belgium	KOR	Korea, Rep.
BOL	Bolivia	LUX	Luxembourg
BRA	Brazil	LVA	Latvia
CAN	Canada	MEX	Mexico
CHE	Switzerland	NIC	Nicaragua
CHL	Chile	NLD	Netherlands
COL	Colombia	NOR	Norway
CRI	Costa Rica	NZL	New Zealand
CZE	Czech Republic	PAN	Panama
DEU	Germany	PER	Peru
DNK	Denmark	POL	Poland
DOM	Dominican Republic	PRI	Puerto Rico
ECU	Ecuador	PRT	Portugal
ESP	Spain	PRY	Paraguay
EST	Estonia	SLV	El Salvador
FIN	Finland	SVK	Slovak Republic
FRA	France	SVN	Slovenia
GBR	United Kingdom	SWE	Sweden
GRC	Greece	TTO	Trinidad and Tobago
GTM	Guatemala	TUR	Turkey
HND	Honduras	URY	Uruguay
HUN	Hungary	USA	United States
IRL	Ireland	VEN	Venezuela
ISR	Israel		

Note: Based on 3-character ISO codes.



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# Employment and productivity

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## Chapter 5



## Chapter 5

# Employment and productivity<sup>1</sup>

*“[With division of labor] ten persons could make among them upwards of forty-eight thousand pins in a day... But if they had all wrought separately and independently, and without any of them having been educated to this peculiar business, they certainly could not each of them have made twenty, perhaps not one pin in a day.”*

Adam Smith

As we saw in Chapter 1, the difference in output per capita between Latin American and developed countries is not due to a lower share of workers or to fewer working hours: the problem is that the productivity of each working hour is substantially lower. Why is this the case?

This chapter focuses on the role of the allocation of workers among firms with different levels of productivity and the working conditions within these firms. The chapter begins with an assessment of these two aspects of labor markets and productivity in Latin America, and then addresses how three labor market institutions affect productivity through those aspects. The three institutions are employment protection legislation, wage-setting regulations, and social benefits and contributions associated with formal employment.<sup>2</sup> Finally, the chapter offers a few policy recommendations.

## Conceptual framework

Figure 5.1 illustrates the main characteristics of the process that allocates workers among firms and of working conditions within them (upper panel). The figure also illustrates, for both worker allocation and working conditions within firms, the different factors through which certain labor policies and regulations can affect labor productivity (bottom panel).

The assignment of workers to firms is the result of a continuous process in which workers seek jobs and firms offer vacancies. This process is characterized by the existence of search and matching costs, and by information asymmetries. Search and matching costs stem, for example, from workers having to invest time and money in finding, applying, and interviewing

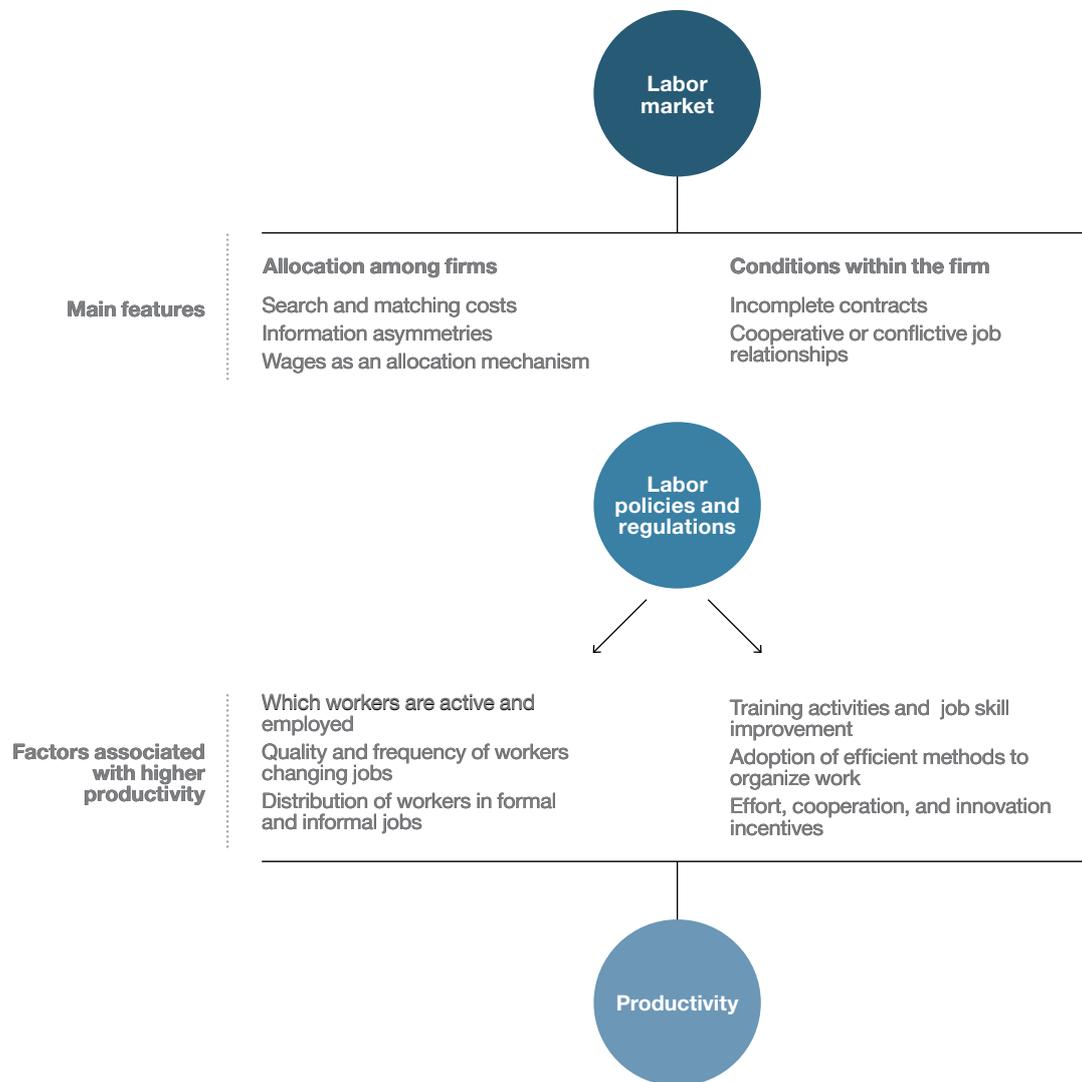
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1. This chapter was authored by Guillermo Alves and Christian Daude, with research assistance from Matías Battocchio, Christian Valencia, Roberto Ferrer, and Federico Juncosa.

2. The vast majority of countries apply another set of labor market regulations that will not be discussed in this chapter. For example, almost all countries in the region have endorsed the International Labor Organization's declarations on fundamental labor rights, guaranteeing freedom of association between workers to form unions and the right to collective bargaining, as well as to avoid discrimination, forced labor, and child labor. Another set of regulations has to do with occupational health and safety, to avoid accidents and mitigate health risks. While this type of regulations may impose high costs in some cases, its impacts on productivity seem uncertain, whereas the benefits in terms of a healthier workforce and higher quality of life are clear. Acknowledging their importance for development, these regulations escape the present analysis.

for vacancies, while firms have to publish ads, process applications, and interview workers. Due to information asymmetries, workers must invest in training, not only to increase their productivity, but also to certify their productive capacity. Firms, on their side, must invest substantial resources in interviews, recommendations, and tests to deal with imperfect information on workers' productive potential.

**Figure 5.1** Conceptual framework: Labor, policies, and productivity



Source: Produced by the authors.

The magnitudes of search and matching costs and information asymmetries determine the quality of matches between firms and workers and, through this channel, have a direct impact on productivity. Labor policies may contribute to higher productivity by improving the quality of matches, for example, by providing labor intermediation services that connect workers with potential vacancies. Likewise, internship programs for young workers can reduce information asymmetries by generating work experience that is useful in the search for future jobs.

Beyond these costs, in order for matches to increase productivity, workers must seek employment in the most productive firms and these firms must be the ones opening more vacancies, with the least productive firms offering fewer positions. In market economies, wages serve as the beacon that guides this process: in general, the most productive firms offer higher wages, the least productive ones offer lower wages, and workers follow the beacon towards the highest possible wages.

Again, public policies influence this process through taxes, subsidies, and regulations that affect wages in different job positions. For example, taxes and contributions levied on formal employment can lead to a higher proportion of workers in informal jobs. While these policies may be justified for different reasons, their impact on productivity should not be ignored.

Numerous factors affect working conditions within firms. First, labor contracts are incomplete in the sense that many aspects of labor relations that affect productivity cannot be specified in contracts. For example, in the absence of certainty regarding the duration of employment, neither workers nor firms have the best incentives to invest in training. In the case of general training, workers can use this training in other firms and, therefore, firms have a lower incentive to finance it. As for firm-specific training, workers have a lower incentive to exert effort to take full advantage of it. In any case, similar to what happens in a marriage, it is not possible to establish fully in a contract the required behavior of each party in relation to the activities and the duration of the relationship.

Second, labor regulations may favor or harm the development of formal and informal norms that foster productivity. For example, regulations affecting workers' earnings (e.g. minimum wage) can either promote or limit the use of pay-for-performance mechanisms, which in some contexts are essential for incentivizing effort. Additionally, labor regulations may promote higher levels of cooperation or conflict in labor relationships within firms.

**Labor regulations and policies affect productivity through the allocation of workers among firms and working conditions within firms.**

## **The allocation of workers to productive positions**

In practice, how does the allocation of workers to productive positions in Latin America occur? Several indicators help to answer this question, starting with participation and employment rates.

Latin America's output per capita lag is not due to the lack of active workers but it could be affected by the waste of productive capacities implied by low rates of female activity.

## Allocation to inactivity, unemployment, or employment

One obvious condition for workers to occupy productive positions is for them to be active in the labor market. Table 5.1 shows that the proportion of people aged 15 and over who are active (employed or seeking employment) in Latin America is on average five percentage points higher than in the OECD. The region does not seem to be lagging behind in terms of productivity due to a lack of workers! However, the greater inactivity of specific groups within the working-age population, in particular women, may imply a misallocation of talents with negative effects on productivity.<sup>3</sup> Indeed, even though female labor force participation rates in Latin America have increased in recent decades, the gap between male and female rates stood at 28 percentage points in 2015, approximately 13 points greater than the average gap in the OECD and East Asia.

There is thus a margin for labor participation rates among women in the region to continue increasing and contributing to the growth of output per capita. This is especially true for countries such as Honduras, Nicaragua, and Mexico, where the gap between male and female participation rates exceeds 30 percentage points.<sup>4</sup> Text box 5.1 explores the causes of this gender gap in the region as well as policies that could help close it.

**Table 5.1** Activity rate by gender

	1990			2015		
	Male	Female	Total	Male	Female	Total
Latin America	81.5	40.9	60.8	79.9	51.6	65.4
OECD	71.8	49.2	60.1	67.4	54.0	60.5
East Asia	79.8	57.3	68.5	76.1	58.3	67.1
World	80.0	51.4	65.7	75.5	48.8	62.1

Note: The table displays the average estimated male, female, and overall activity rates of individuals aged 15 years and older, as per the estimation method of the International Labor Organization. Countries included in each region can be found in the Appendix.

Source: Produced by the authors based on data from the World Development Indicators (World Bank, 2018).

The second obvious condition for workers to occupy productive positions is to be employed. Beyond the fact that a worker is not productive at all while unemployed, unemployment can lead to a loss of productive capacities among workers because they are not practicing their skills (Edin & Gustavsson, 2008; CAF, 2016). High structural unemployment can reveal imbalances between the capacities of the labor force and the requirements of the labor market, as well as minimum wage regulations or high social contributions that limit the hiring of workers.

3. Hsieh, Hurst, Jones, & Klenow (2013), for example, show that about a quarter of per capita economic growth in the United States between 1960 and 2010 is due to the improved assignment of women and African-Americans to occupations.

4. The source is World Development Indicators (World Bank, 2018).

### Text box 5.1 Labor participation gender gap: causes and public policies

Why are women less active than men in Latin America? The 2017 CAF Survey highlights the importance of home and family care responsibilities for women: while almost half of inactive women report that they refrain from seeking employment due to family duties or caregiving, only 7% of men refer to these reasons to refrain from seeking employment (Table 1).

In accordance with the above, evidence from high-income countries indicates that the monetary benefits associated with employment for mothers with children and subsidies for (or the direct provision of) childcare services have been the most effective tools to expand the female labor supply (Olivetti & Petrongolo, 2017).

**Table 1** Main reason for not seeking employment

	Female	Male
Family responsibilities and lack of access to care services	48.2	7.1
Studies	9.2	32
Retirement	4.7	14
Illness	7.6	11.6
Other	30.3	35.3
<b>Total</b>	<b>100</b>	<b>100</b>

Note: The table shows the percentage of people who indicated each option as the main reason for not seeking employment. The sample is taken from individuals aged between 20 and 60, living in 11 Latin American cities (see list of cities in the Appendix).

**Source:** Produced by the authors based on 2017 CAF Survey.

The average unemployment rate in Latin America in 2017 reached 8.8% of the active population.<sup>5</sup> This is a relatively high number, due in part to the negative phase of the economic cycle in several countries following the end of the commodities boom. Looking beyond this average, there are marked differences among countries. Table 5.2 groups them according to the minimum unemployment rates they achieved between 2000 and 2017. In the first group, comprised of the countries in the Southern Cone, Brazil, and Colombia, the unemployment rate did not fall below 5.9%, despite the favorable economic cycle that lasted until the end of the 2000s. In the second group, comprised of Bolivia, Ecuador, Mexico, Peru, and Paraguay, unemployment is structurally low.<sup>6</sup>

5. The source is World Development Indicators (World Bank, 2018).

6. Although, as noted by Ball, De Roux, & Hofstetter (2013), part of the difference between both groups of countries is explained by the higher rate of urbanization of the countries in the first group (the unemployment rate is traditionally lower in rural areas), the reasons for these differences in unemployment rates in the region is a subject on which more research is required.

**Worker mobility is high in the region, so it does not seem to be an obstacle to a good allocation of workers among positions.**

**Table 5.2** Minimum unemployment rate between 2000 and 2017

Countries with high unemployment	Rate	Countries with low unemployment	Rate
Argentina	7.1	Bolivia	2.3
Brazil	6.8	Ecuador	3.8
Chile	5.9	Mexico	2.5
Colombia	8.6	Peru	3.6
Uruguay	6.3	Paraguay	4.8

Note: The table displays the lowest unemployment rate reached by each country between 2000 and 2017. The years in which countries achieved its lowest rate are as follows: Mexico, 2001; Uruguay, 2011; Bolivia, Peru, and Paraguay, 2012; Argentina and Chile, 2013; Brazil and Ecuador, 2014; Colombia, 2016.

Source: Produced by the authors based on data from the World Development Indicators (World Bank, 2018).

## Allocation and mobility among positions

Labor markets are marked by a high rate of job creation and destruction. On the one hand, jobs are created and destroyed as firms are born and die, or because existing firms expand, reduce, or alter the composition of their staff. On the other hand, workers leave old jobs and accept new ones looking for better wages and working conditions. In countries such as Argentina, Brazil, Colombia, and Mexico, between 20% and 30% of total jobs in the economy are created and destroyed every year.<sup>7</sup>

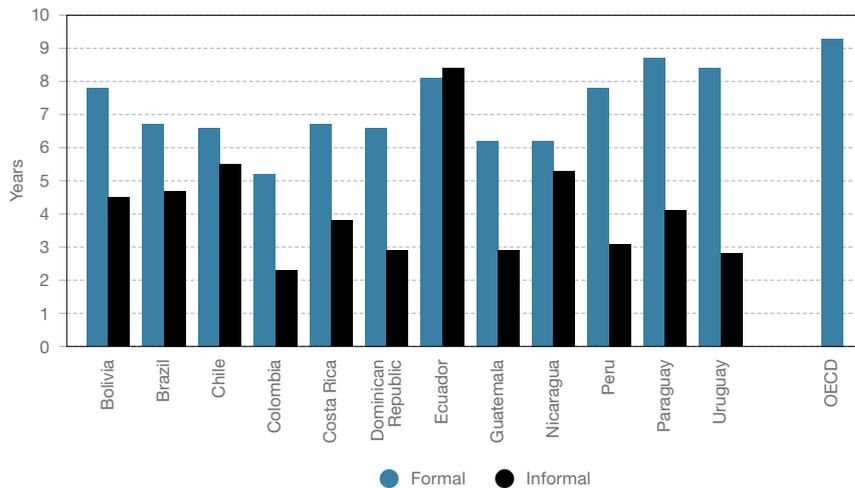
The process of job creation and destruction is critical to increasing the productivity of economies since it allows the reallocation of workers to firms with greater productivity. That said, a high mobility of workers among firms could also have costs. In particular, it can reduce incentives for firms and workers to invest in training. It may also reflect inefficient search and matching processes, i.e., leading to bad short-lived matches that generate higher employment flows.

Worker mobility in Latin America is high compared to developed countries.<sup>8</sup> This is reflected in a lower average job tenure, for both formal and informal employees, but above all for informal employees (Graph 5.1).<sup>9</sup> It is also reflected in higher rates of employment reallocation, that is, in total jobs created and destroyed relative to existing jobs (Graph A 5.1 in the Appendix).

7. Data based on Bartelsman, Haltiwanger, & Scarpetta (2009). See Graph A 5.1 in the Appendix.

8. This has been previously documented, for example, in Alaimo, Bosch, Kaplan, Pagés, & Ripani (2015).

9. The pronounced tenure gap between formal and informal workers is maintained when controlling for worker and job characteristics, but its magnitude decreases significantly. While Graph 5.1 suggests gaps of more than 50% in several countries, the regression analysis based on the 2017 CAF Survey indicates that informal workers with similar characteristics and positions have 16% less years of tenure than formal workers.

**Graph 5.1** Job seniority: salaried formal and informal workers

Note: The graph reports the average job seniority, measured in years, of salaried workers. The data is from 2015, with the exception of Bolivia (2014), Guatemala (2014), and Nicaragua (2009). The OECD value corresponds to the simple average of member countries and refers to formal workers. Countries included in the OECD can be found in the Appendix.

Source: Produced by the authors based on data from CEDLAS (2018) for Latin America and Indicators of Employment Protection (OECD 2018a) for the OECD.

The shorter job tenure in countries in the region compared to the OECD could be due to the lower average age of workers, but also to their greater exposure to macroeconomic shocks, combined with regulations that may favor adjustments in employment levels by firms, instead of salary adjustments. This higher observed turnover could be favorable for productivity if matches between workers and positions tend to improve as workers move among positions. Is this the case?

**Table 5.3** Matches between worker qualifications and job requirements

Previous Job	Current Job			
	I am under-qualified	I am suitable	I am over-qualified	I need other training
I was under-qualified	26.1	37.1	23.9	12.9
I was suitable	10.1	60.6	22.0	7.4
I was over-qualified	5.2	40.0	48.1	6.7
Needed other training	9.2	37.8	25.7	27.3

Note: The table displays the responses to the question: "What do you consider is your qualification level (experience, knowledge, and skills) for your current/previous job...?". The sample is taken from individuals aged between 20 and 60, living in 11 Latin American cities (see Appendix).

Source: Produced by the authors based on CAF Survey 2017.

**Job search mechanisms used by the unemployed suggest that workers' high mobility could be the result of inefficient search and matching processes, with negative impacts on productivity.**

Table 5.3 suggests that it is. The 2017 CAF Survey shows that most of the workers who were underqualified or needed a different training for their jobs in their previous position, ended up having the appropriate training or being overqualified in their current position. Likewise, those who had the appropriate training or were overqualified in their previous position continued to be so in their current position. Worker mobility effectively seems to lead to better matches.

**Table 5.4** How do the unemployed search for jobs?

	Percentage
Goes directly to workplace	36.7
Public or private recruitment agency	25.3
Places or responds to job advertisement	8.8
Asks friends, family, or neighbors for references	14.6
Other	14.6
<b>Total</b>	<b>100</b>

Note: The table displays the percentage of unemployed people who marked each option as their main employment seeking practice. The sample is taken from individuals aged between 20 and 60, living in 11 Latin American cities (see Appendix).

Source: Produced by the authors based on 2017 CAF Survey.

However, the idea that such high mobility reflects inefficient search and matching processes in the first place cannot be discarded. Table 5.4 suggests that, indeed, these processes in the region are not among the most efficient. Workers in large Latin American cities do not make much use of efficient job-search resources, such as employment agencies and job postings. Instead, almost two-fifths of unemployed workers seek employment directly at the workplace, which is costly insofar as it implies physical displacement by the worker. Card, Kluve, and Weber (2010), and Manoli, Michaelides, and Patel (2018), for example, find that it is possible to improve matches through the provision of public labor intermediation services. Countries in the region dedicate only 0.04% of GDP to this type of policies (Cerutti et al., 2014), compared to 0.17% in OECD countries (OECD, 2011). Investing more resources in labor intermediation services thus represents an opportunity for public policy in the region.

## **Allocation between formal and informal positions**

As shown in Chapter 2, the productivity gap between formal and informal jobs (approximated by wage levels) in Latin America surpasses 40%. This suggests that informality is one of the causes of low productivity in the region.

A higher prevalence of informality can lower productivity through various mechanisms. First, the coexistence of formal and informal firms operating under different labor costs harms the efficient allocation of workers among

firms, in the sense that workers occupy informal positions not because they are as productive as formal ones, but to avoid paying taxes or complying with regulations (see Text box 5.2). Second, if the probability of inspections increases with the size of the company,<sup>10</sup> informal firms may have incentives to stay small and not exploit economies of scale or innovate. Third, firms and workers in the informal sector lose access to valuable public services, such as protection and conflict resolution mechanisms provided by the legal system, formal job-search mechanisms, and the benefits of public policies aimed at increasing productivity such as training programs and innovation subsidies. Informal firms also typically lose access to the formal financial market, capital markets, and customer-supplier relationships with formal firms. Fourth, informality compromises the efficient matching of workers and vacancies because it restricts the generation of information on the quality of workers and positions. Finally, at a more systemic level, informality decreases the capacity of the government to raise revenue and therefore affects the provision of public services

**The allocation of a large proportion of workers to informal jobs in Latin America can negatively affect productivity through an extensive set of mechanisms.**

### Text box 5.2 Firms' voice on workers' allocation

The views of the firms in the region regarding the main obstacles to their functioning reinforce the relevance of some aspects of worker allocation discussed in this section. One third of firms highlight poorly educated workers, and another third point to competition from informal firms. Moreover, competition from informal firms is identified as the biggest obstacle by the highest percentage of firms. Although labor regulations are not considered an obstacle by a large percentage of firms, Latin America features the largest percentage of firms that identify this as an obstacle.

**Table 1** Firms' perceptions regarding operational obstacles

Country	Obstacle			Greatest obstacle		
	Poor worker education	Labor regulations	Competition from informal firms	Poor worker education	Labor regulations	Competition from informal firms
Latin America	30.3	19.6	33.3	8.9	5.9	17.5
OECD	14.2	7.2	13.0	10.4	6.5	11.7
East Asia	12.0	5.2	16.2	7.3	3.3	17.7
South Asia	20.2	9.8	20.4	3.4	5.1	6.2
Sub-Saharan Africa	19.4	12.2	39.6	2.2	1.1	11.5

Note: For each region the table displays simple averages of countries. Only information from the last available year between 2010 - 2017 is used for each country. Countries included in each region can be found in the Appendix.

Source: Produced by the authors based on data from the Enterprise Surveys (World Bank, 2017b).

10. Almeida & Ronconi (2016) show that labor inspections are more common in larger firms.

**For a position to be formal, the benefits of formality must exceed its costs, both for the worker and for the employer, and the analysis of said costs and benefits is informative on the causes of informality.**

However, the allocation of workers to informal jobs is in part a cause, but also a consequence, of low productivity.<sup>11</sup> If the productivity of a worker in a certain position is lower than the cost of formally hiring him, this match can only be informal. Different characteristics of workers (such as their skills and training) and firms (such as their level of capital and technology) influence productivity. Together with the costs of formal hiring, they determine whether a match is formal or not. From a public policy standpoint, this distinction is key: although productivity can be increased with policies that reduce informality, a broader set of policies is required to increase productivity.

What costs and benefits does a formal labor relationship hold for workers and firms when compared to an informal one? Table 5.5 lists the main ones. For businesses, formality can imply higher wage costs due to minimum wage regulations and taxes and contributions linked to salaries such as social security contributions (see Text box 5.2). It also implies higher hiring and firing costs. On the other hand, formality leads to greater access to credit and to different types of public programs, and to a greater variety of suppliers and customers. It also avoids fines, which in turn depend on enforcement efforts by the state..

**Table 5.5** Costs and benefits of formality for firms and workers

	Costs	Benefits
Firms	<ul style="list-style-type: none"> <li>– Minimum Wage</li> <li>– Taxes and social contributions</li> <li>– Hiring and firing costs</li> </ul>	<ul style="list-style-type: none"> <li>– Access to suppliers and clients</li> <li>– Access to government loans and programs</li> <li>– Avoid inspection fines</li> </ul>
Workers	<ul style="list-style-type: none"> <li>– Taxes and social contributions</li> </ul>	<ul style="list-style-type: none"> <li>– Minimum wage</li> <li>– Social benefits:               <ul style="list-style-type: none"> <li>Retirement</li> <li>Health insurance</li> </ul> </li> <li>– Employment protection</li> <li>– Access to credit</li> <li>– Worker rights</li> </ul>

**Source:** Produced by the authors.

For workers, the main costs of formality are also taxes and other monetary contributions that finance the social benefits associated with formal employment, such as retirement and health services.<sup>12</sup> Another possible cost is the loss of access to money transfers or other forms of social assistance for the unemployed. On the other hand, the benefits of formality may include a higher salary (in cases where there is a high minimum wage) and access to better social benefits (whose relative

11. In contemporary economies, there is a broad set of formal rules associated with employment, from the payment of taxes and social contributions to labor safety standards compliance. Labor informality can be defined as the non-compliance with these rules. Traditionally in the region, in addition to this “legal” definition of informality, a “productive” definition has been used, which identifies informal firms as those with low productivity. For a discussion of these two concepts see, for example, Gasparini & Tornarolli (2009). The productive definition combines the concept of informality with that of low productivity, making it impossible to study the relationship between norms and productivity proposed in this chapter.

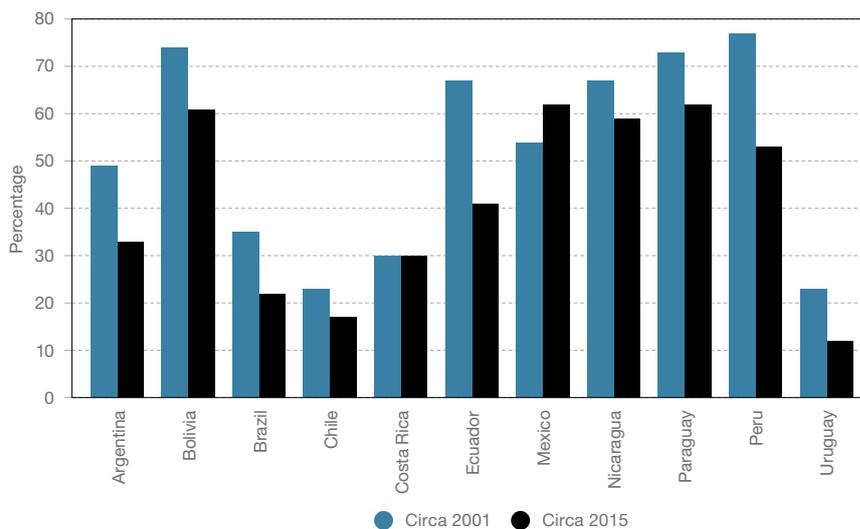
12. Depending on the state of labor supply and demand, and on job market regulations, taxes and contributions will affect firms or workers to a greater or lesser extent, regardless of whether the law designates those taxes and contributions as paid by employers or as a discount on worker payroll.

value depends on access to comparable social benefits in the informal sector). There are also other rights and benefits that vary according to labor legislation in each country, such as collective bargaining rights, accident insurance, the right to vacations and maternity or paternity leave, among others.

For a formal match to take place, it has to suit both the firm and the worker. For example, a high minimum wage can make formal employment more convenient for the worker, but not for the firm. In the same way, formal employment may be convenient for the firm, but not for the worker. Formality is sometimes not very tempting for workers because while many of its benefits are uncertain and deferred over time, its costs are certain and immediate. People's difficulty to assess correctly uncertain and deferred benefits favors informal matches and justifies enforcement efforts by the State.

**The formalization of a position requires that the value generated exceeds the costs implied by the contributions and regulations associated with formal employment and, therefore, informality is also a consequence of low productivity.**

**Graph 5.2** Evolution of the informality rate: salaried workers



Note: The informality rate refers to the percentage of salaried workers who do not make retirement contributions. The informality rate is shown per country at two separate times: around 2001 and around 2015. The data reported for the first and second time period for each respective country is as follows: Argentina, 2003 and 2015; Bolivia, 2002 and 2014; Brazil, 2001 and 2015; Chile, 2000 and 2015; Costa Rica, 2001 and 2015; Ecuador, 2003 and 2015; Mexico, 2000 and 2014; Nicaragua, 2001 and 2014; Paraguay, 2002 and 2015; Peru, 2000 and 2015; and Uruguay, 2001 and 2015.

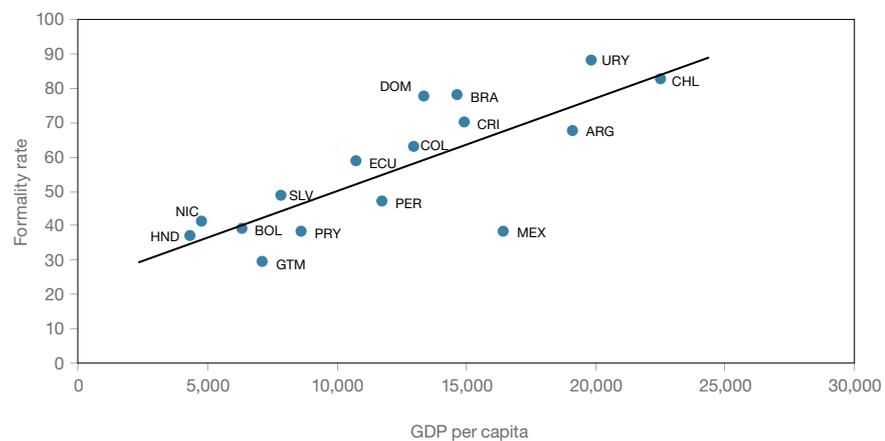
Source: Produced by the authors based on data from CEDLAS (2018).

What does the data reveal about labor informality in Latin America and the link between informality and productivity? Graph 5.2 shows the state and evolution of labor informality in Latin America between 2001 and 2015, and displays an optimistic outlook: the proportion of informal workers has decreased in almost all countries in the region. It is plausible that the solid economic growth cycle during those years produced higher incomes and covered the costs of formality, in an example of how greater productivity can lead to less informality. Graph 5.3,

however, shows that beyond the positive correlation between per capita GDP and formality, there are important differences in formality rates between countries with similar per capita GDP. The most notorious case is that of Mexico, which ranks high in the region in terms of per capita GDP in the region but displays one of the lowest formality rates. But there are also other country pairs with similar levels of per capita GDP and differences in labor formality rate of around 20 percentage points (Argentina and Uruguay, El Salvador and Guatemala). These differences show that informality has determinants that transcend countries' levels of wealth.

Another body of evidence suggests that negative productivity shocks can lead to greater informality. Combining information on informality in Graphs 5.2 and 5.3 with information on unemployment in Table 5.2, it can be inferred that countries with high unemployment tend to have less informality and countries with low unemployment have more informality. Although this implies that both groups of countries share the challenge of increasing the share of workers in formal positions, it also suggests that informality acts in part as an alternative to unemployment. This notion is consistent with recent evidence on how labor markets in different regions of Brazil responded to the negative shocks in labor demand that followed the trade liberalization process. While unemployment increased in the regions most affected by the liberalization process, 20 years later informality replaced unemployment as an adjustment mechanism (Dix-Carneiro & Kovak, 2017a). Thus, informality in the region can be explained, in part, by how labor markets respond to negative labor demand shocks. This supports the recommendation for the adoption of a gradual approach in the implementation of policies expected to cause negative labor demand shocks (see Text box 5.3).

**Graph 5.3** Formality rate and GDP per capita



Note: The graph shows the relation between the formality rate and GDP per capita. The formality rate is defined as the percentage of salaried workers who make retirement contributions. GDP per capita is expressed in 2011 constant dollars at purchasing power parity. Data is from 2014, with the exception of data from Bolivia, Guatemala, Mexico, and Nicaragua which is from 2015.

Source: Produced by the authors based on data from CEDLAS (2018) for formality rate and World Development Indicators (World Bank, 2018) for GDP per capita.

### **Text box 5.3 Labor markets and shock adjustments**

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A number of recent papers have documented how the greater exposure of certain regions to competition from international trade can increase, depending on context, either their unemployment or informality levels (Autor, Dorn, & Hanson, 2013; Autor, Dorn, Hanson, & Song, 2014; Chetverikov, Larsen, & Palmer, 2016; Dix-Carneiro, Soares, & Ulyssea, in press; Dix-Carneiro & Kovak, 2017b). In the case of Brazil, Dix-Carneiro and Kovak (2017b) find that the regions most affected by trade liberalization experienced higher unemployment in the medium term (5 to 10 years), while in the long term (15-20 years) that higher unemployment led to greater informality. This type of negative impact or adjustment cost in the face of trade liberalization has also been documented in the United States, a country that is generally considered to have very flexible labor institutions.

What is the best policy response to this evidence? Autor (2018) recommends, first, implementing policies that compensate workers affected by shocks, such as unemployment insurance and monetary subsidies for low-income workers. Second, he recommends a gradual approach when undertaking reforms that strongly reduce the demand for labor among groups of workers that are concentrated in specific industries or regions. A gradualist approach allow enough time for older workers to retire from declining occupations, while young workers transition to new occupations and industries, thus avoiding the disruptive costs that this type of shocks can have on labor markets.

Finally, informality rates by educational level suggest that the most educated (arguably, the most productive) are more formal. Table 5.6 shows the percentage of workers who do not contribute to social security in several countries of the region, whether salaried or self-employed, and according to their educational level. The huge differences among educational levels reinforce the idea that informality is associated with lower productivity and underpin the argument that increasing schooling levels is a powerful force for reducing informality (see Haanwinckel & Soares, 2017). But they do not suggest that it is a panacea: with the exception of Uruguay, informality rates among salaried workers with complete higher education are not negligible, and among self-employed workers with complete higher education they are quite high.<sup>13,14</sup>

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13. Not all countries require self-employed workers to make social security contributions. Therefore, they are not informal in terms of (not) complying with that rule. Notwithstanding this, we take the absence of contributions as an approximation of the adherence of these workers to the set of formal rules of the economy.

14. Although the choice of informality of these highly qualified workers may hold some logic from an individual standpoint, there are multiple reasons why these individual decisions can lead to lower levels of productivity at a systemic level.

The existence of a 20% to 30% wage gap between formal and informal jobs for workers of similar characteristics suggests that the allocation of workers to informal jobs reduces productivity.

**Table 5.6** Percentage of salaried and self-employed workers who do not make social security contributions by education level

	Salaried workers			Self-employed		
	Incomplete secondary education	Complete higher education	Overall sample	Incomplete secondary education	Complete higher education	Overall sample
Bolivia	86.1	19.8	61.4	97.9	80.2	96.8
Brazil	34.8	5.7	22.4	78.5	44.9	71.2
Chile	25.0	9.2	17.5	85.2	64.2	81.6
Colombia	59.6	6.4	37.1	95.2	47.9	89.8
Costa Rica	59.6	6.1	37.1	95.2	94.1	89.8
Guatemala	72.3	34.9	71.5	100.0	94.2	99.8
Honduras	63.1	19.4	64.0	99.8	97.0	99.6
Nicaragua	66.2	19.1	59.6	99.1	91.9	98.8
Paraguay	80.5	28.8	62.3	99.9	97.2	99.7
El Salvador	54.4	8.3	52.0	91.8	70.1	96.4
Uruguay	13.6	1.6	11.9	73.7	14.8	66.6

Note: The values are expressed in percentages. The data for Brazil, Chile, Colombia, Honduras, Paraguay, El Salvador, and Uruguay is from 2015; the data for Bolivia, Guatemala, and Nicaragua is from 2014, and the data for Costa Rica is from 2010.

**Source:** Produced by the authors based on data from CEDLAS (2018).

What about the causal relationship between informality and productivity?<sup>15</sup> One way to explore this link is to assess whether workers with similar characteristics, in similar jobs, have different levels of productivity (as approximated by salary) in formal and informal firms. Graph 5.4 shows that the average salary of informal workers is between 32% (Chile) and 54% (Colombia) lower than the average salary of formal employees. These differences are between 10 and 20 percentage points lower when controlling for worker characteristics (such as education, age, attendance to an educational institution, and number of children), and between 5 and 10 additional percentage points lower when controlling for job characteristics (such as city and sector of activity).<sup>16,17</sup>

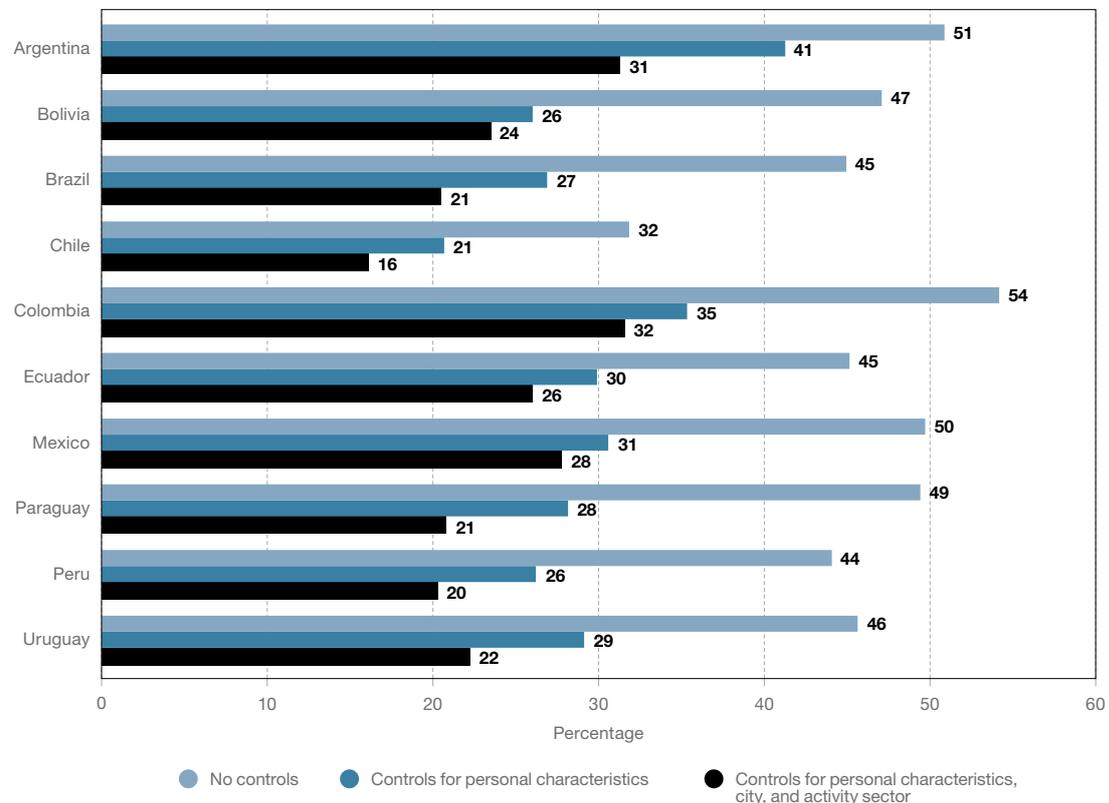
15. Some studies have found effects of formalization of firms on sales and profits (McKenzie & Sakho, 2010; Fajnzylber, Maloney, & Montes-Rojas, 2011; de Mel, McKenzie, & Woodruff, 2013). McKenzie & Sakho (2010), and de Mel et al. (2013) agree that the effects of formalization are very heterogeneous depending on firm size, and that the ability to issue invoices is a mechanism to expand sales and thus profits. Fajnzylber et al. (2011) find that formal firms increase their income by 55% and their profits by 45%, compared to those that are not. The main factor is the greater likelihood of having a fixed location and a larger number of employees, which suggests that these firms adopt more permanent, capital-intensive, and larger-scale technologies and business lines. Although these studies generally support the hypothesis of a negative impact of informality on productivity, greater effort is needed to evaluate the impact of labor formalization policies on productivity in the region.

16. Acknowledging that firm size can be a consequence of informality, in these regressions we do not include firm size as a control variable. Either way, the gap stays within a similar range when controlling for firm size.

17. The size of the gap is similar when using data from the 2017 CAF Survey. This survey has the advantage of allowing us to control for specific measures of workers' cognitive and socio-emotional skills. These skills show a positive and statistically significant association with wages, and informal workers have lower skills in average. However, controlling for them in the regression exercises does not change the size of the wage gap between formal and informal workers.

That is, there are still important differences (between 15% and 30%) in workers' average salaries in formal versus informal positions, supporting the hypothesis that the allocation of workers to informal jobs diminishes their productivity.<sup>18</sup>

**Graph 5.4** Wage gap between formal and informal salaried workers



Note: The gaps are computed from a regression that uses the logarithm of hourly wage as dependent variable. They indicate, in percentage terms, how much lower the informal salary is in comparison to the formal salary. The regression accounts for all dependent workers. Coefficients are reported for three different specifications: no controls, controls for personal characteristics, and controls for personal characteristics, city, and activity sector. The personal characteristics variables are: five levels of education, age, age squared, and number of children. There are 17 activity sectors that follow the ISIC, Rev. 3, classification. The regressions are each estimated separately per country, combining all household survey waves between 2011 and 2015. All coefficients are statistically significant at the 1% level.

**Source:** Produced by the authors based on data from CEDLAS (2018).

18. In addition, the persistence and the size of the gap suggest two hypotheses. First, it is likely that there are unobservable differences between formal and informal workers that explain part of the gap. Second, with equal worker characteristics, labor markets with no wage regulations should lead to informal wages being higher than formal ones, so that informal workers are compensated for the benefits that come along with formality. The sizeable wage gap in favor of formal positions thus points to the role of institutions in fixing formal wages above equilibrium (minimum wage) or in increasing formal workers' bargaining power (unions).

**Informal workers are in smaller firms and have lower quality matches, two mechanisms by which informality contributes to lower productivity.**

As discussed above, informality makes jobs less productive via several mechanisms. First, informality leads workers towards firms that are kept small to avoid being audited. Indeed, as we saw in Chapter 2, a vast majority of informal workers in Latin America are in firms with fewer than 10 workers, which contrasts sharply with the distribution of workers in formal positions. Data from the 2017 CAF Survey for 11 large cities in the region confirms this pattern. Even when controlling for a broad set of worker and job characteristics, informal workers are 24 percentage points more likely to work in a firm with at most five employees, compared to formal workers.<sup>19</sup>

Second, informality can worsen the quality of matches between workers and positions, due to less generation of information. Data from the 2017 CAF Survey revealing the subjective perceptions of workers on how adequate their training is for their current job position supports this hypothesis. After controlling for a broad set of worker and job characteristics, the percentage respondents who believe that they need a different skillset for their current job is between two and four percentage points higher for informal workers than for formal workers. Likewise, a higher percentage of informal employees report being underqualified or overqualified for their job, but in both cases the difference relative to formal employees is not statistically different from zero.<sup>20</sup>

Lower quality matches for informal jobs are evidenced by a greater worker turnover in those positions. Graph 5.1, discussed above, has already shown that the average tenure in informal positions is lower than in formal positions. Table 5.7 shows how the percentage of workers in informal positions who change their employment situation in a one-year period is also much higher than the percentage of formal workers that change their situation.<sup>21</sup> As is documented below, the potentially excessive mobility of workers in informal positions could explain their lower level of skill acquisition compared to workers in formal positions.

In general, the lower quality matches in informal jobs could also help explain the pattern described in Chapter 2, in which the informal sector has a less efficient inter-firm labor allocation than the formal sector.

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19. This probability results from a probit regression based on data from the 2017 CAF Survey. The coefficient corresponds to the marginal impact calculated over average worker characteristics. Both coefficients are significant at 1%. The control variables are city, occupation type, activity sector, educational level, cognitive and emotional abilities, and worker age.

20. This result corresponds to a multinomial logit regression with data from the 2017 CAF Survey, where the dependent variable evaluates the degree of adequacy of the worker's skillset for her current job using four categories: correct, overqualified, underqualified, and need for a different training. The reported values between 2 and 4 percentage points refers to the marginal impact of informality on the category "need for a different skillset", calculated over average worker characteristics. The control variables are city, occupation type, activity sector, educational level, cognitive and emotional abilities, and worker age.

21. Although the greater stability of workers in the category "formal salaried workers" could be a consequence of the fact that formal jobs represent the majority of jobs in many economies, the same pattern is verified in Mexico, where the formal sector is smaller than the informal sector.

**Table 5.7** Changes among job categories for formal and informal salaried workers

	Inactive	Unemployed	Employer	Self-employed	Formal salaried worker	Informal salaried worker	Total
<b>Argentina 2009-2014</b>							
Formal salaried worker	3.5	1.9	0.5	2.0	86.6	5.5	100
Informal salaried worker	16.7	5.7	1.2	9.6	14.6	52.2	100
<b>Brazil 2009-2015</b>							
Formal salaried worker	6.4	2.2	0.7	2.9	84.6	3.2	100
Informal salaried worker	15.8	3.5	1.3	9.7	28.1	41.6	100
<b>Mexico 2013-2014</b>							
Formal salaried worker	4.9	2.3	0.6	1.9	74.8	15.5	100
Informal salaried worker	14.5	3.7	1.9	8.6	16.2	55.1	100
<b>Spain 2005-2008</b>							
Formal salaried worker	5.9	4.0	0.6	1.4	87.4	0.7	100
Informal salaried worker	20.0	9.9	0.4	3.0	48.4	18.3	100

Note: Each cell reports the percentage of individuals that go from being formal or informal employees in the initial period, to each of the six occupational categories shown in the columns, in the final period. A formal worker is one who contributes personally or through his employer to social security. The panel dimension of household surveys is used, considering the individual status in the initial period (the time of the first interview) and the final period (the time of the last interview). The period between the first and the last interview is: four quarters for Argentina, three quarters for Brazil, five quarters for Mexico, and four quarters for Spain. Multiple waves of data are pooled, between: 1st quarter of 2009 and 4th quarter of 2014 for Argentina, 1st quarter of 2009 and 3rd quarter of 2014 for Brazil, 4th quarter of 2009 and 4th quarter of 2014 for Mexico, and 1st quarter of 2009 and 4th quarter of 2014 for Spain.

Source: Produced by the authors based on data from CEDLAS (2018).

## Working conditions within the firm

### On-the-job skill acquisition

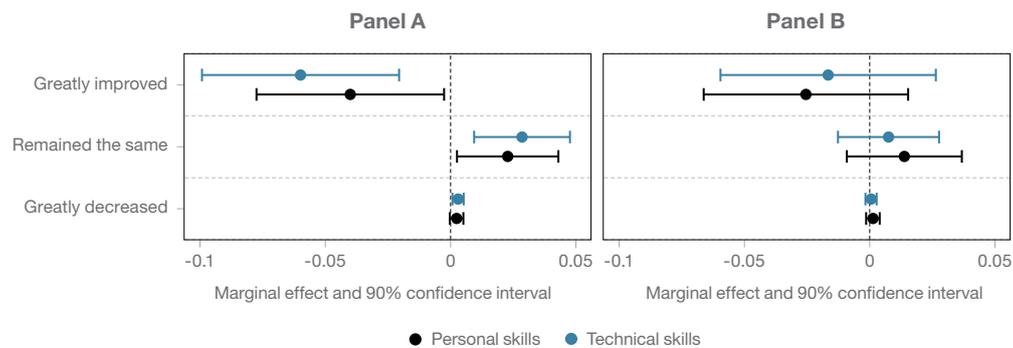
Once a worker has been allocated to a specific position, her productivity in that position will increase if her skills also increase. The 2016 Report on Economic Development (RED) devotes a chapter to skill acquisition in the workplace and shows that these skills can be improved in three ways (CAF, 2016): participation in training activities, learning-by-doing, and learning from peers. The report also describes how the acquisition of skills through these three mechanisms depends on many job characteristics. Particularly, workers accumulate more skills in larger firms and formal firms, two characteristics that, as indicated in Chapter 2, are not predominant in the region.

How much smaller is the probability that informal workers improve their technical and personal skills? Graph 5.5 quantifies the skill acquisition gap between formal

**Workers in smaller firms and in informal jobs improve less their technical and personal skills, which negatively affects productivity.**

and informal workers in the same cities, occupation type, activity sectors, levels of education, age, sex, and levels of cognitive and emotional skills.<sup>22</sup> Panel A does not control for company size, while Panel B compares firms of equal size. As can be seen in panel A, informal workers are less likely to report having greatly improved their technical and personal skills, and are more likely to declare that their technical and personal skills have remained unchanged. When comparing workers in firms of equal size (panel B) the differences in probability are minor and statistically insignificant. This is consistent with data from the 2017 CAF Survey showing that workers in firms with up to five workers acquire significantly less technical and personal skills, and with data presented in this chapter and in Chapter 2 showing that informal workers are more common among smaller firms. Firm size is then a key factor for skill acquisition and a critical channel that associates informality with lower skill acquisition.

**Graph 5.5** Gap in workplace skill acquisition between informal and formal workers



Note: The graph shows the marginal effects and 90% confidence intervals estimated from ordered probit model regressions. The dependent variable takes values between -5 and 5 according to skill improvement, where -5 indicates that skills greatly decreased, 0 indicates that they remained the same, and 5 indicates that they greatly improved. The independent variable of interest takes on the value of 1 for informal workers and 0 for formal workers. The values in the graph indicate how much higher the probability is of selecting the indicated value among informal workers as opposed to formal workers, under the assumption that the other independent variables take on their average values. Every regression includes variables that describe 14 levels of education, 11 categories of activity sector, and 43 employment types. The panel B specification includes controls based on six categories of firm size, unlike panel A. The sample includes individuals aged between 20 and 60, living in 11 Latin American cities (see Appendix).

Source: Produced by the authors based on data from the 2017 CAF Survey.

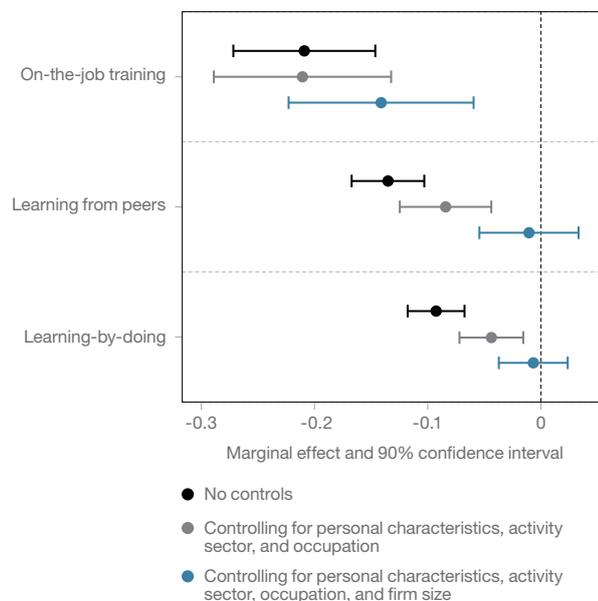
Graph 5.6 illustrates the lower acquisition of skills by informal workers in each of the three aforementioned mechanisms. It shows that informal workers are less likely to receive on-the-job training, learn from peers and through practice, even when controlling for worker characteristics, activity sector and occupation type. This gap persists when controlling for firm size in the case of on-the-job training but not for the other two mechanisms. The smaller size of firms affects

22. This marginal effect is the result of an ordered probit regression computed over average worker characteristics. The regression controls for 14 levels of education, 6 categories of company size, 11 categories of activity sector, and 43 occupation categories.

the acquisition of skills because there are fewer opportunities to practice and fewer peers to learn from.

Why do training activities differ between formal and informal positions? First, as seen earlier, informal workers' high mobility reduces incentives for firms to offer training. Second, training activities often receive public support (for example, through direct subsidies or tax exemptions), which informal firms cannot access..

**Graph 5.6** Gap in workplace skill acquisition between formal and informal workers



Note: The graph shows the marginal effects and 90% confidence intervals estimated from probit regressions in which the dependent variable takes on the value of 1 if the interviewee stated he had acquired skills via the indicated channel, and 0 if not. The independent variable is equal to 1 if the worker is informal and 0 if formal. The values on the graph indicate how much higher the probability is of acquiring skills via the method in question among informal workers as opposed to formal workers, under the assumption that the other independent variables take on their average values. Three specifications are used: no controls; controls based on 14 educational levels, 11 categories of activity sector, and 43 categories of types of employment; and finally, in addition to the previous controls, 6 categories of firm size. The sample is made up of individuals aged between 20 and 60, living in 11 Latin American cities (see Appendix).

Source: Produced by the authors based on data from the 2015 CAF Survey.

The preceding analysis suggests that informality leads to less on-the-job training. On the other hand, there is evidence that public policies for on-the-job training can be very effective to increase formal employment in the medium and long term (Escudero, Kluve, Mourelo, & Pignatti, 2017). Some proven cases of success in the region are the “Jóvenes en Acción” program in Colombia (Attanasio, Guarín, Medina, & Meghir, 2017), the “Primer Paso” program in Argentina (Berniell & de la Mata, 2017), the “Juventud y Empleo” program in the Dominican Republic (Ibarrarán, Kluve, Ripiani, & Rosas, 2015) and the “Yo Estudio y Trabajo” program

**In Latin America, evidence abounds that programs aimed at young people with internships, which allow on-the-job training, have a positive impact on formality.**

in Uruguay (Araya & Rivero, 2017). While these policies are especially beneficial for young people because they generate information that they can use in the rest of their working lives, training policies can also be also useful, more generally, for helping workers adapt to rapid changes in labor demand.

## Management practices and firm productivity

Several studies have highlighted the importance of management practices for firms productivity as well as the effectiveness of programs aimed at improving those practices (Bloom, Eifert, Mahajan, McKenzie, & Roberts, 2013; Bloom, Mahajan, McKenzie, & Roberts, 2018; Bender, Bloom, Card, Van Reenen, & Wolter, 2018; Bruhn, Karlan, & Schoar, 2018).<sup>23</sup> Managerial practices can also be affected by regulations that limit management decision-making,<sup>24</sup> such as employment protection regulations affecting hiring and firing decisions, and minimum wage regulations that limit the implementation of pay-for-performance practices.<sup>25</sup>

Graph 5.7 illustrates, for a set of countries, the quality of management practices in terms of hiring, remuneration, and promotions, according to data from the World Management Survey (WMS) by Bloom and Van Reenen (2007). This index represents the average, on a scale of 1 to 5, of answers to questions on managerial practices, where 1 represents the worst practice and 5 represents the best practice. The questions assess, for example, the quality of talent hiring and retention practices, as well as the implementation of pay-for-performance schemes.

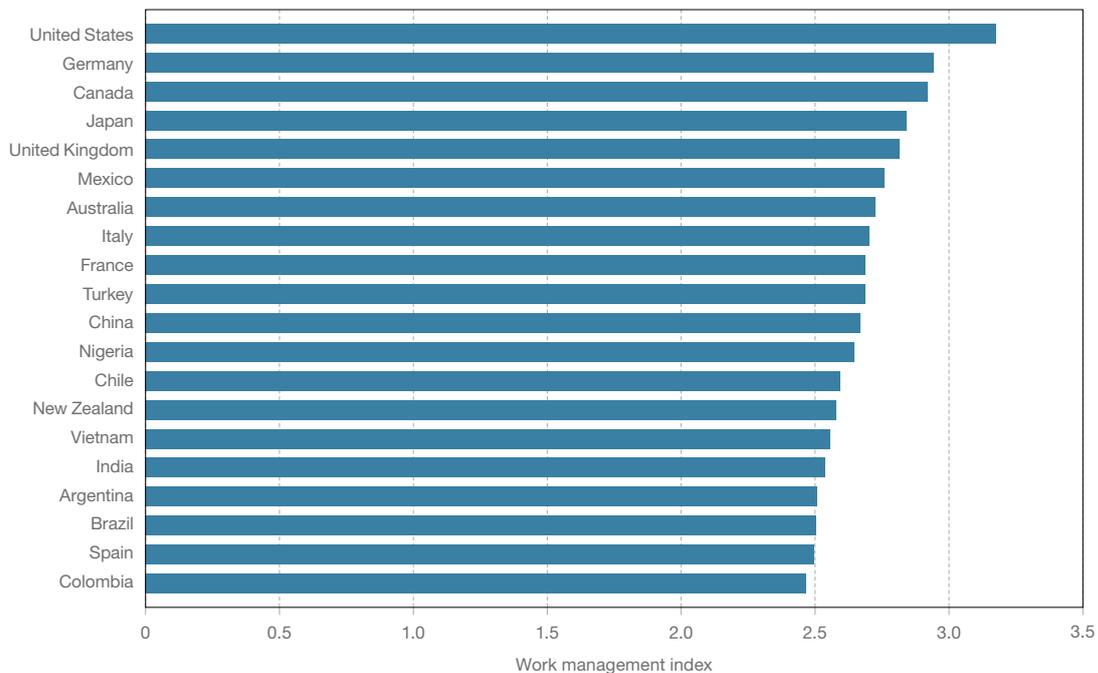
Among the Latin American countries included in the survey, Mexico appears relatively well positioned in terms of the quality of its average labor management practices, even ahead of several countries with higher output per capita, such as France and New Zealand. Argentina, Brazil, and Colombia, on the other hand, appear to be lagging behind countries with lower output per capita, such as Nigeria, Vietnam, and India.

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23. Using data from Germany, Bender, Bloom, Card, Van Reenen, & Wolter (2018) show that managers' level of human capital is strongly associated with firms' productivity and that the best managed firms hire and retain workers with more human capital. Bloom, Eifert, Mahajan, McKenzie, & Roberts (2013), and Bloom, Mahajan, McKenzie, & Roberts (2018) show that a randomized experiment offering free management advice to firms in the textile industry in India increased productivity by 17% within one year, and that the improvements in managerial practices and the increase in productivity are maintained up to seven years after the intervention. Bruhn, Karlan, & Schoar (2018) find that a randomized experiment offering training and management consulting to small businesses in Mexico increased productivity in the short term, and the number of employees and sales after five years.

24. Management practices are not only important from the point of view of labor relations within the firm, but also from the perspective of assigning workers to positions. Managers affect firms' entire structure and, therefore, the allocation of workers with greater managerial potential to these positions acquires great relevance for productivity (Alder, 2016). For example, Bandiera, Hansen, Prat, & Sadun (2017) estimate that 13% of the productivity gap between Brazil and India on the one hand, and the United States, France, Germany, and the United Kingdom on the other, is due to this misallocation problem. In addition, Alder (2016) shows how the efficient allocation of managers among firms can have enormous impacts on aggregate productivity.

25. Another factor that has been associated with the low quality of managerial work practices is family ownership of firms. See, for example, Lemos & Scur (2018).

**Graph 5.7** Quality of work management practices

Note: The index is the simple average of the responses to six questions focusing on work management practices. Each question has a score of 1 to 5, where 1 represents the worst practice, and 5 the best. The surveys were carried out between 2013 and 2014 on a representative sample of manufacturing companies with between 50 and 5,000 employees.

Source: Produced by the authors based on data from the World Management Survey (WMS, 2015).

Among the managerial practices related to personnel management, there is evidence that pay-for-performance schemes have had positive impacts on productivity in certain contexts. Randomized experiments in firms have shown how the introduction of pay-for-performance, either individually (Shearer, 2004) or in teams (Hamilton & Owan, 2003; Friebe, Heinz, Krueger, & Zubanov, 2017), can achieve productivity increases of more than 10%.<sup>26</sup>

Table 5.8, based on the 2017 CAF Survey, shows a limited use of different pay-for-performance schemes in some of Latin America's main cities. The survey's data on this topic are generally in line with the results from the WMS: Mexico City appears as the city with the greatest use of these schemes (both in terms of individual and team bonuses and awards associated with

26. The convenience of implementing pay-for-performance versus fixed payments varies by sector. For example, it is common for workers in direct sales positions to have part of their salary linked to sales, since in many of these cases there is a clear relationship between workers' effort and the produce of that effort (sales), which is observable. Nevertheless, in other sectors, these two conditions on the relationship of workers' effort and their outcomes may not hold, making pay-for-performance implementation inconvenient or even unfeasible. This heterogeneity poses a special challenge for policies and regulations, which tend to establish homogeneous rules across sectors.

**Some countries in the region, such as Brazil and Argentina, are lagging behind in the quality of labor management practices, particularly in the implementation of performance payments and in the level of worker autonomy.**

goals and in terms of payments based on results or commissions). At the other end, São Paulo and especially Buenos Aires are the cities with the lowest prevalence of such practices. Among the cities in countries that do not appear in the WMS, Panama shows high levels of pay-for-performance, similar to those of Mexico, Bogotá, Lima, and Santiago de Chile are at an intermediate level, and La Paz, Quito, Caracas, and Montevideo are at a low level, in line with São Paulo.

Table 5.8 also shows a low degree of autonomy among Latin American workers in terms of decisions regarding certain aspects of their work, such as the sequence of tasks, working speed or pace, and work schedules. In line with the results in the previous paragraph, work autonomy is relatively greater in the capital cities of Mexico and Panama, lower in São Paulo and Buenos Aires, and intermediate in the remaining cities.

**Table 5.8** Pay-for-performance and worker autonomy

City	Possibility of receiving bonuses or rewards			Employment related autonomy		
	Individual	Group	For results or commissions	Workflow	Work rhythm or pace	Work hours
Bogotá	35.3	24.7	27.0	42.7	23.2	52.1
Buenos Aires	17.9	9.0	8.9	56.5	45.2	68.7
Caracas	21.8	15.5	28.9	61.8	58.2	69.0
Mexico City	52.9	35.2	45.7	36.6	21.1	45.4
Panama City	50.8	37.3	33.8	41.4	21.5	45.9
La Paz	22.3	17.5	22.7	47.5	40.3	62.4
Lima	39.5	35.2	28.5	53.4	34.5	53.6
Montevideo	20.2	16.8	12.6	46.6	32.8	53.6
Quito	20.8	13.7	21.2	52.6	23.8	49.6
Sao Paulo	26.7	26.5	25.0	61.5	40.8	59.5
Santiago de Chile	31.2	24.2	28.6	52.6	31.9	62.2
Total	30.3	22.6	24.2	52.1	35.8	58.9

Note: The table shows the percentage of individuals who have access to performance-based pay and the percentage of individuals who state to have none or "very little" possibility of deciding on any of the performance related factors of their job. The corresponding questions are: (i) "In your main job, are you likely to receive any of the following bonuses or rewards if you meet your goals?", (ii) "To what degree are you able to choose and change ...?". The sample is taken from employees aged between 20 and 60.

**Source:** Produced by the authors based on CAF Survey 2017.

Public policies can help improve management practices in the region. First, consulting programs and management training can produce high returns in the form of increased productivity. Second, wage regulations could promote, and not restrict, the establishment of pay-for-performance systems. These and other aspects of work organization could be included in bargaining schemes between workers and firms with the aim of achieving institutional arrangements that favor greater productivity.

## Regulations and productivity

By influencing the costs, benefits, and rules associated with different positions, labor regulations can affect both the allocation of workers between firms and the conditions that favor productivity within firms. In the previous section, we saw how regulations shape the basic incentives to decide whether to work in the formal or informal sector, a key dimension of productivity in the region. In this section, we analyze employment protection policies, wage-setting policies, and social contributions and benefits associated with formal employment. For each policy, we discuss the elements that justify its existence, its prevalence in the different countries of the region, the theoretical mechanisms by which each policy can affect productivity, and the existing evidence for these different mechanisms. Table 5.9 summarizes some of these elements.

**Table 5.9** Policy and productivity summary

Policy	Justification	Effects on productivity	
		Theory	Evidence
Job protection	Internalize costs related to firing and short-term labor contracts.	<p>Greater stability among workers increases incentives to innovate and train.</p> <p>Hiring and firing costs restrict reallocation to more productive jobs and firms.</p> <p>Increased hiring and firing costs distort the use of production factors towards non-labor factors.</p>	<p>Negative effects explained by an inefficient allocation of workers. These effects are particularly severe in industries that require higher labor flexibility.</p> <p>Negative effects of temporary contracts on employment and future earnings.</p>
Wage setting	Redistribution: increase wages of the lowest paid workers.	<p>More or less job training.</p> <p>Lower prevalence of performance-based pay.</p> <p>More informality.</p> <p>Reduced labor hiring.</p>	<p>Lack of negative effects on training decisions. The evidence is actually consistent with positive impacts.</p> <p>No evidence of effects on performance-based pay.</p> <p>Correlations show higher informality in activity sectors most affected by minimum wage, but there is no causal evidence.</p> <p>Minimum wage influences informal wages, which may limit its effect on informality.</p> <p>Moderate increases in the minimum wage do not affect employment.</p>
Contributions and social benefits associated with formal employment	Redistribution and provision of health and old-age insurance.	Increased informality.	<p>Lower contributions increase formality.</p> <p>Better social benefits reduce informality.</p> <p>The design of the contributions and benefits scheme is important.</p>

**Source:** Produced by the authors.

## Employment protection

Employment protection legislation (EPL) regulates dismissals (motives and processes, including notification and compensation), hiring modalities (temporary or indefinite), trial periods, and subcontracting. The main reason for their existence is that layoffs and short-term contracts can undermine worker

**Countries in Latin America are highly heterogeneous in terms of their hiring and firing regulations, with levels that are similar on average, in layoffs, and very high in hiring, compared to the OECD average.**

welfare (Eliason & Storrie, 2006; Sullivan & von Wachter, 2009; Amarante, Arim, & Dean, 2014; García-Pérez, Castelló, & Marinescu, 2016).<sup>27,28</sup>

Graph 5.8 summarizes the state of the EPL in a set of countries within and beyond the region according to two composite indicators developed by the OECD: one that measures the level of protection against dismissals and another that measures hiring flexibility. Both indicators vary between 0 and 6, and higher values imply higher levels of protection.

To measure protection against dismissals, the OECD takes into account, for example, if there are regulations regarding the type of notification to be made and the communication deadlines that must be met by the employer when deciding a dismissal, if compensation exists and in which amount, and the possibility and mechanisms of worker reinstatements in the event of unfair dismissals. According to this indicator, countries in the region have, on average, less protection against dismissals than those in the OECD (1.9 versus 2.3), but there is great dispersion both within the region and within developed countries. For example, in countries with lower dismissal regulations, such as New Zealand, the United States, and Central American countries, there is no specific procedure for firms to follow when communicating a dismissal decision to the worker. At the other extreme, in countries with a high level of protection, such as Venezuela, Germany, France, Argentina, and Mexico, legislation generally contemplates the existence of unfair dismissals, establishes special compensations and, in some cases, the possibility of reinstating the worker.

To measure the level of contract flexibility, the OECD takes into account, for example, whether there are restrictions on the number of times a limited-time contract can be renewed, and on the type of tasks that can be performed with temporary contracts. On average, Latin America has much more contracting regulations than OECD countries (2.6 vs. 2.1). Several countries in the region with mid-level protection against layoffs, such as Brazil, Ecuador, or Uruguay, have highly restrictive hiring regulations.

The restrictions imposed by these regulations on workers' entry and exit flows can have a negative impact on productivity.<sup>29</sup> For example, to the extent that hiring decisions are more difficult to reverse, firms may not hire highly productive workers and instead have to retain less productive ones. In addition, higher adjustment costs could also reduce the entry and exit of firms.

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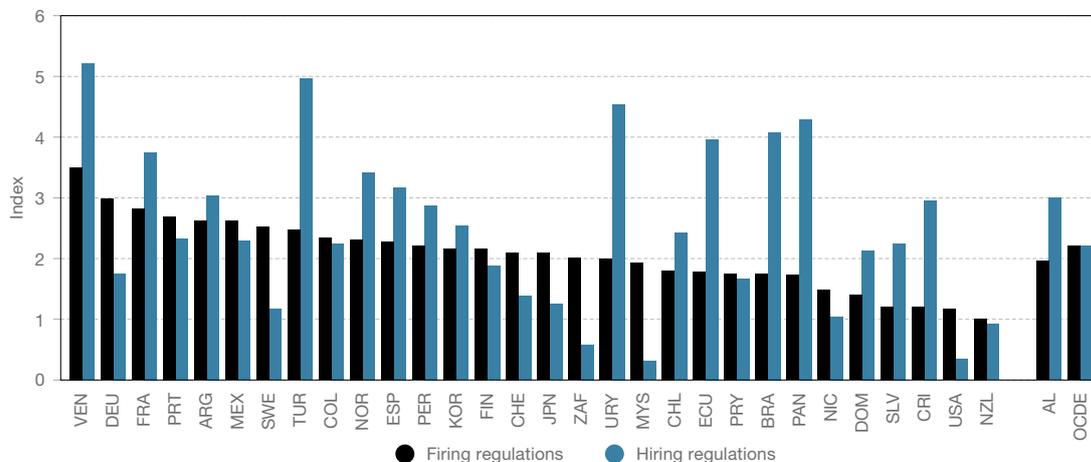
27. Sullivan & von Wachter (2009) find impacts of 1 to 1.5 years of life expectancy on laid-off workers in the United States in the 1970s. Eliason & Storrie (2006) show negative impacts of firm closure on the salary of Swedish workers up to 4 years after the event. Amarante, Arim, & Dean (2013) show, for Uruguay, salary losses of 38% one quarter after the end of the employment relationship, and 14% after one year. García-Pérez, Castelló, & Marinescu (2016) show that the flexibilization of hiring regulations in Spain led to young workers having worse incomes and employment in the future.

28. Although a large part of these costs can be covered more efficiently with a public unemployment insurance scheme (see Text box 5.4), firms' dismissal decisions cause a negative externality on workers and (when they exist) the finances of unemployment insurance and training and reintegration programs. Compensations or dismissal taxes thus play the role of making firms internalize these negative externalities (Blanchard & Tirole, 2008; Cahuc & Zylberberg, 2008; Tirole, 2017).

29. Meanwhile, theory is not conclusive regarding the effect of EPL on the absolute level of employment, since it decreases layoffs but also hiring (Blanchard & Portugal, 2001).

Given that exiting firms are expected to be less productive than the average, and that entering firms bring innovations in terms of products and processes, obstacles in firms' creation and destruction process could have a negative effect on the aggregate level of productivity. Finally, to the extent that these regulations make labor more expensive, firms could have incentives to invest more in capital and to employ less labor than optimal. On the other hand, EPLs can increase productivity by increasing workers' tenure and thus strengthening their incentives to innovate and invest in firm-specific training (Acharya, Baghai, & Subramanian, 2013, 2014; Boeri, Garibaldi, & Moen, 2017).

**Graph 5.8** Employment protection



Note: Synthetic indicators for 2013-2014 are shown: level of protection against layoffs and level of flexibility of hiring mechanisms. Both indicators vary between 0 and 6; higher values imply higher levels of protection. The averages for Latin America and the Caribbean and OECD countries are based on the countries shown above. The OECD average does not include Chile nor Mexico.

Source: Produced by the authors based on Indicators of Employment Protection (OECD, 2018a) data for OECD countries and the Employment Protection Database (OECD/IDB, 2018) for Latin American and Caribbean countries.

In general, the available evidence on the impacts of EPL focuses on protection against dismissal and tends to confirm the relevance of these mechanisms. Most studies have found negative effects, with different mechanisms at work depending on the specific context (Micco & Pagés, 2007; Lafontaine & Sivadasan, 2009; Autor, Dorn, Hanson, & Song, 2014; Petrin & Sivadasan, 2013; Bjuggren, 2018).<sup>30</sup> While there is evidence that EPL can boost labor productivity through

30. Micco & Pagés (2007), for the case of Chile, suggest that the main channel is firm entry and exit. Lafontaine & Sivadasan (2009) study changes in the number of workers over time in a firm with branches in several countries and find slower adjustments in countries with more regulations. Petrin & Sivadasan (2013) show that the rise of dismissal costs in Chile increased the discrepancy between costs and labor productivity at the firm level, which could be explained through several channels. Autor, Dorn, Hanson, & Song (2014), on the other hand, point to inefficient allocation mechanisms among different production factors: the increase in job protection in the United States increased the stock of capital, which led to higher labor productivity, but also lower total factor productivity. Finally, Bjuggren (2018), in Sweden, points to an inefficient allocation in terms of which workers firms choose to dismiss.

**The evidence points to predominantly negative impacts of protection against dismissals on productivity.**

increased innovation activities, the higher hiring costs involved lead to higher capital use per worker and lower total factor productivity (Acharya et al., 2014; Autor et al., 2014).

The following exercise allows an in-depth analysis of the empirical relationship between EPL, specifically protection against dismissals, and productivity using a methodology similar to that proposed by Micco and Pagés (2007). The exercise compares the evolution of productivity in industries with higher or lower employment flows in countries with varying levels of protection against dismissals.<sup>31</sup> The intuition is that, since EPL can affect productivity by restricting employment flows, its effects should be greater in industries that require greater flows, and vice versa.

In order to establish which industries require higher or lower flows of employment, we use the US labor market, characterized by very low levels of EPL, as a reference.<sup>32</sup> For example, the chemical industry requires relatively low employment flows, with the sum of jobs created and destroyed in a single year being approximately 12% of the total jobs in the industry. At the other extreme, this number is 22% for the footwear industry, an industry that then requires relatively high employment flows.

The results of the exercise show that the productivity of industries that require greater labor flexibility is indeed lower in relation to the productivity of industries that require less flexibility in countries with greater regulations for dismissals. For example, in a high-protection country such as Venezuela, the footwear industry would be 6.2% less productive than the chemical industry, in comparison to a low-protection country like Costa Rica. While these results could also be interpreted as Venezuela's chemical industry being more productive than its footwear industry in comparison with Costa Rica's, the broader evidence on the relationship between dismissal regulations and productivity supports the former interpretation on these regulations having negative effects on productivity.<sup>33</sup> More generally, the exercise suggests that layoff protection regimes should take into account the heterogeneous levels of employment flows that different economies and industries need in order to operate efficiently. These heterogeneous needs also impose limits in terms of comparing EPL levels among countries that have different economic structures.

In terms of public policy, dismissal regulations are a necessary tool for firms to internalize dismissal costs for workers and public finances but they have at

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31. The exercise estimates a regression where the dependent variable is the logarithm of total factor productivity (TFP) of industries in each country and year, and the independent variable is the interaction between the OECD dismissal protection index at the country and year level and the US reallocation rate at the industry level, as reported by Davis, Haltiwanger, & Schuh (1998). The regression includes industry and country-year fixed effects. The exercise covers the period from 1985 to 2013 for all countries and years for which the TFP and EPL data coincide. This yields a sample of around 30 countries, mostly in Europe and Asia.

32. Micco & Pagés (2007) show that the ranking of industries according to the intensity of employment flows is highly correlated among countries and that therefore the choice of reference country does not alter this methodology's results.

33. The result thus illustrates how EPL affects industries differently, which is consistent with the two causal directions between EPL and productivity already mentioned. For example, innovation may be more important for productivity in the chemical industry than in the footwear industry and this could lead to greater dismissal protection favoring incentive schemes for innovation in the chemical industry, in line with what is suggested by Boeri, Garibaldi, & Moen (2017).

least three important limitations (Blanchard & Tirole, 2008; Cahuc & Zylberberg, 2008; Tirole, 2017). First, they can negatively affect productivity, especially in industries that require greater employment flows to operate. Second, severance payments are not the best instrument to provide income for workers who become unemployed (see Text box 5.4).<sup>34</sup> Third, except for dismissal regulations protecting trade union members or victims of discrimination, it is difficult to justify the existence of dismissal regulations that go beyond compensation payments, such as the obligation to reinstate unfairly dismissed workers. The difficulty of establishing whether a dismissal is fair or not leads to costly legal processes that dramatically increase the costs of formal employment and uncertainty. Given these limitations, countries should prioritize strengthening their unemployment insurance systems, moderating severance pay and limiting regulations that can lead to costly legal procedures.<sup>35</sup>

**Unemployment insurance has advantages over employment protection legislation because it allows reallocations that increase productivity and protect workers from unemployment.**

Regarding hiring regulations, some authors have found negative effects of contract flexibilization on the income and future employment prospects of younger workers (Autor & Houseman, 2010; García-Pérez et al., 2016). This evidence, however, is scarce. Given the high level of contracting regulations, more research is needed on the impact of these regulations on productivity.

#### **Text box 5.4 Is unemployment insurance a substitute for severance payments?**

Severance payments could be justified given workers' need for an income to support themselves while they remain unemployed. However, they can be a relatively poor instrument to fulfill that function. First, at the time of dismissal, the length of the unemployment spell is uncertain, making it difficult to calculate how much the worker should be paid. Second, it is generally better for the worker to receive several payments over time than a single payment at the beginning of the unemployment period. Third, dismissals can coincide with firm bankruptcy, making the corresponding payments difficult. Therefore, providing unemployment insurance to cover worker income while unemployed is generally considered more efficient (Blanchard & Tirole, 2003).

Unemployment insurance should ideally be financed by firm contributions in good times, contemplating gradual upward or downward adjustments of these contributions as firms dismiss workers. This mechanism would make firms internalize the costs of their dismissals on the unemployment insurance system. In addition, it would have the allocative advantage of not overloading firms that do not fire workers with the social costs generated by those that do.

34. By allowing workers to have more resources and time to look for jobs, unemployment insurance has, in principle, a potential to increase productivity by improving the allocation of workers to positions (Tatsiramos, 2014), but evidence of this mechanism is scarce (Bosch, 2016).

35. The strengthening of unemployment insurance systems in high-informality contexts faces a series of challenges. For a detailed discussion of this topic, see Bosch (2016). For example, the existence of informal labor in the region implies that workers could collect unemployment insurance and, at the same time, work in informal jobs. This is an additional difficulty for the design of unemployment insurance systems in the region. For a discussion of this point, see Álvarez-Parra & Sánchez (2009) and Espino & Sánchez (2015). For a discussion of the role of a system based on individual savings accounts in informality contexts, see Cirelli, Espino, & Sánchez (2017).

Unemployment insurance, however, does not completely replace the role of severance payments for two reasons. In the first place, dismissals entail additional psychological costs and provoke the loss of social ties (Blanchard & Tirole, 2003). These costs accrue at the time of dismissal and could therefore be covered by the firm through compensation. Second, severance payments provide credibility to incentive systems in which firms promise higher future payments contingent on worker effort (if they could fire them when these payments are due, the promise would not be as credible) (Boeri, Garibaldi, & Moen, 2017).

In summary, although unemployment insurance does not completely replace severance payments, it can partly substitute it by providing income to dismissed workers during unemployment, reducing the necessary compensation amount. In terms of productivity, another advantage of unemployment insurance is that, by reducing the negative impact that dismissals have on worker well-being, it favors the social and political viability of dismissals that lead to reallocation of workers to more productive positions.

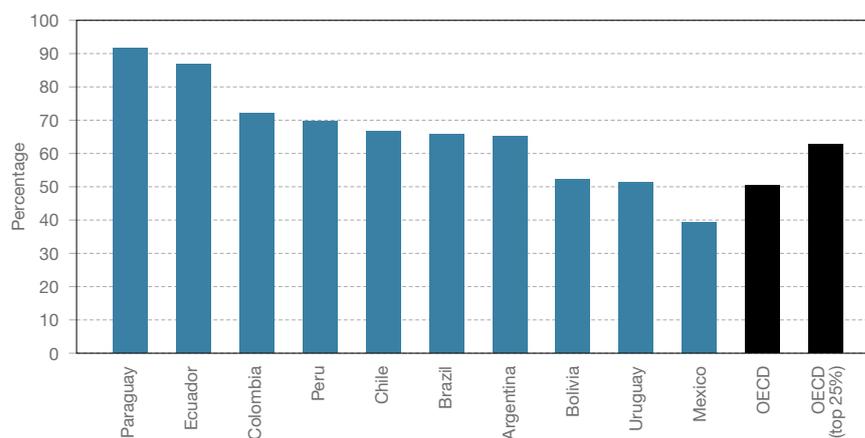
## Wage-setting institutions

### Minimum wages

Minimum wages have a distributive aim: they seek to increase the income of the most vulnerable workers. How high are they in Latin America?

Given the differences in income per capita among countries in the region, comparing the absolute values of their minimum wages does not provide a clear picture. That is why a relative measure is used: the minimum wage as a percentage of the median salary of each economy. Graph 5.9 presents this measure for several countries in the region and the OECD. As the graph shows, there are important differences among countries. Three groups can be distinguished: a first group with particularly high minimum wages, formed by Paraguay and Ecuador, a second intermediate group with most of the countries, including Argentina, Brazil, Chile, Colombia, and Peru, and a third group with a lower minimum wage, formed by Bolivia, Mexico, and Uruguay. The first two groups have high minimum wages compared to OECD countries, even when considering the average of the 25% of OECD countries with the highest minimum wages.

Although the minimum wage is high in the region (or perhaps for that same reason), compliance is relatively low. Table 5.10 shows, in addition to the minimum wage as a percentage of the median salary, the share of formal and informal workers whose salary is below the minimum wage for each country. At one end, Bolivia, Brazil, Colombia, and Mexico have a non-compliance rate among formal workers that is close to zero, while at the other end, Argentina, Ecuador, and Paraguay have a non-compliance rate between 17% and 22%. Failure to comply with minimum wage regulation among formal employees is an example of labor informality as a grayscale phenomenon. In the case of informal employees, non-compliance levels are generally important, exceeding half of the workforce in several countries.

**Graph 5.9** Minimum wage as a percentage of full-time worker median wage

Most Latin American countries have very high minimum wages, with a large fraction of salaried informal workers earning incomes below that minimum.

Note: The OECD average is based on 2016 data, for the 35 member states of the OECD, with the exception of Austria, Chile, Czech Republic, Denmark, Finland, Iceland, Italy, Mexico, Norway, Sweden, and Switzerland. The average of the countries in the higher quartile of the OECD is based on France, New Zealand, Portugal, Slovenia, and Turkey. The data from Latin America is from 2015, except for Mexico and Bolivia, which dates from 2014.

Source: Produced by the authors based on data from CEDLAS (2018) for Latin American countries, and from OECD (2018) for OECD countries (except Chile and Mexico).

**Table 5.10** Minimum wage summary statistics

Country	Minimum wage as a percentage of median wage	Percentage of formal salaried workers below minimum wage	Percentage of informal salaried workers below minimum wage	Over-representation of low education level around minimum wage <sup>a/</sup>
Argentina	65.2	17.8	68.7	1.33
Bolivia	52.3	2.5	26.2	0.91
Brazil	65.7	2.5	48.2	1.16
Chile	66.6	12.5	43.1	1.49
Colombia	72.1	2.5	55.0	1.11
Ecuador	86.8	17.1	64.7	0.98
Mexico	39.3	0.8	20.6	1.19
Peru	69.8	12.2	44.3	0.53
Paraguay	91.6	22.2	65.0	0.89
Uruguay	51.3	11.7	64.8	1.31

Note: The table displays descriptive data regarding the 2015 legal minimum wage in each country, with the exception of Bolivia and Mexico, whose data is from 2014.

a/ Over-representation is calculated as the quotient of two ratios: i) the number of salaried workers with incomplete secondary education over those who earn around the minimum wage, taken as the numerator; and ii) the number of salaried workers with incomplete secondary education over the total of salaried workers, taken as the denominator. "Around the minimum wage" is defined as +/- 30 dollars at 2005 purchasing power parity, which represents around 10% of the Brazilian minimum wage.

Source: Produced by the authors based on data from CEDLAS (2018).

**In most countries in the region, minimum wages affect the wages of a great number of workers, not only formal workers but also informal workers.**

What is the impact of minimum wages on the aggregate wage level? A set of graphs contribute to answering this question by plotting the proportion of workers at each salary level, for both formal and informal workers. The graphs also include a vertical line representing the minimum wage level in each country. Minimum wages can be considered to have an effect on aggregate wages when these graphs show a significant accumulation of workers around the minimum wage.<sup>36</sup> Graph 5.10 shows the cases of Argentina and Brazil (the graphs for the rest of the countries are included in the Appendix). In those two countries, there is a significant accumulation of informal workers around the minimum wage, while in the case of formal workers this accumulation is only observed in Brazil and not in Argentina. The rest of the graphs in the Appendix show that the minimum wage has a clear incidence on formal and informal wages in most countries in the region, with the exception of formal workers in Bolivia, Mexico, and Uruguay. In the cases of Mexico and Bolivia, the minimum wage is probably too low to have an effect on formal workers, although it does seem to affect informal workers slightly; in Argentina and Uruguay, as will be seen later, the collective wage bargaining institutions may substitute to some extent the role of the minimum wage. Although we do not expect minimum wages to affect informal wages, in several cases their effects are even higher than on formal wages.<sup>37</sup> This suggests that the minimum wage is an important point of reference for salary negotiations in the informal sector.

Minimum wages can reduce productivity by affecting the allocation of workers to productive positions. First, they can have a negative impact on employment by impairing the employability of workers whose productivity is below the minimum wage level. Second, in Latin America they can affect productivity through the informality channel. If the minimum wage surpasses many workers' labor productivity, firms have an incentive not to hire these workers (pushing them towards unemployment or low-productivity self-employment) or to hire them informally with lower wages.

Minimum wages can also affect productivity by affecting certain working conditions within firms, particularly the acquisition of skills and the implementation of effort provision incentives such as pay-for-performance schemes. Regarding skill acquisition, the theoretical effect of the minimum wage is ambiguous (Acemoglu & Pischke, 2003; Garicano & Rayo, 2017). On the one hand, when it comes to general skills that may increase the productivity of workers in other firms, the minimum wage can reduce the chances that workers "pay" for that training by temporarily accepting a lower salary. On the other hand, in labor markets with frictions, the minimum wage can encourage firms to invest in training to increase the productivity of less qualified workers and thus compensate for the higher wage

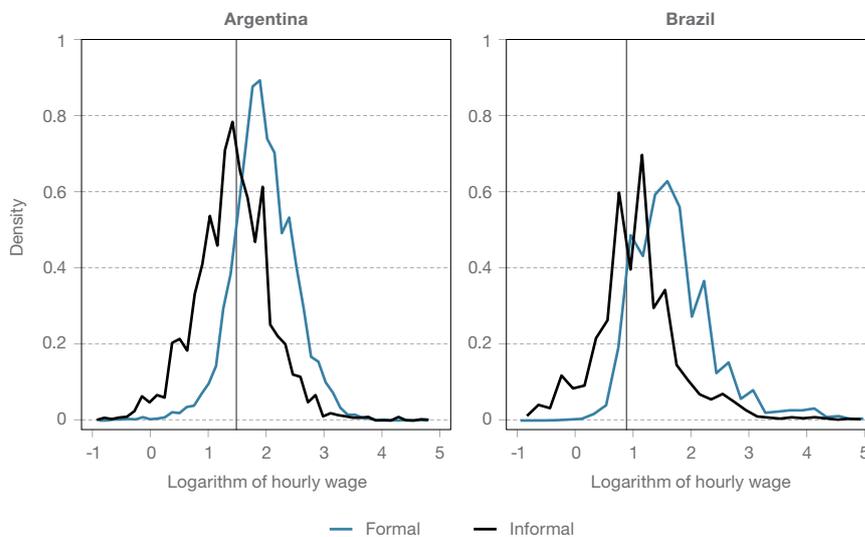
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36. A series of idiosyncratic aspects in each country can cause accumulation to occur slightly below or above the minimum wage value. Some of these factors include the rounding of wages in household surveys and the consideration of net or nominal incomes.

37. This higher incidence clearly occurs in the cases of Mexico and Bolivia, where minimum wages have no effect on formal wage earners, and in the cases of Brazil, Peru, and Chile, where the mass of informal wage earners immediately above the minimum wage is greater than formal earners. The relevance of the use of minimum wage to determine informal wages has been documented previously in other studies, for example Boeri, Garibaldi, & Ribeiro (2011).

costs imposed by the minimum wage. In the case of effort incentives provided by pay-for-performance schemes, the theoretical impact of the minimum wage is negative, since it restricts the possibility of introducing this type of variable payment systems.

**Graph 5.10** Formal and informal worker wage distribution and minimum wage (2015)



Note: The graphs show the estimated distribution of the logarithm of the hourly wage earned from the main job, expressed at purchasing power parity dollars. The vertical line represents the minimum hourly wage for each country, in force at the time of the survey.

Source: Produced by the authors based on data from CEDLAS (2018).

A joint analysis of the level, compliance, and incidence of minimum wages highlights how these three factors influence one another as well as certain mechanisms that affect productivity in Latin American countries. For example, in Mexico and Bolivia, the low minimum wage enables high compliance but limits its incidence in the formal sector, and at the same time, it does constitute a significant reference for the informal sector. In these cases, the redistributive role of the minimum wage in informality seems to be particularly relevant, which contrasts with the theory.

The other extreme features countries such as Ecuador, Paraguay, and Peru, where high minimum wages can be linked to relatively high levels of non-compliance in the formal sector, and to a majority of workers earning less than the minimum wage in the informal sector. This results in a limited incidence among low-income workers and therefore a limited redistributive impact. This limited incidence among low-income workers can also be seen in the fact that low-educated workers are not overrepresented around the minimum wage, as is the case in most countries in the region (see Table 5.10). The high minimum

wages in these three countries could help explain their high levels of informality (see Graph 5.2).

In the middle, countries such as Brazil, Chile, and Colombia have moderate minimum wages when compared to the rest of Latin America, although they remain high compared to OECD levels. In these cases, there is a high level of compliance among formal workers<sup>38</sup> and a high incidence on the salaries of formal and informal workers. In this group of countries, the relatively high minimum wage level, combined with a high level of compliance in the formal sector (a possible sign of a better enforcement) could have effects on both informality and unemployment.<sup>39</sup>

The relatively high incidence of minimum wages on both formal and informal wages observed in most countries could limit this policy's potential effects on informality. This is because, as previously discussed when presenting Table 5.5, informality decisions depend on the relative costs and benefits of a formal versus an informal position. Then, if minimum wages affect both formal and informal wages for a relevant set of workers, the policy does not change those workers' formalization costs. Although this observation moderates the concerns on the negative impacts of minimum wages in the region, both the graphs with the distribution of wages (5.10 and Appendix) and Table 5.10 show that a significant mass of informal workers are below the minimum wage. This implies that the minimum wage hardly benefits low-income workers: among them, the minimum wage can be too high relative to their productivity and can work as an incentive towards informality.

In order to analyze in more detail the relationship between minimum wage and informality, the following empirical exercise studies sectors that have greater or lesser exposure to the minimum wage.<sup>40</sup> We measure exposure as the ratio between the minimum wage and each sector's median salary. For example, in the restaurants and hotels sector, which generally has low wages, the minimum wage amounts to 79% of the sector's median salary, on average across countries. On the other hand, the transport, storage, and communications sector has relatively high salaries, and the minimum wage reaches, on average, 59% of the median salary. The hypothesis of this exercise is that minimum

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38. Although Table 5.10 shows Chile with a non-compliance rate of 12.5%, this may be due to the fact that Chile has 3 minimum wages: one for workers between 18 and 65 years of age, another for those under 18 and over 65, and a third one for incomes with a "non-remunerative" nature. The calculation of compliance has been done by taking into account only the first one.

39. As seen in the section that treats the allocation of workers between inactivity, unemployment, and employment, these three countries have a high level of structural unemployment, which could lead one to believe that the minimum wage is acting negatively on the employment level. However, a recent study by Saltiel & Urzúa (2017) for Brazil concludes that increases in the minimum wage have no effect on employment.

40. The regression's dependent variable is the proportion of informal workers, and the independent variable is the interaction between a variable that reflects exposure to the minimum wage and the minimum wage level. Industry and country-year fixed effects are included. The regression is estimated for a set of ten countries with data from four periods: 2000-01-02-03, 2005-06, 2010-11 and 2014-15. The exercise is performed using all variables in the same period and using the exposure variable with a one period lag to avoid mechanical correlation between the minimum wage level and exposure. A robustness exercise is also performed using as a measure of exposure the proportion of workers in the sector with a low educational level, under the assumption that these sectors have greater exposure to the minimum wage.

wage increases should be associated with greater informality in the former relative to the latter sector.

Indeed, the results show a positive association between national minimum wage increases and the informality of the sectors most exposed to the minimum wage in comparison to the least exposed. However, the magnitude of the impact seems to be relatively small. For example, the doubling of the minimum wage in Brazil would be associated with a 0.6 percentage points higher informality rate in the restaurants and hotels sector compared to the transportation, storage, and communications sector. That said, it is important to highlight that this methodology assesses only the impact of minimum wages on the relative informality of different sectors and not its absolute impact on informality in the economy as a whole.

Regarding the empirical impact of the minimum wage on the employment decisions of firms, available evidence for both developed countries and countries in the region points towards non-existent or small-scale impacts (Manning, 2016; Broecke, Forti, & Vandeweyer, 2017; Saltiel & Urzúa, 2017).<sup>41</sup> However, the available evidence generally derives from cases of moderate minimum wages, meaning that the high minimum wage levels in several countries of the region constitute an alert regarding their potential effects on employment.

Finally, there is not much evidence on the impact of minimum wages on the mechanisms that affect productivity within firms. Some studies have found that minimum wages do not reduce training activities and may even increase them slightly (Acemoglu & Pishcke, 2003; Arulampalam, Booth, & Bryan, 2004; Dustmann & Schönberg, 2009).

In short, the most relevant impact of the minimum wage on productivity in Latin American countries could be on incentivizing informal jobs. However, evidence in this regard is not overwhelming and the high levels of both informality and minimum wages in the region justifies that research on this relationship should be a high priority. On the other hand, the high proportion of low-income workers, mostly informal, who do not comply with minimum wage regulations, limits the redistributive potential of this tool. Minimum wages in the region affect wages, but not necessarily those of low-income workers. Given this limitation and the high levels of income inequality in the region, countries could consider alternative redistributive instruments that are more effective and do not promote informality. Within them, monetary transfers associated with formal employment have the advantage of promoting this type of employment, but their redistributive potential is limited in countries with high informality. On the other hand, an alternative with a more neutral effect on informality but more effective from a redistributive point of view are monetary transfers targeted at low-income households.

**The main mechanism by which high minimum wages in the region could affect productivity is by encouraging informality, but evidence in this regard is scarce and more research is needed.**

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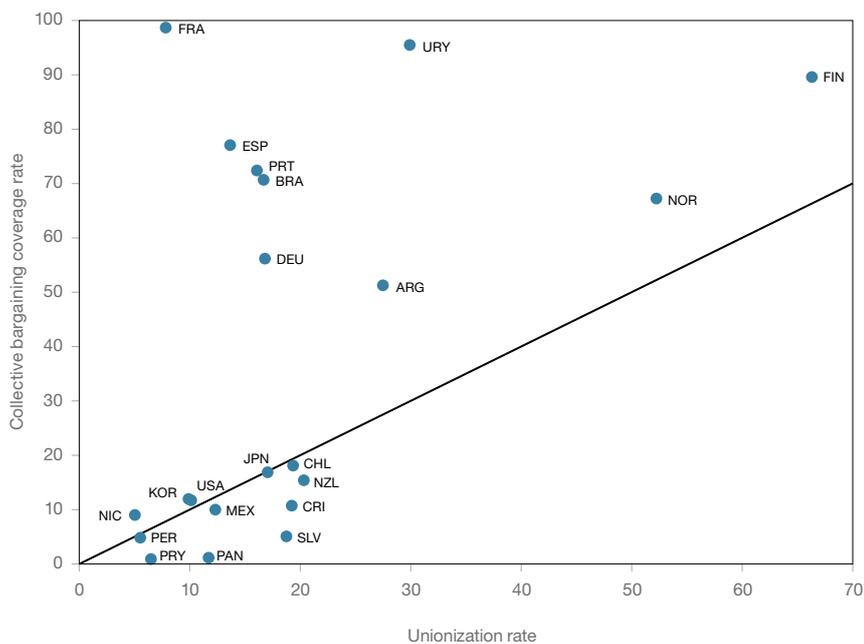
41. There is large body of literature on the impact of minimum wages on employment. Two recent reviews of this literature are those of Manning (2016) for developed countries, and Broecke, Forti, & Vandeweyer (2017) for developing countries. In a recent study for the case of Brazil, Saltiel & Urzúa (2017) reach similar results.

## Collective wage bargaining

Collective wage bargaining between workers and employers is a relevant wage-determination mechanism in Latin America, particularly in Argentina and Uruguay. But the specifics of collective bargaining vary greatly among countries. For instance, it can cover different aspects of the employment relationship besides salary, such as the definition of work schedules and the rules that govern hiring and dismissals. Furthermore, collective bargaining can take place at different levels: the firm, the industry, and even the economy as a whole. Likewise, it can occur voluntarily or it can be legally mandatory. Finally, what is negotiated and agreed by a group of firms and workers may or may not be mandatory for firms and workers who did not participate in the negotiation.

Graph 5.11 shows collective bargaining and union coverage in both developed and Latin American countries. The graph exhibits a large dispersion in both variables for both groups of countries. Furthermore, although the coverage of collective bargaining is generally greater in countries with high unionization rates, several countries, including Brazil and Uruguay, have a high coverage of collective bargaining without a high unionization rate.

**Graph 5.11** Unionization and collective bargaining



Note: The coverage rate indicates the percentage of employees whose wages or employment conditions are determined by one or more collective bargaining agreements. The unionization rate indicates the number of employee union members, as a percentage of salaried employees. The data dates from between 2010 and 2016 for both variables. The 45 degree line indicates where the collective bargaining coverage rate matches the unionization rate.

Source: Produced by the authors based on data from ILOSTAT (ILO, 2018).

Collective bargaining can affect productivity in several ways. In terms of allocative efficiency, collective bargaining that sets similar norms for large and diverse groups of firms implies imposing equal conditions for firms of varying sizes and levels of productivity, bearing implications for the entry, exit, and informality decisions of these firms. On the one hand, the negotiation of high wages could expedite the exit of firms with lower productivity and thus increase aggregate productivity. On the other hand, high wages could act as a barrier to entry in certain industries, hurting productivity growth with a slower entry of new firms that are more productive. Likewise, as in the case of the minimum wage, higher wages could lead to higher informality. Then, two key aspects that determine the scope of this type of allocation problem are: i) the homogeneity of firms that negotiate together and pay the same wages, and ii) the extent to which the negotiated conditions affect workers and firms that do not participate in the negotiation. These aspects determine to what extent different firms and employees operate under equal regulations.

In addition, collective bargaining can affect working conditions within firms through several channels. For example, the exchange of information between employers and employees can favor the implementation of processes that increase productivity, since workers have information about production processes that entrepreneurs lack. In addition, collective bargaining can increase productivity by reducing labor conflicts, avoiding strikes and disputes. Finally, depending on the type of agreement, it can either favor or limit the implementation of performance payments that lead to an increase in productivity.

Regarding the evidence on the effects of collective bargaining on the efficient allocation of workers to jobs, Villanueva (2015) argues that the dissociation between unionization and collective bargaining coverage rates observed in some countries could imply that a large part of the actors affected by collective bargaining do not participate in it. This could potentially have detrimental effects on employment and productivity. Villanueva also points out how, in the cases of Germany and the Netherlands, it has been possible to limit the potential negative effects of a high collective bargaining coverage without high unionization, by establishing a minimum representation rate by each industry and region as a condition for the agreements to be mandatory to those industries and regions.

Regarding working conditions within firms, it is worth noting that Latin American countries with the largest collective bargaining coverage, such as Uruguay, Brazil, and Argentina, have the lowest incidence of pay-for-performance schemes and of workers reporting being more autonomous in terms of choosing their task sequence, working pace, and work schedules (see Table 5.8). This could suggest that collective bargaining in these countries acts mainly as a minimum wage by activity sector, with little tendency to include aspects aimed at improving productivity.

**Collective bargaining can negatively affect productivity by imposing homogeneous conditions on heterogeneous actors, and positively affect it by facilitating the exchange of information and reducing the levels of conflict between workers and employers.**

**Social contributions and benefits associated with formal employment affect productivity because they determine a good part of the costs and benefits of informality.**

## **Contributions and social benefits associated with formal employment**

Both in Latin American and OECD countries there is a broad set of social benefits (such as health insurance, unemployment insurance, maternity and paternity benefits, old-age pensions, monetary transfers for children, and disability pensions) that fulfill insurance and redistribution purposes. Following a traditional Bismarckian paradigm, these benefits are often linked to formal employment and are financed by contributions from employers and employees. While in developed countries, the discussion focuses mainly on the effect of the design of these programs on labor participation, employment, and unemployment, in Latin America the effect on informal employment is also considered, expanding the scope of the effects of contributions and social benefits on productivity. In addition, depending on each country's tax regime, formal employment can be subject to income taxes. This tax also affects the incentives for worker allocation between formal and informal positions.

Graph 5.12 shows the monetary contributions associated with formal employment as a percentage of formal wages for a set of Latin American countries and for the OECD average. The graph includes employers and workers' social security contributions and workers' income tax. As the graph shows, the sum of these contributions as a percentage of salary in the region is, on average, well below the OECD. Nevertheless, there is a significant heterogeneity within the region. Some of the countries with the highest levels are Argentina,<sup>42</sup> Brazil, and Uruguay, whose contributions exceed 30% of the average salary and are close to the OECD average, while contributions in the two countries with the lowest levels, Honduras and Trinidad and Tobago, are near 10% of the average salary.<sup>43</sup>

Breaking down the contributions into their three components shows that the difference between the region and the OECD is mainly due to the low incidence of income tax in the region (OECD/IDB/CIAT, 2016). This low incidence means that the pattern of contributions in the region is generally less progressive. However, several countries apply non-taxable minimums below which contributions to social security do not apply, which implies zero or negative contributions for lower-income workers. This is the case for workers in the first income decile in Bolivia, Colombia, Costa Rica, Ecuador, Honduras, Nicaragua, and Peru (OECD/IDB/CIAT, 2016).<sup>44,45</sup>

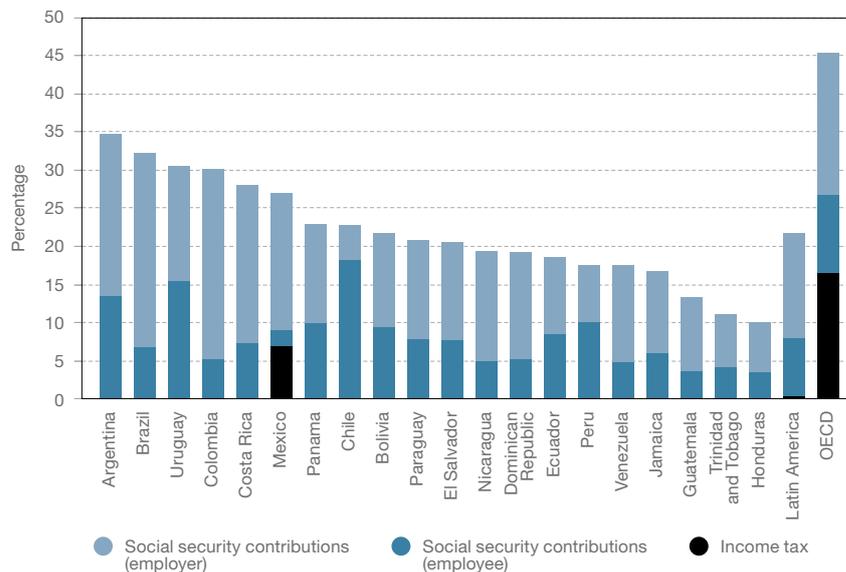
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42. At the beginning of 2018, Argentina introduced a non-taxable minimum for employer contributions, which reduces contributions for lower-income workers.

43. Contributions as a percentage of wages vary according to income level and household composition, since these two characteristics affect, respectively, the levels of income taxes and monetary benefits. The data in Graph 5.12 refer to a single-person household comprised of an adult with an income equal to the average of the economy. The difference in contributions between the region and the OECD is lower if we consider households with children, since in the OECD contributions decrease strongly with the number of children.

44. Argentina joined this group of countries with a non-taxable minimum starting in 2018.

45. Bear in mind that employer contributions are based on a minimum wage that is high in many countries, meaning that incentives for informality persist among lower-income workers despite the existence of non-taxable minimums.

**Graph 5.12** Taxes and contributions as percentage of wages (2013)

Note: The data corresponds to a household made up of a single adult with no children on an average worker income. The Latin American average is based on the countries shown. The OECD average includes the 35 member states with the exception of Chile and Mexico.

Source: Produced by the authors based on data from OECD/IDB/CIAT (2016).

The evidence suggests that both the value of monetary contributions and workers' valuation of the associated benefits have a relevant impact on informality. Regarding contributions, Fernández and Villar (2017) study the reduction of employer social security contributions from 29.5% to 16% that took place in Colombia in 2012 (financed by higher taxes on corporate profits) and find that it led to a reduction in informality of around 5 percentage points. Additionally, Bernal, Eslava, Melendez, and Pinzon (2017) and Morales and Medina (2017) find that this reduction in informality was due to a greater creation of formal employment in micro and small firms.

Regarding the valuation of benefits, Bérigolo and Cruces (2014) observed that the expansion of health benefits for formal workers in Uruguay had the effect of increasing formalization.<sup>46</sup> Likewise, Almeida, and Carneiro (2012) found evidence in Brazil that workers value social benefits and “pay” for them by accepting a lower salary in the formal sector than they would in the informal sector. This last piece of evidence highlights the interrelation between different policies such as social benefits and minimum wages: in the case of Brazil, the

46. Bérigolo & Cruces (2014) also find that the increase in contributions that financed the expansion of health benefits generated an increase in income underreporting, especially in workers in small firms. However, the increase in revenue associated with the increase of registered workers far exceeded the revenue reduction associated with higher underreporting.

**Evidence abounds on the relevance of contributions and benefits associated with formal and informal employment for decisions related to worker and firm informality.**

existence of a high minimum wage would not have allowed workers to accept lower wages in order to “pay” for the received social benefits, and this could have led to lower formal employment.

Several studies also explore the valuation and costs of social benefits for formal and informal workers, and their impact on informality (Levy, 2008; Camacho, Conover, & Hoyos, 2014; Bosch & Campos-Vázquez, 2014; Garganta & Gasparini, 2015). In the case of Mexico, Levy (2008) argues that the joint existence of a health insurance system for formal workers (financed by formal employment contributions) and a different one for informal workers (financed by general revenue) encourages informality. Similarly, in the case of Argentina, Garganta and Gasparini (2015) found that the introduction of a transfer for workers without formal employment and with children implied a drop of 8.4 percentage points in their probability of migrating towards a formal job (a reduction of almost 40% in the probability of formalization).

In general, social benefits can affect informality if moving from informal to formal employment involves the loss of a cash transfer, as this may lead to low-income workers preferring informality. For example, Bérgholo and Cruces (2016) found that a cash transfer program in Uruguay reduced registered employment by about 8 percentage points.

Beyond its impact on informality, the design of benefits and contributions can affect productivity via other channels. For example, the effects of benefits or contributions on certain business decisions (such as size, sector of activity or type of workers hired) can have negative consequences on productivity through the allocation channel. Escobar, Lafortune, Rubini, and Tessada (2017) studied the introduction of a program in Chile through which firms with more than 19 female employees had to cover childcare expenses for employees with children. Although the program aimed to increase female labor participation, the authors find that firms made an effort to fall below the threshold of 19 employees, with reduced the demand for female workers and distorted hiring decisions, at the expense of productivity. The authors argue that if, on the other hand, the program had been financed with a tax on company profits, its impact on the female participation rate would have been the desired one.

In summary, the evidence suggests two promising policy alternatives regarding contributions and social benefits that could contribute to reduce informality and, through this channel, improve the allocation of workers to jobs. First, following the example of Colombia’s reform, countries can explore substituting contributions linked to formal jobs with less distorting financing mechanisms. Likewise, countries should aim to reduce the non-monetary costs of the administrative procedures associated with those contributions. Second, regarding benefits, these should be designed without discouraging formal employment in general, as in the case of cash transfers in Uruguay, nor penalizing certain types of workers or firms in particular, as in the case of childcare in Chile.

## Regulations and their enforcement

The impact that de jure regulations have on productivity stem not only from their design but also from their level of compliance, which in turn depends on enforcement efforts. What does the evidence say about the enforcement of labor regulations in Latin America and their impact on productivity? Available evidence in general confirms that enforcement efforts affect the impact of labor regulations on firms' behavior.<sup>47</sup> In other words, the same labor regulation can have very different effects on productivity depending on firms' compliance with the norm.

Enforcement efforts can affect productivity in different ways. For example, non-compliance with norms can act as a mechanism for introducing flexibility and allow greater efficiency (Forteza & Noboa, 2017); in these cases, enforcement has a negative impact on productivity by limiting this mechanism. Second, in weak institutional contexts, monitoring can be used as an extortion tool to extract profits by corrupt officials or politicians (Djankov, La Porta, Lopez-de-Silanes, & Shleifer, 2002), in which case it not only produces a negative impact on productivity but also fails to improve compliance with regulations. Third, enforcement may be biased against large firms,<sup>48</sup> or firms that are more easily inspected, compromising productivity through the allocation channel. Finally, uncertainty surrounding compliance and the lack of monitoring can be a further cause of conflict between workers and firms, and thus affect the conditions that promote productivity within the company.

Graph 5.13 explores the link between employment protection regulations and inspections (measured as the number of labor inspections per 10,000 workers) in Latin America and countries outside the region. Employment protection regulations are quantified according to the OECD indicator that measures firing and hiring regulations in different countries with a scale between 0 and 6, where 0 indicates very lax labor regulations and 6 very strict regulations. The graph shows a large dispersion in both employment protection regulations and labor inspections, with a null or slightly negative correlation between both variables in Latin America. For example, among countries that have similar levels of employment protection, between 1.5 and 2 points, Chile stands out with a high number of inspections (about 300 per 10,000 employees), while Paraguay features almost no inspections at all. Similarly, some countries, such as Mexico and Venezuela, have high levels of regulation and meager enforcement efforts. In other words, the levels of de jure labor regulation in the region do not necessarily correspond to de facto levels of regulation. In sharp contrast, the correlation between employment protection regulations and inspections is highly positive in countries outside Latin America.<sup>49</sup> Countries with very lax regulations, such

**When fiscalization efforts are low and biased, for example, towards larger firms, they introduce distortions in resource allocation with negative impacts on productivity.**

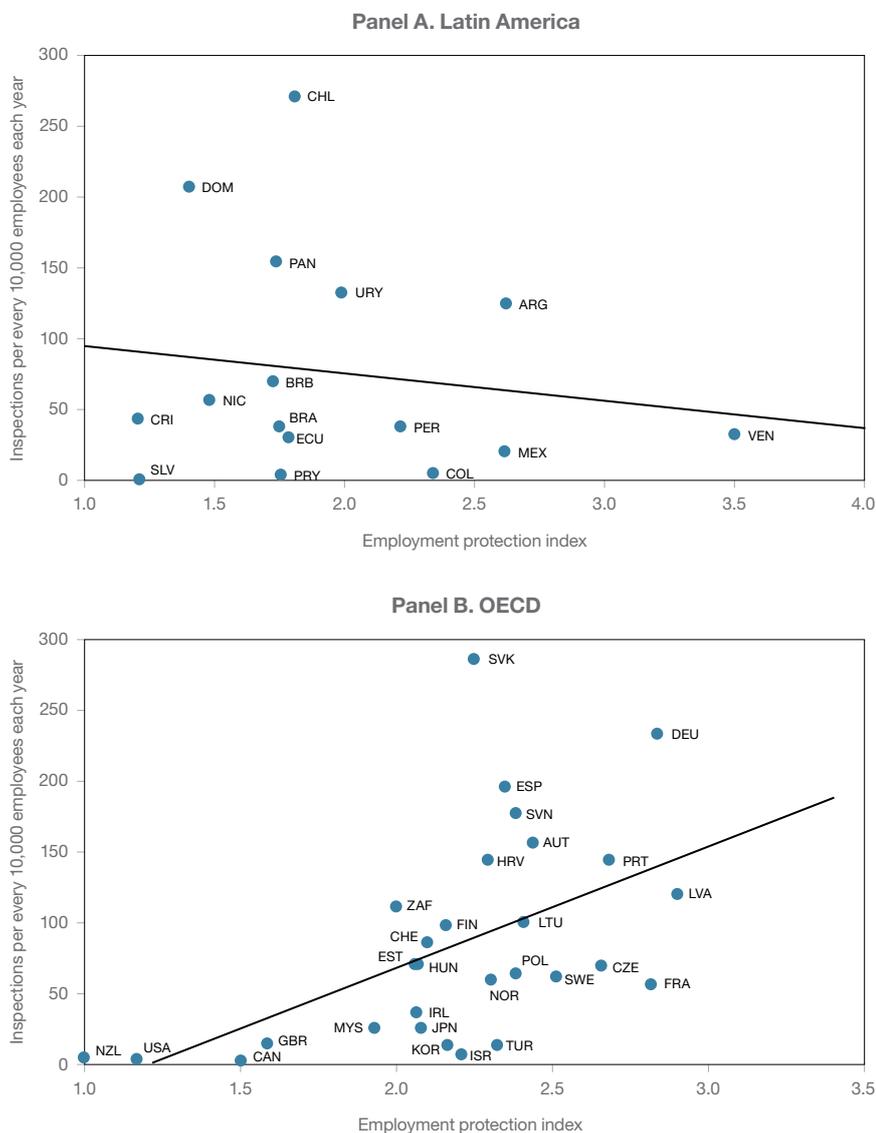
47. Several recent studies show that inspections affect the impact of labor regulations. For example, regarding Brazil, Almeida, & Poole (2017) found that inspections of labor conditions affect firms' reactions to trade shocks in terms of employment creation and destruction. Likewise, Bargain & Boutin (2017) show that the increase of the minimum working age in Brazil from 14 to 16 years had heterogeneous effects, depending on different enforcement efforts in different regions. Meghir, Narita, & Robin (2015) show that in labor markets with search and matching costs, greater enforcement increases formalization and welfare by allowing workers to move towards higher productivity positions in the formal sector.

48. Almeida & Ronconi (2016) show that labor inspections are more common in larger firms.

49. The negative relationship for Latin America and the positive one for countries outside the region holds when controlling for countries' per capita GDPs and population, and when using alternative regulation indexes such as the one provided by Botero, Djankov, La Porta, Lopez-de Silanes, & Shleifer (2004).

as the United States or New Zealand, do not carry out inspections, while countries with strict regulations, such as Germany or Portugal, carry out many.

**Graph 5.13** Inspections and employment protection



Note: The graph shows the labor inspection rate and the employment protection index for Latin American countries in Panel A and for OECD countries in Panel B. The straight line corresponds to an ordinary least squares regression of the first variable over the second. The employment protection index is developed by the OECD to be a synthetic indicator of 12 items and considers individual and collective job termination regulations. The inspection and inspector data are averages for the 2009-2015 period. The employment protection index data corresponds to 2013.

**Source:** Produced by the authors based on data from ILOSTAT (ILO, 2018) and Indicators of Employment Protection (OECD, 2018a).

The disconnection between regulation and controls in Latin America can impair productivity through the allocation channel since, by encouraging non-compliance on behalf of some firms and workers, firms end up operating under different rules, and firms or sectors are either benefited or harmed for reasons other than productivity. As can be seen in Text box 5.2, almost a third of firms in the region believe informal competition represents an obstacle for them. In terms of public policy recommendations, in cases where inspections are unfeasible for political or financial reasons, it may be advisable to balance regulation and inspections in order to ensure all-around compliance, even if this implies adopting levels of *de jure* regulation that may seem at first too lax and not potent enough given the goals in mind.

## Final considerations

The allocation of workers to productive positions, working conditions within firms, and the regulations affecting labor relations affect Latin American productivity through various channels.

First, structural unemployment is a major problem in several countries of the region, as well as low female labor participation, indicating that the most productive matches between firms and workers may not be taking place. Policies that subsidize child-care services and monetary transfers for workers with children can increase the female activity rate.

Second, labor markets in the region generally show sufficient fluidity in employment flows, but workers use inefficient means to find jobs. Public employment services, in which the region invests little, can be an effective tool to achieve matches that are more productive.

Third, informality has a negative impact on productivity, as it affects both the allocation of workers to positions as well as the conditions leading to higher productivity within firms. Employees in informal positions work in smaller firms, show an excessively mobility among jobs, and have fewer opportunities for on-the-job training, all of which are associated with a lower productivity. In turn, greater worker productivity and a higher level of education are associated with less informality. Thus, the different policies discussed in this report for increasing productivity may result in less informality, setting in motion a virtuous circle. In addition, active labor market policies for youth, particularly training programs, can be very effective in increasing formal employment in the medium and long run.

Fourth, in part due to a high prevalence of informality and small firms, worker skill acquisition is limited in the region, especially due to scarce training activities. Likewise, Latin American countries, with the exception of Mexico, appear to be lagging behind in terms of the quality of their management practices, making little use of pay-for-performance schemes and organizational practices that give greater autonomy to workers. Programs aiming at improving management practices could have a strong impact on productivity.

Fifth, employment protection regulations are very relevant in labor markets in the region, but there are great differences among countries. In general, the levels of protection against dismissals are lower than the levels of regulation surrounding contracting mechanisms. In countries with high protection against dismissals, such as Argentina, Mexico, and Venezuela, their high informality and/or low enforcement efforts cast doubt on their level of compliance, which could negatively affect productivity through misallocation of workers to positions.

Sixth, the minimum wage is high in most of the region and it affects the wages of both formal and informal workers, but not necessarily those of lower-paid workers. Thus, its impact as a redistribution tool is not clear and countries with high minimum wages should consider alternative policies that have greater redistributive potential and that pose fewer incentives towards informality (such as cash transfers).

Seventh, social contributions and benefits associated with formal employment also affect productivity through various channels, especially through informality. Improving the design of benefits and considering alternative modalities for their financing (such as general revenue) can reduce incentives towards informality.

Finally, there is a dissociation in the region between the level of employment protection regulations and their enforcement, which can have a negative impact on the efficient allocation of workers to positions. Policies that a priori do not seem powerful enough, but that ensure near-perfect compliance, can improve the allocation of workers to positions and, therefore, productivity.

# Appendix

## Questions and indicators used in tables and graphs

**Graph 5.5.** Uses the following indicators from the 2017 CAF Survey:

- Compared to when you started working at your current job, how do you think your personal (or technical) skills related to your professional activity have changed (for example: teamwork, communicating or interacting with co-workers, interacting with clients, resolving conflicts, leadership, decision-making, negotiation, etc.)?
- Compared to when you started working at your current job, how do you think your technical skills related to the performance of your duties have changed (for example: computer skills, language skills, company or job processes, handling machinery or work tools, etc.)?

**Graph 5.6.** Uses the following indicators from the 2017 CAF Survey:

For the “on-the-job training” indicator, the result is based on a binary variable that takes the value of 1 if the answer is yes:

- In the last 12 months, have you attended any learning or training sessions organized by your employer (either at your workplace or outside the firm)?
- For the “Peer learning” indicator, the result is based on a binary variable that takes the value of 1 if the answer is “sometimes”, “almost always” or “always”, or 0 if the answer is “never” or “rarely”:
- At your job, how often do you learn new job-related things from your colleagues or supervisors?
- Finally, for the “learning-by-doing” indicator, a binary variable is constructed that takes the value 1 if the respondent answers the following question with “sometimes”, “almost always” or “always”, and value 0 if he/she answers “never” or “rarely”:
- At your job, how often do you learn new job-related things through practice?

**Graph 5.7.** Uses the following questions from the World Management Survey (WMS, 2015):

- Managing human capital: To what extent are senior managers evaluated and held responsible for attracting, retaining, and developing talent in the organization?
- Managing human capital: To what extent are all people in the company rewarded equally regardless of their performance, or is performance and responsibility clearly linked to rewards?

- Solving the problem of people with low performance: Are people with low performance rarely dismissed, or are they retrained and/or transferred to different roles, or outside the company, as soon as the weakness has been identified?
- Promoting high performance people: Are people promoted mainly based on seniority, or does the company actively identify, develop, and promote those with higher performance?
- Attracting human capital: Do competing firms offer better reasons for the most talented individuals to join their firms, or does the company offer many reasons to motivate the most talented to join?
- Retaining human capital: Does the company do relatively little to retain the most talented individuals, or does it do whatever is necessary to retain the most talented when there are indications that they could leave the organization?

## Lists of countries included in tables and graphs

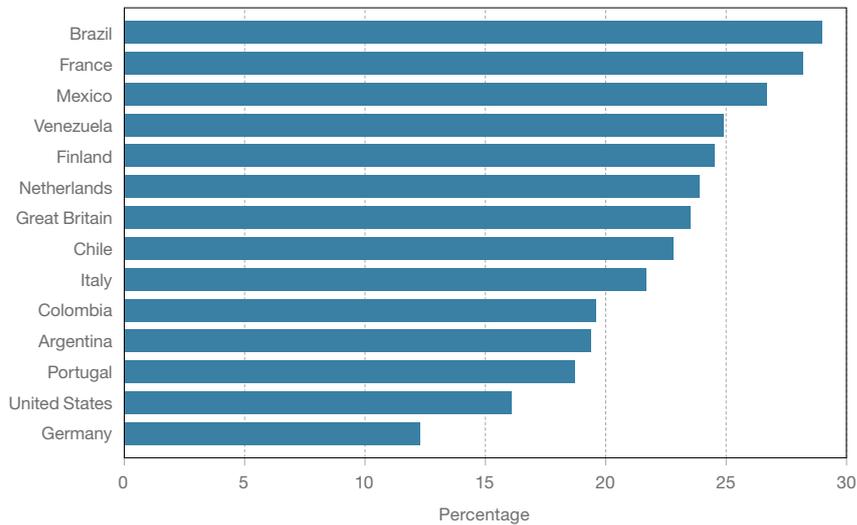
**Table 5.1.** Latin America includes Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela. OECD refers to the 35 member countries, except Chile and Mexico. Eastern Asia includes Burma, Cambodia, China, East Timor, Hong Kong, Indonesia, Laos, Macau, Malaysia, Mongolia, the Philippines, Singapore, Thailand, and Vietnam. World refers to 218 countries according to the World Bank's regional classification.

**Graph 5.1.** The OECD includes Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Iceland, Italy, Korea, Latvia, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, and United Kingdom.

**Text box 5.2 Table 1.** Latin America includes Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela. OECD includes Estonia, Hungary, Israel, Latvia, Poland, Czech Republic, Slovakia, Slovenia, Sweden, and Turkey. Eastern Asia includes Burma, Cambodia, China, Indonesia, Laos, Malaysia, Mongolia, the Philippines, Thailand, East Timor, and Vietnam. Sub-Saharan Africa includes Angola, Benin, Botswana, Burundi, Cameroon, Central African Republic, Côte d'Ivoire, Democratic Republic of Congo, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Swaziland, Sudan, South Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.

**Text box 5.1 Table 1, Table 5.3, Table 5.4, Graph 5.5, Table 5.8.** Data from the 2017 CAF Survey is used, covering the following cities: Bogotá, Buenos Aires, Caracas, La Paz and el Alto, Lima, Montevideo, Mexico City, Quito, Panama City, Santiago de Chile, and São Paulo.

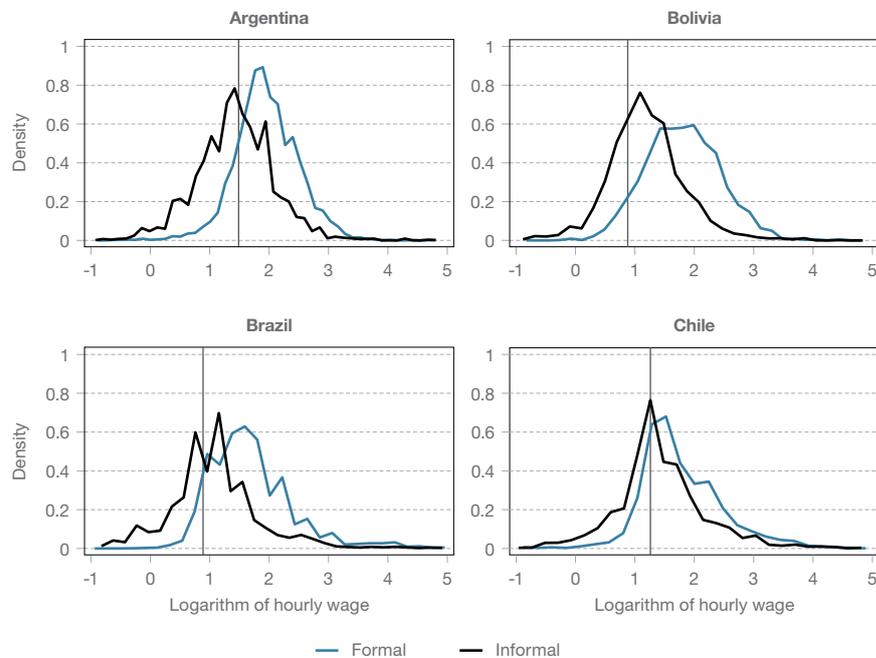
**Graph A 5.1** Job reallocation rate



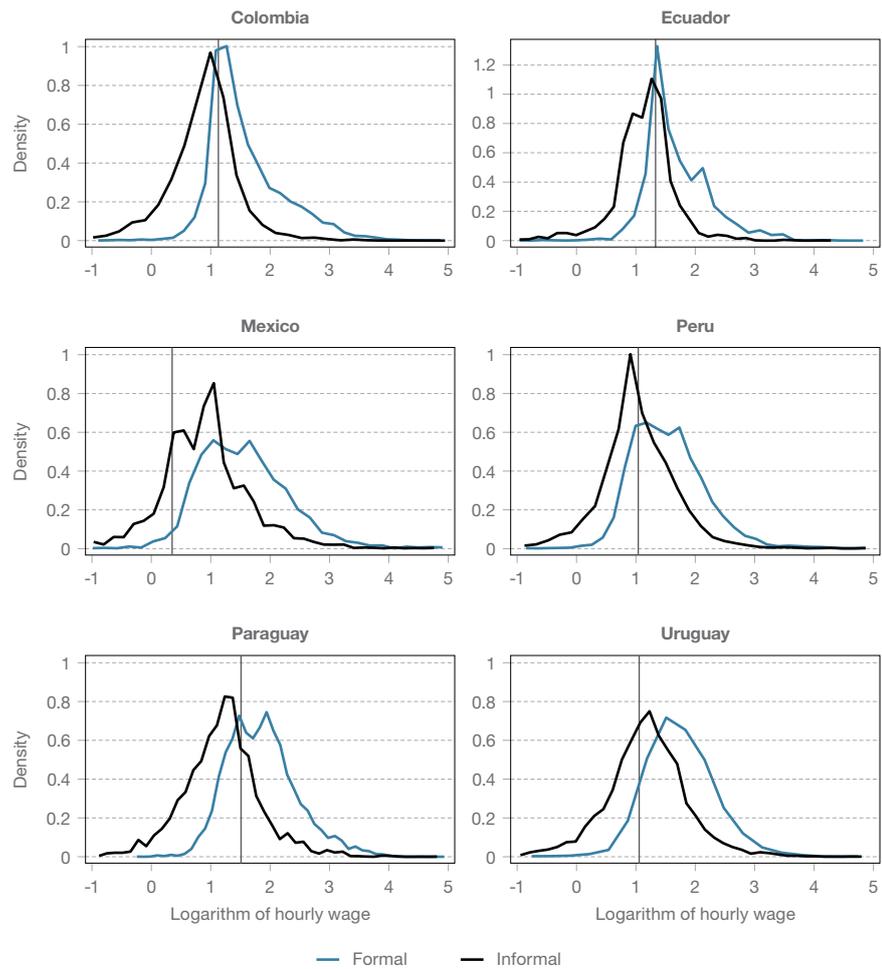
Note: The reallocation rate measures the intensity of job flows defined as the total amount of jobs created and destroyed in relation to the average amount of existing jobs. For each country the average for all available years is shown. The earliest year is 1979 for Germany and the most recent is 2011 for Argentina.

Source: Produced by the authors based on data from Bartelsman, Haltiwanger, & Scarpetta (2009).

**Graph A 5.2** Formal and informal worker wage distribution



Continued >



Notes: The graphs show the estimated distribution of the logarithm of the hourly wage earned from the main job, expressed at purchasing power parity dollars. The vertical line represents the minimum hourly wage for each country, in force at the time of the survey. The data is from 2015 for every country except Bolivia and Mexico, whose data is from 2014.

Source: Produced by the authors based on data from CEDLAS (2018).

**Table A 5.1** List of country codes

<b>Code</b>	<b>Country</b>	<b>Code</b>	<b>Country</b>
ARG	Argentina	KOR	South Korea
AUT	Austria	LTU	Lithuania
BRA	Brazil	LVA	Latvia
BRB	Barbados	MEX	Mexico
CAN	Canada	MYS	Malaysia
CHE	Switzerland	NIC	Nicaragua
CHL	Chile	NOR	Norway
COL	Colombia	NZL	New Zealand
CRI	Costa Rica	PAN	Panama
CZE	Czech Republic	PER	Peru
DEU	Germany	POL	Poland
DOM	Dominican Republic	PRT	Portugal
ECU	Ecuador	PRY	Paraguay
ESP	Spain	SLV	El Salvador
EST	Estonia	SVK	Slovak Republic
FIN	Finland	SVN	Slovenia
FRA	France	SWE	Sweden
GBR	United Kingdom	TUR	Turkey
HRV	Croatia	URY	Uruguay
HUN	Hungary	USA	United States
IRL	Ireland	VEN	Venezuela
ISR	Israel	ZAF	South Africa
JPN	Japan		

Note: Based on 3-character ISO codes.



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# Improving business financing

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## Chapter 6



## Chapter 6

# Improving business financing<sup>1</sup>

*“Money flows in the direction of value”.*

Uche Ugo

Uche Ugo's vision of the natural flow of money exudes the optimism of an entrepreneur and digital creator. Is it a realistic view of how capital is allocated? As is common in economics, the correct answer is “it depends”. In this case, it depends on the financial system.

When the financial system works well, savings are allocated to investments in firms that generate the most value, i.e. the most productive ones, leading to higher productivity and higher aggregate income. When it malfunctions, it can generate many problems: credit rationing, high spreads, or excessive credit for certain sectors or firm types. These problems compromise the flow of funds to more productive activities and contribute to the creation of overly small firms, allow unproductive firms to continue operating, increase the size of the informal sector, promote less dynamic labor markets, and reduce innovation.

In line with this important role, the development of financial systems explains a large part of the differences in income and productivity levels among countries.<sup>2</sup> Unfortunately, Latin America's level is still a long way from that of more developed regions and undoubtedly underlies the lower levels of productivity in the region. For example, domestic credit to the private sector as a percentage of GDP is 50% in Latin America, while in OECD countries it is 147%.<sup>3</sup> The upside of this situation is that the potential for improving the financial systems' performance is enormous: some authors estimate that if Latin America adopted the best financial practices, productivity in the region would increase by 18% and production by 88%.<sup>4</sup> How could the operation of Latin America's financial systems be improved, thereby contributing to regional productivity?

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1. This chapter was authored by Lian Allub, with research assistance from Christian Valencia and Matías Italia.

2. There is extensive literature, both theoretical and empirical, that addresses the role of the financial system in different aspects of countries' economic development (Banerjee & Newman, 1993; Carranza, 2000; Erosa, 2001; Greenwood, Sánchez, & Wang, 2010; Buera, Kaboski, & Shin, 2011; Buera & Shin, 2011; Buera & Shin, 2013; Midrigan & Xu, 2014, among others). In particular, these studies point out how access to financing affects resource allocation and therefore productivity. The different mechanisms studied are: occupational decisions, sectoral decisions or decisions to adopt more productive technologies.

3. These values are for 2016.

4. These values correspond to the simple average for Latin American countries available from the total factor and production productivity gains presented in the article by Greenwood, Sánchez, & Wang (2013), if all countries in the world adopted the best financial practices.

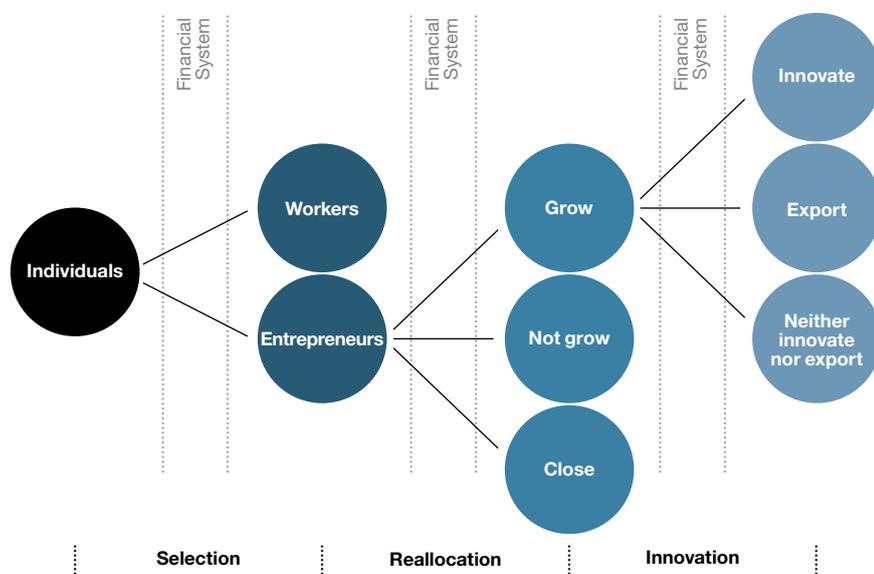
**The financial system is key to the start-up, growth, innovation, and export decisions of firms.**

This chapter addresses this very question. First, it describes the channels through which the financial system affects productivity. Second, it provides an overview of the level of development of Latin American financial systems compared to some developed and emerging economies. Finally, it analyzes different public policies carried out in the region to improve the operation of the financial system and identifies those that obtained the best results.

## The financial system as a driver of productivity

The financial system affects productivity through three mechanisms: selection, reallocation and innovation (Figure 6.1). The selection mechanism operates on the decision of individuals to become employees or entrepreneurs, which significantly affects the type of skills that the economy will devote to thinking about and managing new firms. The reallocation mechanism refers to the decision of entrepreneurs to grow, to remain in business or to close, which affects firm dynamics. Finally, the innovation mechanism affects firms' decisions to develop new products and production processes and to expand into new markets abroad, which affects the economy's innovation and export dynamics. This in turn affects the returns to factors of production and thus individuals' investment decisions in human capital, which can feed back into these mechanisms.

**Figure 6.1** Three economic decisions linked to productivity, and in which the financial system is key



Source: Produced by the author.

To maximize productivity in the economy, it is necessary that high-productivity firms enter the market, grow, and innovate. However, when the financial system is inefficient, productivity is not the only determinant of the creation, expansion, and innovation of firms, and often the firms that survive and grow are not the best ones. An inefficient financial system alters firms' life cycles, and can delay high-productivity firms in reaching their optimal size, postpone decisions to export or innovate, or even exit the market, while less productive firms, which should close, remain afloat for prolonged periods. As the most productive entrepreneurs are generally those who want to grow, innovate, and export, they are also those who need the most funds, and therefore are likely to have the most problems accessing the levels of credit they desire.<sup>5</sup> The more severe this problem is, the greater the productivity losses. If the most productive entrepreneurs do not operate or operate on a small scale, the returns to productive factors are affected, especially those of skilled and unskilled labor, and people's investment decisions in human capital can be distorted. This process adds new distortions to each of the previous mechanisms, affecting the decisions to embark on new business opportunities, grow, innovate, and export.

Why do financial systems not always work well? In a frictionless economy, financial intermediaries order projects according to their profitability and finance the most profitable projects, achieving an efficient credit allocation. In the real world, however, there are many frictions in the form of information asymmetries, externalities or incomplete markets.

Among the problems of information asymmetry, those of adverse selection and moral risk stand out.<sup>6</sup> These problems arise because the borrower (e.g. a firm) has complete information about the value of the project to be undertaken and its intention to put effort into it and repay the loan, while lenders (e.g. a bank or a stock market investor) do not. In these cases, "adverse selection" occurs because lenders are forced to evaluate borrowers according to market averages, to the detriment of higher-value projects and more compliant borrowers. This could cause the interest rate to go up, or the amount borrowed to go down, excluding from the market some of the firms with the most valuable projects and causing the most risky firms to remain active. Situations of "moral hazard" arise because borrowers have incentives to act against the interests of lenders. For example, a borrower might devote more effort to a project financed with its own funds than to a project financed with funds from the lender, something that would be virtually impossible for the lender to verify.

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5. An insight to this result is that more productive companies have higher optimal operating scales and therefore need more funds to achieve them. Given equal conditions in the rest of the characteristics, and productivity being a difficult characteristic to observe for the financial intermediary, the loan amount will be similar for more or less productive firms, and therefore the most productive firm will probably have more problems in reaching its optimal scale. Barlevy (2003) developed a general equilibrium model in which he shows that, when there are restrictions to credit access, the most productive firms face the greatest credit restrictions.

6. Jaffee & Russell (1976), Stiglitz & Weiss (1981), and Bernanke & Gertler (1987), among others, have studied the effects of information asymmetries on credit allocation. They found that information problems move credit allocation away from efficiency, affecting the amount of available credit, its cost, and the selection of beneficiaries.

**The performance of the financial system is affected by three types of frictions: information asymmetries, externalities, and incomplete markets.**

Both of these information problems cause lending institutions to resort to alternative methods to protect themselves, such as requiring guarantees or a certain flow of short-term funds or hiring specific agencies to monitor firms applying for a loan. These actions impose barriers or carry an associated cost that excludes certain firms from the financial system, particularly new and small ones, either because they do not have credit information or collateral, or because the cost of accessing the loan is too high for them, especially when compared to the typically low amounts requested.

The second type of friction in financial systems is that of externalities. For example, the problems mentioned above could be addressed by generating more information. One of the virtues of information is that it has positive externalities: once it is generated, others can use it without depleting it. These externalities, however, are not internalized by lenders, who are usually unwilling to privately fund the information or, when they do, are unwilling to share it. As a result, less information is generated and made available than what is socially desirable. As a second example, many projects in need of financing have positive externalities, i.e. higher social returns than private ones. However, lenders only evaluate the private rate of return of a project, which leads to fewer projects with positive externalities (or more projects with negative externalities) being financed than socially optimal, and even refrain from financing projects that should be financed.<sup>7</sup>

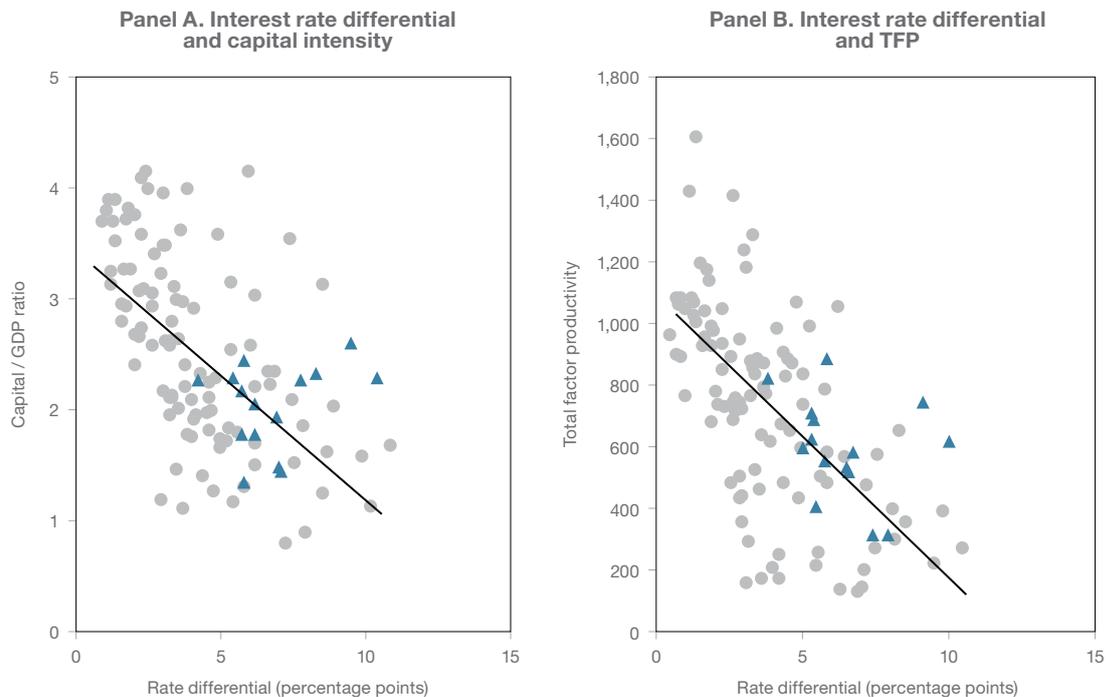
The third type of friction is related to incomplete markets. Markets are said to be incomplete when there are not enough assets to insure against every possible event. A simple example is that of a crop that depends on the weather. The producer's consumption and investment decisions will be very different if the weather is good or bad. If there is an asset that is contingent on the state of the weather, i.e. an asset that loses value if the weather is good and gains value if the weather is bad, the producer could insure his/her harvest using this asset and decide on its consumption, savings and investment efficiently. However, in the absence of such an asset, the producer consumes more than desired if the weather is good and less than desired if the weather is bad, and therefore her consumption, saving and investment decisions are not efficient.

The list of frictions that can affect the performance of financial systems makes it less surprising that these systems often malfunction, compromising aggregate productivity. Graph 6.1 illustrates how a malfunctioning financial system (approximated as a large differential between lending and borrowing interest rates) is strongly correlated with a lower capital-to-output ratio (a variable that captures the intensity of capital used to produce) and a lower total factor productivity (TFP).<sup>8</sup> This negative effect on productivity is channeled through the selection, the reallocation and the innovation mechanisms. How do these mechanisms operate in Latin America?

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7. The problem of externalities applies to many situations of economic reality, and the financial system is not the exception.

8. These relationships have been identified by Greenwood, Sanchez, & Wang (2013).

**Graph 6.1** Financial development and productivity

Note: Panel A shows the relationship between the capital/GDP ratio and the interest rate differential for 115 countries. The interest rate differentials and the capital/GDP ratio are 2010 to 2015 averages. Panel B shows the relationship between total factor productivity and the interest rate differential for 117 countries. The rate differential refers to net income received from interest by banks as a proportion of total earning assets. The blue triangles represent Latin American countries. The full list of countries is in the Appendix. To calculate total factor productivity, the capital stock for each country is computed from 1955 to 2003. The initial value is calculated using the formula  $k = i/(g+\delta)$ , where  $i$  is the gross real investment at purchasing power parity (PPP),  $g$  is the investment growth rate and  $\delta$  is the depreciation rate (fixed at 0.06). For the initial  $i$  and  $g$  values the average for the first five years available for each country is used (mainly 1950 to 1954). A series for each country is computed following  $k = k(1 - \delta) + i$ . The total factor productivity is computed as  $(o/l)/(k/l)^\alpha$ , where  $o$  is GDP,  $l$  is total employment, and  $\alpha$  is the share of capital as a percentage of income. A value of 0.35 is used for  $\alpha$ . The graph is an update of Greenwood et al. (2013).

**Source:** Produced by the author based on data from Financial Structure Dataset (Beck, Demirgüç-Kunt, & Levine, 2000; Beck, Demirgüç-Kunt, & Levine, 2009; Čihák, Demirgüç-Kunt, Feye, & Levine, 2012) with the 2017 review for the interest rate differential, and Penn World Table version 9.0 (Feenstra, Inklaar, & Timmer, 2015) for total factor productivity.

## Occupational and scale decisions

As illustrated in Figure 6.1, selection and reallocation mechanisms affect, respectively, the occupational decisions of individuals and the scale of firms. In an ideal world, if there were no barriers to turning good ideas into productive projects, the individuals with the highest entrepreneurial skills would be the entrepreneurs and the least skilled individuals would be the workers. In turn, the more skilled entrepreneurs would increase the scale of their firms, while the less skilled would not grow or even close. This does not always take place in the real world. Barriers to credit access discourage (or prevent) many skilled individuals to pursue their entrepreneurial plans, while offering easy passage to several less skilled individuals with their own funds or the possibility of obtaining them. In turn, skilled entrepreneurs end up operating at inefficiently small scales, while less skilled entrepreneurs with the financial opportunity to grow do not do so

**In presence of barriers to credit access, funds may not be allocated to the most talented entrepreneurs, distorting occupational decisions.**

for lack of talent. Thus, credit access barriers affect the occupational choice decisions of individuals (between being entrepreneurs or workers) and the scale reached by firms. Moreover, these effects bring about changes in interest rates and in the market wages that feed back into these decisions.

In other words, if the most talented individuals are those who have the potential to undertake the best projects and operate the largest firms, demanding more labor and capital, then credit access barriers that affect their decision to become entrepreneurs, or to grow once they are entrepreneurs, will prevent the realization of that potential; many of the entrepreneurs who effectively operate in the economy will be the least talented, operating smaller firms, demanding less labor and capital. This is how distortions in credit access can reduce economic wages and market interest rates, decreasing the benefit of being a worker and increasing the returns of becoming an entrepreneur (either employers or self-employed individuals), thus feeding back into individuals' occupational choice decisions.

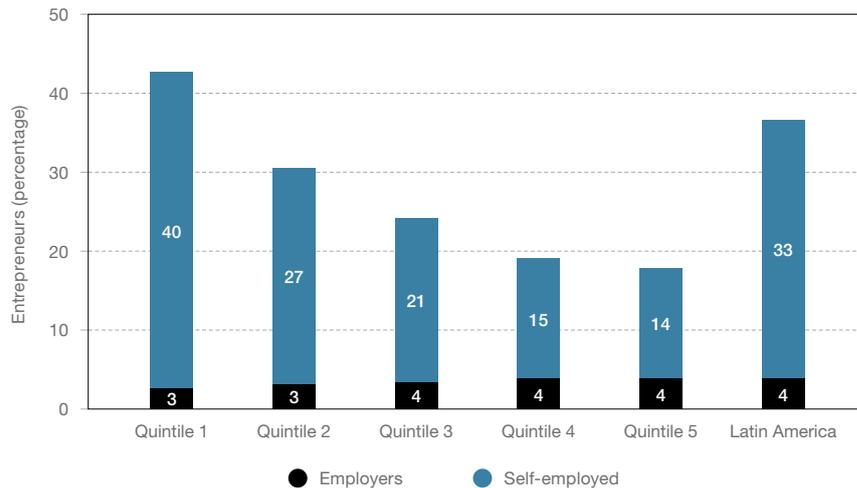
Graph 6.2 illustrates the relationship between the financial market and occupational decisions in Latin America. The graph shows that the proportion of individuals who choose to be entrepreneurs decreases as the country's level of financial development increases; and this drop is mainly explained by a reduction in the proportion of self-employed individuals (while the proportion of employers increases). For the region as a whole, the proportion of entrepreneurs is 36%, compared to approximately 20% in developed countries, but this is explained by the high incidence of self-employment (CAF, 2013).

The relationship between financial systems and scale also appears to be fully operational. As discussed in Chapter 2, compared to the United States, the distribution of firms in the region is shifted to smaller firms, which is accentuated in the economy's informal sector.

The bias toward self-employment in the occupational structures of countries with less credit for the private sector partly reflects the feedback that barriers to credit access produce on occupational choice decisions and firm growth, via lower wages and lower interest rates. The first channel operates as follows: firms are too small; therefore, demand for labor is lower; this depresses the equilibrium wage leading to an increase in the value of being self-employed. The second channel operates through distortions in capital returns. If there were no barriers to credit, firms would use capital to the point where the marginal productivity of capital is equal to its marginal cost, which is measured by the market interest rate. With barriers, ventures whose return on capital is higher than the interest rate may be unable to incorporate more capital because they do not have access to credit. This opens the door for other people to undertake a venture with their own funds in search of higher capital returns than those offered by the market (also measured by the market interest rate, in this case deposit rates), which adds another incentive for self-employment.<sup>9</sup>

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9. In an economy without barriers to credit and without any other type of friction, the marginal product of capital must be equal to the interest rate, so that an individual would not obtain greater returns on her capital if she used it in a firm or deposited it in a bank.

**Graph 6.2** Occupational decisions and credit

Latin America exhibits a high proportion of self-employed workers and a low proportion of salaried workers compared to more developed countries.

Note: The graph sorts 115 countries in five groups (quintiles) based on the amount of domestic credit provided to the private sector as a percentage of GDP. Quintile 1 contains the countries with the lowest credit, and quintile 5 those with the highest credit. The bar for Latin America is the simple average of 21 countries in the region. The bars show the percentage of employers and self-employed people from the total employed people for each quintile and for Latin America. The percentage of entrepreneurs is the sum of percentages for employers and self-employed people. Employers are those who are self-employed and hired one or more people who work for their firm. Self-employed workers are those who work on their own and have not hired any employees on a continuous basis. Domestic credit to the private sector as a percentage of GDP is for the year 2015. The list of countries included is found in the Appendix. The reported values are rounded off.

Source: Produced by the author based on data from ILOSTAT (ILO, 2018) and World Development Indicators (World Bank, 2018).

### Text box 6.1 Why do microenterprises fail to grow?

As discussed in this chapter, the higher entrepreneurship rates observed in developing countries are mainly due to the higher incidence of self-employment. Many times, these self-employed are micro-entrepreneurs who, for different reasons, did not grow. These reasons include lack of managerial skills, technological deficiencies, bureaucratic constraints that hinder growth, and lack of funding.<sup>a</sup> How relevant is the latter?

The empirical literature is inconclusive on whether or not credit barriers are a constraint on the growth of small-scale ventures. De Mel, McKenzie, and Woodruff (2008) and Banerjee and Duflo (2014) found positive effects on the scale of operations for different programs<sup>b</sup> carried out in Sri Lanka and India. In contrast, Fafchamps, McKenzie, Quinn, and Woodruff (2014) found no positive effects of relaxing financing restrictions on the size of firms' operations. Grimm and Paffhausen (2015) demonstrated that access to finance has positive results only when complemented with the development of managerial skills and business services. Karlan, Osei, Osei-Akoto, and Udry (2014) determined that, for small farmers in Ghana, the most important constraint is the lack of insurance, and the credit access programs implemented had a smaller effect than insurance.

Allub and Erosa (2014) found that the vast majority of self-employed earn marginal returns on capital equal to or similar to the interest rate in financially constrained economies, indicating that they are not restricted in the access to credit (if they were, the marginal return on capital in their ventures should be higher). These self-employed are subsistence entrepreneurs<sup>e</sup> who choose entrepreneurship as an alternative to being unemployed or low-paid wage earners. Improving access to credit for these individuals would not boost the growth of their venture, as they are operating on their (small) optimal scale.

In conclusion, the evidence seems to indicate that while credit may be a constraint, many microenterprises in Latin America do not grow for other reasons, including limited alternative market opportunities (e.g. in salaried employment) or those that have to do with a low level of managerial or other skills necessary for the adoption of more productive technologies. In other words, many of these ventures are run by individuals who choose entrepreneurship as an alternative to low wages or unemployment, but do not have the managerial skills necessary to grow and increase the productivity of their business. The greatest public policy challenge is to create the conditions for the financial system to better identify those microenterprises that do have growth potential and encounter difficulties in accessing the credit market.

a. See CAF (2013).

b. The work of De Mel et al. (2008) studies a direct transfer, while Banarjee & Dufló (2014) studied credit programs.

c. CAF (2013) presents a detailed analysis of the existence of these entrepreneurs and the possible causes that give rise to their appearance in Latin America.

Of course, the kind of self-employment that arises from these restrictions is not particularly lucrative. Gasparini, Gluzmann, and Jaume (2012) show that in countries with more developed financial systems, such as Chile, employers have a higher average income than self-employed workers, who in turn have a higher income than salaried workers. On the other hand, countries with less developed financial systems, such as Argentina, have less income dispersion and with the peculiarity that the average income of self-employed people is lower than that of salaried workers (employers continue to be the group with the highest average income).

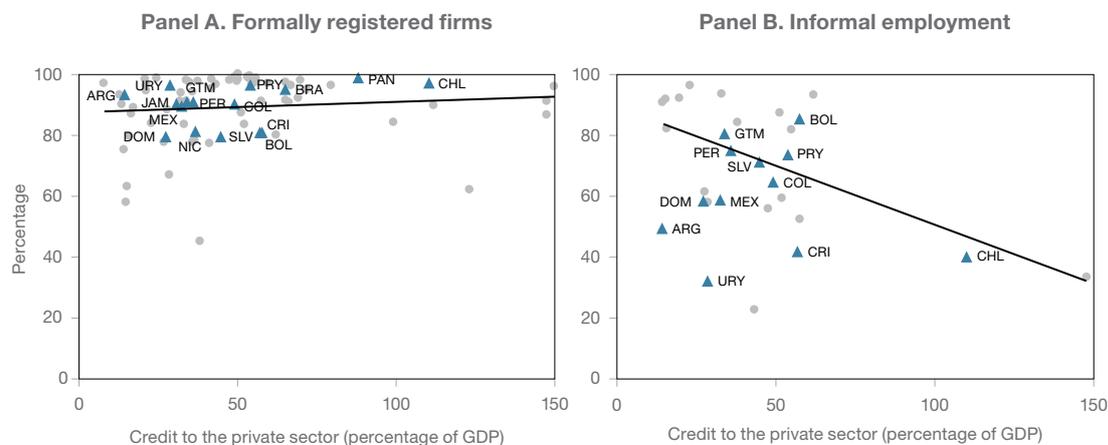
Credit barriers therefore seem to have a clear impact on the occupational choice decisions and scale of Latin American firms. But how important are these selection and reallocation mechanisms in explaining differences in TFP among countries? Different economists estimate that the productivity increase that could be obtained by eliminating credit frictions in an economy is between 18% and 24% (Midrigan and Xu, 2014) and could reach up to 36% (Buera, Kaboski, & Shin, 2011). They have also found that both the selection and reallocation effects are important, and their relative importance depends largely on the fixed costs of being an entrepreneur. When fixed costs are high, the selection effect becomes very important because financial frictions severely affect the entry of firms. Midrigan and Xu (2014) found, for example, that the selection mechanism explains between 50% and 75% of the TFP gains that would be obtained by eliminating credit frictions. As the fixed costs of being an

entrepreneur decrease, the selection mechanism loses prominence in favor of the reallocation mechanism.<sup>10</sup>

Another relevant factor closely related to occupational choice and scale decisions is the decision to operate in the formal or informal sector. As highlighted in previous chapters, the size of the informal sector is a major concern in Latin America. Graph 6.3 illustrates a positive relationship between the development of the financial system (approximated by the credit/GDP ratio) and the number of formally registered firms (Panel A) and a negative relationship between this development and the proportion of informal employment (Panel B).

**Underdeveloped financial systems reduce firms' incentives to operate in the formal sector.**

**Graph 6.3** Financial development and informality



Note: Panel A shows the correlation between credit to the private sector as a percentage of GDP and the percentage of formally registered firms in 82 countries. Panel B shows the correlation between credit to the private sector as a percentage of GDP and informal employment for 29 countries. The measure of formally registered firms corresponds to the start of their operations and is the average of years 2006 and 2017. Informal employment corresponds to the percentage of non-agricultural informal employment, and is the average of years 2006 and 2016. Credit is defined as domestic credit to the private sector as a percentage of GDP and is the average of the years 2014 to 2016. The list of included countries can be found in the Appendix.

Source: Produced by the author based on data from World Development Indicators (World Bank, 2018).

The decision to operate in the formal sector has both costs and benefits. Among the costs are the bureaucratic procedures associated with registering a firm, the legal requirements once it becomes operative and the tax obligations pertaining to its productive activity. The benefits include access to credit. Since formal firms are visible to the authorities, it is easier for a creditor to claim their debts in the event of nonpayment, in contrast to informal sector firms, which can easily hide

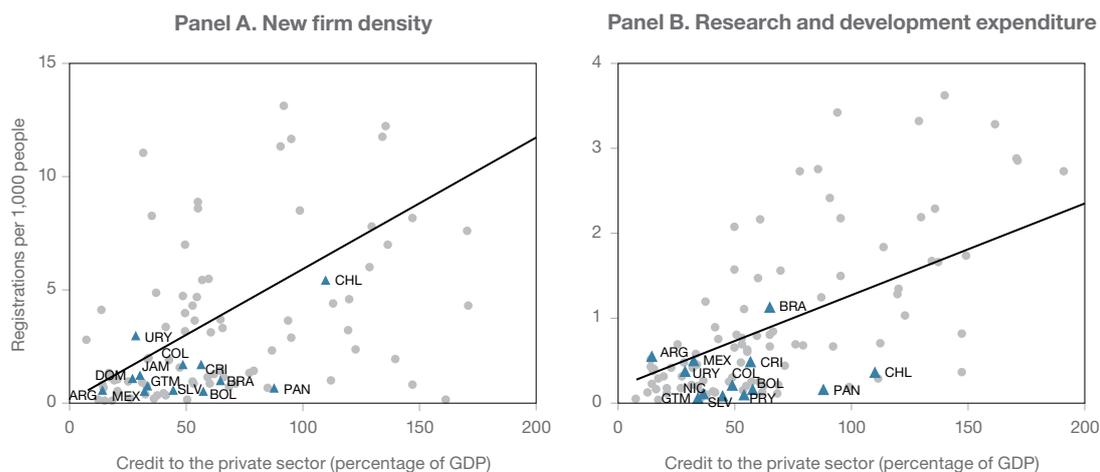
10. In order to break down the gains attributable to the selection channel and the reallocation channel, the authors have used macro-quantitative models that simulate counterfactual scenarios to separate the contributions of both channels. For example, in such counterfactual scenarios, occupational choices can be fixed and capital and labor can be efficiently redistributed (with marginal productivities that are equalized among firms). Such an exercise makes it possible to compute productivity gains due to the reallocation channel by comparing the new and the original allocations. Selection gains are computed by default as the difference between TFP in the frictionless economy and the one obtained by reallocating labor and capital.

their collateral from enforcement authorities.<sup>11</sup> Thus, formal businesses generally have more access to credit. In this way, more developed financial systems can work as an incentive for firms to join the formal sector, improving productivity. This is relevant because, as seen in previous chapters (Chapter 2, for example), informality negatively affects productivity in the economy.

## Investment and innovation decisions

As illustrated in Figure 6.1, financial resources are essential to firm creation and growth, but also to incorporate new products or implement new production processes, including creating a new firm or conquering new markets. In Figure 6.1, these decisions are related to the innovation mechanism. Graph 6.4 illustrates a positive relationship between the development of the financial system and some of these decisions.<sup>12</sup>

**Graph 6.4** Financial development, firm creation, and innovation



Note: Panel A shows the correlation between credit to the private sector as a percentage of GDP and new firm density for 97 countries. Panel B shows the correlation between credit to the private sector as a percentage of GDP and research and development expenditure for 107 countries. New firm density refers to registrations for every 1,000 persons between 15 and 64 years of age, and is computed as the average of years 2006 to 2016. Research and development expenditure is measured as a percentage of GDP, and is the average of the years 2006 to 2015. For both variables averages are used with the intention of not dropping any observation. However, if the average from 2014 to 2016 is used, the correlation is similar. Credit is defined as domestic credit provided to the private sector as a percentage of GDP, and is the average of the years 2014 to 2016. The list of included countries can be found in the Appendix.

Source: Produced by the author based on data from World Development Indicators (World Bank, 2018).

Panel A reveals that the greater the development of financial systems (approximated by the ratio of credit to the private sector in relation to GDP), the greater the density of new firms; Panel B illustrates that credit access is positively related to investment in

11. See Leal-Ordóñez (2014).

12. Empirical evidence indicates a causal relationship between research and development spending, innovation and productivity (see for example Griffith, Redding, & Van Reenen, 2004; Rouvinen, 2002; Chudnovsky, López, & Pupato, 2006; and Hall, 2011).

research and development (R&D). New businesses density is related to productivity for several reasons. First, young firms are generally the most dynamic (CAF, 2013). Second, because younger firms present high failure rates, it is often argued that the more that are created, the greater the likelihood that some of them will survive and grow.<sup>13</sup>

Access to credit is also important for a firm's decision to expand and serve new markets abroad. In turn, foreign trade fosters productivity because it allows the most productive firms to gain access to a larger market and grow, taking advantage of economies of scale. Credit access affects the decision to export through at least two channels. The first is related to the availability of funds to cover the costs inherent to exporting. Kohn, Leibovici, and Szkup (2017) studied this mechanism with a model that incorporates occupational choice decisions, frictions in access to credit, and export decisions. They found that 42% of firms stop exporting because they do not have enough access to credit. The associated productivity losses are about 26%. The second channel is related to a mechanism identified by Caggese and Cuñat (2013): many firms incur in excessive precautionary savings to insure against adverse shocks, which delays their decision to export; with better financial conditions, these firms could launch into foreign trade on time, knowing that they can resort to credit in case of negative shocks.

Credit access affects not only the decision to export but also the decision of what to export. Crinò and Ogliari (2015) found that as financial systems develop, the composition of the export basket also evolves, increasing the average quality of the products in it.

Finally, access to credit, or rather its absence, can compromise the gains of trade openness, although the evidence on this point is ambiguous. Trade openness is positive for productivity because international competition induces a healthy selection among firms, in which those with lower productivity tend to exit the market (Melitz, 2003). Caggese and Cuñat (2013) found that the gains from greater openness (approximated as a reduction in trade costs) are greater in economies with lower financial frictions, but Kohn et al. (2017) found the opposite.

## How the economic cycle affects these decisions

Selection and reallocation mechanisms can be exacerbated during certain stages of the economic cycle, particularly in recessions. How does this work?

The selection mechanism may be exacerbated by the lack of firm entry during recessions. If productive firms are not created due to lack of credit access in these periods, a “lost generation” of firms can occur: when the economy recovers, the selection of operating firms is worse and therefore the aggregate productivity of the economy is lower.<sup>14</sup>

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13. Of course, the mere existence of many new companies does not ensure that some will become successful projects, if the conditions for the development of dynamic ventures (access to credit, technology, skilled labor, as well as more general conditions that determine the business climate) are not assured.

14. See Gourio, Messer, & Siemer (2016).

**Underdeveloped financial systems could exacerbate the effects of financial recessions, aggravating the scarring effect and attenuating the cleansing effect.**

The reallocation mechanism may be exacerbated by the inability of firms to insure themselves against possible shocks in the economy: if the financial system is developed, the most productive firms can prepare against these shocks and resist them; on the other hand, if credit access is restricted, productive firms may not be able to face these shocks, making their response suboptimal. This can lead to productive firms with restricted access to credit to shrink or exit the market, while less productive firms without financing problems continue to operate.

Depending on the development of the financial system, during a recession there could be a “scarring” effect (when the firms that exit the market in response to a negative shock are the most productive) or a “cleansing” effect (when those that exit the market are the least productive). When the cleansing effect prevails, the economy’s productivity increases, and vice versa. Existing evidence (both from more empirical approaches and from macro-quantitative models) does not account for an unequivocal cleansing effect and suggests that financial frictions mitigate the cleansing effect during a recession.<sup>15</sup>

These effects differ according to the type of recession, i.e. whether it is financial or real. A financial shock is particularly difficult for more productive firms, which tend to have greater credit needs because they need to operate on a larger scale and hire more workers. Therefore, a financial shock leads to fewer entries and more exits by high-productivity firms, while this effect is smaller for low productivity firms because their credit requirement is lower. This affects productivity in the long term.<sup>16</sup> On the other hand, a real shock affects all firms in a similar manner, so any behaviors that differ from that of normal periods among firms with different productivity levels goes largely unnoticed.

The effects of financial recessions on TFP are considerable and are reinforced by the presence of financial frictions. Buera, Fattal Jaef, and Shin (2015) report that, after a financial crisis, the fall in production is 5% and the fall in TFP is 4%. Eslava, Maffioli, and Arjona (2015) have found that the productivity of firms that exit the market during a financial recession but stay afloat in normal times is 15% higher than that of firms that exit the market in normal times, and that the TFP is 1.2% lower after a financial recession when there are restrictions on access to credit.

Finally, access to credit also interacts with other institutions in the economy, such as labor institutions, which influence decisions of scale and responsiveness during the economic cycle. If contracting modalities with different degrees of flexibility exist in the economy (e.g. permanent and temporary contracts), access to credit may affect the modality that is ultimately chosen. This, in turn, can affect productivity via the decision to invest in human capital.<sup>17</sup> Frictions in the credit market produce two opposing effects on the hiring decision: a “demand for

15. See Hallward-Driemeier & Rijkers (2013), Ouyang (2009), and Osotimehin & Pappadà (2017).

16. See Eslava, Maffioli, & Arjona (2015), Barlevy (2003), Duygan-Bump, Levkov, & Montoriol-Garriga (2015), and Sepahsalari (2016).

17. It could be argued that companies have fewer incentives to invest in the human capital of temporary workers because the expected return on their investment is lower than for permanent workers.

productivity” effect (as frictions increase the value of internally generated revenues and the most productive workers help generate them, firms have incentives to offer them permanent contracts) and a “flexibility” effect (since financial frictions make firms more vulnerable to liquidity shocks and high dismissal costs make them less flexible, firms have incentives to offer temporary contracts).

Therefore, labor regulations interact with access to credit in determining the hiring modalities in a firm and affect its investment in human capital and its productivity.<sup>18</sup> Caggese and Cuñat (2008) have demonstrated that credit restrictions increase the cost of permanent contracts, making firms more dependent on temporary contracts. On the other hand, a vast body of literature<sup>19</sup> indicates that temporary contracts negatively affect productivity and therefore the TFP.

**With the exception of Chile, financial systems in Latin America remain small and inefficient and are still far from the levels found in developed countries.**

## Diagnosis of financial systems in Latin America

Latin America exhibits low levels of development in its financial systems overall and in its credit markets in particular. This can be verified through a series of indicators that account for the size, efficiency, coverage and competition of financial systems, as well as other more sophisticated metrics that seek to capture their level of development from a multidimensional scope.

### Size and efficiency

Latin America has a small credit market. Credit to the private sector as a percentage of GDP in most Latin American countries barely reaches 50%, far below that of reference developed and emerging countries or groups of countries (Graph 6.5). The most notable exception in the region is Chile, whose ratio exceeds 100%.<sup>20</sup> Moreover, in most countries in the region, the level of credit as a percentage of GDP is lower than that corresponding to their income level (this can be seen from the location below the trend line of the triangles in Graph 6.6, which presents the relationship between credit to the private sector as a percentage of GDP and GDP per capita).

Beyond their size, Latin American credit markets are inefficient. Spreads, which, as mentioned earlier, provide a good approximation of how financial systems work, are much higher in the region than in the reference economies. For example, while the spread for Latin America is 7.5 percent, the spread in Australia or Switzerland is less than half (3.3 and 2.9 percent, respectively).

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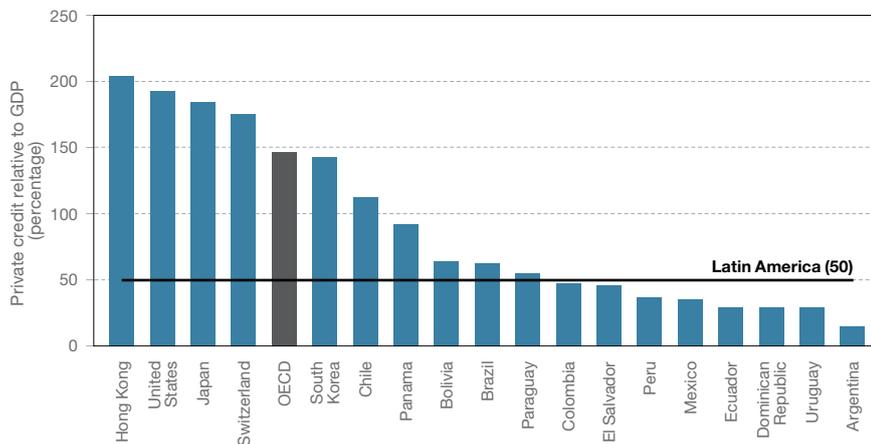
18. See Caggese & Cuñat (2008).

19. See, for example, Dolado, Ortigueira, & Stucchi (2016), Addressi (2014), or Castellani, Lotti, & Obando (2017), among others.

20. Information for 2016.

Brazil, in particular, has extremely high spreads (over 30%), while Chile and Mexico have the lowest in the region, similar to Australia and Switzerland.<sup>21</sup>

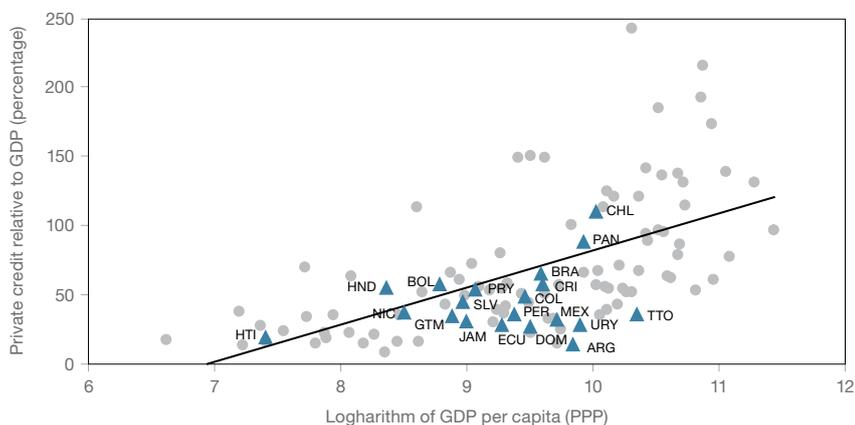
**Graph 6.5** Credit market size



Note: The graph shows the domestic credit provided to the private sector as a percentage of GDP in the year 2016. The OECD average is reported by the World Bank. The Latin America average is the simple average of countries included in the graph.

Source: Produced by the author based on data from World Development Indicators (World Bank, 2018).

**Graph 6.6** Income per capita and financial development



Note: The graph shows the correlation between domestic credit provided to the private sector as a percentage of GDP and the Logarithm of GDP per capita for 110 countries. Credit to the private sector is the average of years 2014 to 2016. GDP per capita is in constant 2011 dollars at purchasing power parity (PPP) and refers to the average of years 2014 to 2016. The list of countries can be found in the Appendix.

Source: Produced by the author based on data from World Development Indicators (World Bank, 2018).

21. These values correspond to the median spreads for 2016 and are taken from the World Bank Development Indicators database. For the aggregate of Latin American countries, it is the average of the medians.

Beyond credit markets, stock markets, an alternative source of financing for certain types of firms, are also less entrenched in most Latin American countries when compared to reference countries. In 2016, the average market capitalization to GDP ratio in the countries of the region was close to 40%, while in OECD countries, on average, it exceeded 100% and in cases such as Singapore, it exceeded 200%. Once again, the exception in the region is Chile, which has a market capitalization value as a percentage of GDP of 87%, close to that of countries such as France, Belgium, or South Korea. Even in this case, however, Brandao-Marques (2016) has demonstrated that the liquidity of the Chilean stock market is comparatively low, mainly due to corporate governance laws that do not guarantee minority shareholders sufficient protection.

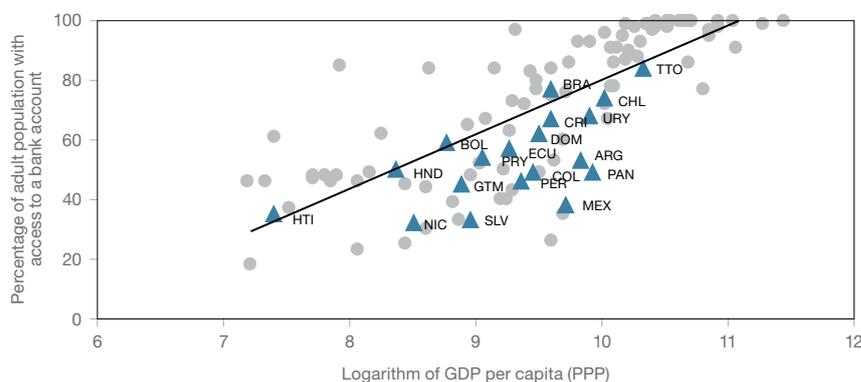
**The financial system's coverage in the region still has ample room for improvement.**

## Coverage

Greater financial development not only implies larger and more efficient financial systems, but also that their financial instruments provide appropriate support for different needs (see, for example, Text box 6.2) and that citizens have effective access to them (which they must also know and understand). This dimension of financial development is captured by financial inclusion indicators, particularly financial education.

Latin America is also lagging behind in these dimensions. Graph 6.7 displays the positive relationship among countries' GDP per capita and the percentage of the adult population that has an account in a financial institution. Latin American countries (represented by triangles in the graph) are mostly below the trend line, i.e. they have a lower level of access to the financial system than would correspond to their level of economic development. As detailed in Text box 6.3, the region also has very low levels of financial education.

**Graph 6.7** Access to financial services and income level



Note: The graph presents the correlation between the percentage of adult population with access to a bank account and the logarithm of GDP per capita for 111 countries. Access is measured as the percentage of population over 25 years old with a bank account in a financial institution, and refers to the year 2017. GDP per capita is the average of the years 2014 to 2016 in constant 2011 dollars, in purchasing power parity (PPP), and is expressed in logarithms. The list of countries is in the Appendix.

Source: Produced by the author based on data from World Development Indicators (World Bank, 2017c).

**Text box 6.2 Insurance markets: the case of the agricultural and livestock sector**

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Beyond the credit and securities markets, insurance firms are an important player in financial systems, since, in exchange for a premium, they provide financial coverage for various eventualities, such as accidents, illnesses, natural disasters, and even death.

The role played by these organizations can be illustrated with a simple example from the agricultural sector: in an imaginary pampas of the region there are two farmers with the possibility of sowing \$100 worth of seeds. The farmers know that if it rains the harvest will be \$200, but if it does not rain it will only be \$50. They also know that the probability of rain is the same as that of drought and that when it rains in one area there is a drought in the other. With this information, they can calculate that the expected value of the crop is \$125 (calculated as  $0.5 \times \$200 + 0.5 \times \$50$ ), higher than the cost of planting but with a high risk. In cases like this, an insurance firm can insure farmers against the risk of a bad harvest. It could, for example, charge a \$50 premium to each farmer and pay \$95 to anyone facing a drought. In this example, each farmer renounces income in the case of rain (\$150 net of premium instead of \$200), but reduces losses in the case of drought (by receiving \$95 net of premium instead of \$50).

The insurance firm's profit is the difference between its proceeds of \$100 and its payment of \$95. While the expected value for each is somewhat lower if they purchase insurance ( $0.5 \times \$150 + 0.5 \times \$95 = \$122.5$ ), the lower risk in the event of drought can make it a very attractive option if the farmers are sufficiently risk-averse.

In the real pampas, such as those in Argentina, a wide variety of insurances are used, including insurances against specific risks, multi-risk coverages and index-based coverages. In the case of specific risk insurance contracts, the event to be insured is specified in the policy (e.g. hail) and the insurer is liable for damages caused only by this event. Multi-risk insurance, on the other hand, covers damage associated with a multiplicity of risks, generally climatic (e.g. hail, fire, flood, drought, wind, frost, lack of soil,<sup>a</sup> and excessive rainfall) and/or biological (e.g. insects, pests, and diseases).<sup>b</sup> In the case of index-based coverage, the compensation process is triggered when an objective index (which generally has a high correlation with production losses) reaches certain pre-established levels.<sup>c,d</sup>

Many economists have studied the role of insurance in investment decisions in the agricultural sector. For example, Karlan et al. (2014), have compared the effects on agricultural production in northern Ghana of a direct subsidy program and a risk insurance program and found that the beneficiaries of the insurance program increase investment more than the recipients of the subsidy. This seems to indicate that risk represents a greater constraint than credit when investing. In addition, the authors have found that the demand for insurance may be affected by confidence that the insurer will fulfill the contract. The demand for insurance is greater if in the past the individual received the compensation promised by the insurance firm or if people in his/her social network were benefited. Therefore, firms seeking to insure unlikely events may face a low demand for their policy due to a lack of opportunities to build that trust, so they may find it useful to offer policies for more frequent events that allow them to build a good reputation.

In short, insurance markets are another important ingredient of a comprehensive financial services offering. The case of agricultural insurance in Argentina illustrates the specificity that these instruments can achieve in order to adapt to different needs.

- a. The lack of soil refers to the impossibility of timely harvesting because of inconsistent soil due to excessive rainfall.
- b. Within these types of insurance there are three types of coverage: 1) input coverage, which guarantees input suppliers the collection of their credits on the farmer's land; 2) investment coverage, which gives the producer the possibility of covering production costs; 3) regional coverage, which guarantees yields for the producer according to the history of the geographical area according to information from the National Ministry of Agriculture, Livestock and Fisheries.
- c. Within this type of coverage there are: i) area yield indexes, which are based on average production within a given area; if yield is below the limit, insured producers receive compensation; ii) climatic indexes, which are based on the historical correlation between climatic events and crop yields; compensation in this case is executed when the index reaches or exceeds a predetermined level; iii) indexes based on satellite images.
- d. Information obtained from the Office of Agricultural Risk (2018).

Lusardi and Mitchell (2016) argue that greater financial education yields benefits of various kinds. It basically improves the savings and investment decisions of individuals and leads to more active participation in financial systems. For example, individuals with greater financial education invest in stocks, have precautionary savings, adopt pension plans, accumulate more wealth and better manage their debts. Individuals with less financial knowledge, on the other hand, are more likely to use more expensive means of financing. The authors have verified that the direction of causality is effectively from knowledge to behavior.

Financial education also impacts on business decisions and outcomes. Drexler, Fischer, and Schoar (2010) and Bruhn and Zia (2013) have suggested that greater financial education leads to better business practices and corporate performance. In particular, Drexler et al. (2010) showed that when individuals have a low level of financial education it is more effective to impart basic financial knowledge to them than to train them in more sophisticated management practices. Bruhn and Zia (2013) demonstrated that while the survival of businesses is not affected by the level of financial education of their entrepreneurs, surviving businesses whose entrepreneurs are more financially educated apply better management practices, make better investment decisions, and achieve better terms for their loans.

### **Text box 6.3** Financial education and inclusion

In order to gauge the level of financial education in Latin America, CAF-Latin American Development Bank sponsored and financed the Financial Capacity Measurement Survey (EMCF) and has so far made its application possible in six countries in the region: Argentina, Bolivia, Chile, Colombia, Ecuador and Peru. The survey is nationally representative, reaching older men and women and both urban and rural populations.

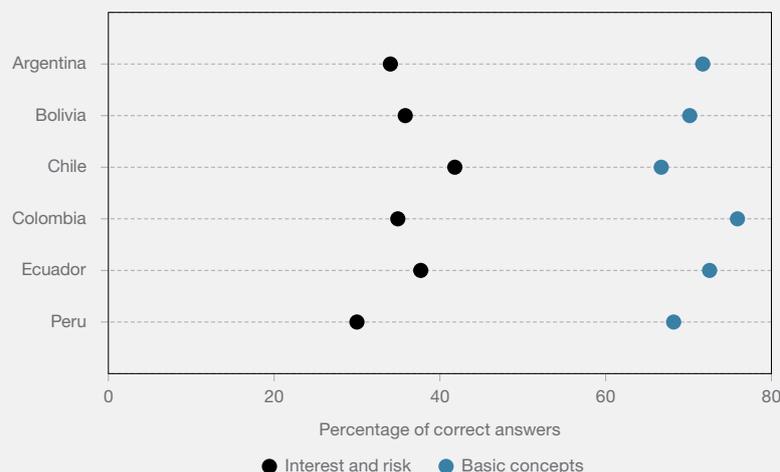
Based on three EMCF questions (on the concepts of divisibility, inflation and interest), the level of "basic" financial knowledge of the population can be summarized. Three other questions cover the ability to calculate interest (simple and compound) and the understanding of the relationship between return and risk.

On average, 70% of respondents answer questions about basic financial concepts well. Colombia presents the best results, with 76% of respondents answering correctly, while Chile shows the lowest percentage of correct answers, 67%. There is much dispersion in the percentage of correct answers to the inflation question, in line with the contrast between the inflationary processes of the different countries; in Chile, for example, only 32% of those surveyed answer this question correctly (which partly explains Chile's worse results in the set of "basic concepts"), while in Argentina that percentage is 70%. The question with the highest rate of correct answers is the one corresponding to the interest rate, surpassing 80% in all countries and reaching 98% in Chile.

For interest and risk calculation questions, the average correct response rate is around 35%. In this case, Chile has the best performance, with 41% of correct answers, while Peru has the worst results, with only 30%. Respondents often correctly answer that the concepts of return and risk are associated, but have difficulties to calculate interest.

Respondents who answer all questions correctly within each group are a clear minority. In the case of basic concepts, Colombia once again presents the best performance, with 45% of respondents answering everything correctly, while Chile presents the worst results, with only 25% of respondents being correct. In the interest and risk category, the percentage of respondents who answer everything correctly does not exceed 5% in any country.

**Graph 1** Level of financial knowledge



Note: The graph shows the percentage of correct answers for two types of questions related to finance: 1) basic concepts 2) interest and risk concepts. The percentage of correct answers for each type is the simple average of three questions. For basic concepts it is the average of the percentage of respondents who correctly answer a division, basic knowledge of interest, and inflation. For interest and risk concepts it is the average of correct answers to questions on simple interest, compound interest, and a conceptual question about risk. The questions can be found in the Appendix, Table A 6.1.

Source: Produced by the author based on data from the Measuring Financial Capabilities in the Andean Countries Survey (Mejía, Pallota, & Egúsquiza, 2014; Mejía, Pallota, Egúsquiza, & Palán, 2014; Mejía, Pallota, & Egúsquiza, 2015; Mejía, Pallota, Egúsquiza, & Farné, 2015; Mejía, Pallota, Egúsquiza, & Virreira Centenalles, 2015).

## Competition in the financial sector

Chapter 3 described the role of competition in promoting productivity. Competition in the financial market is a particular case, with an important but not always favorable role.

Several economists have studied the degree of concentration or competition in credit markets<sup>22</sup> and, based on the statistic of Panzar and Rosse (1987),<sup>23</sup> have found that credit markets operate in monopolistic competition. For Latin America, Olivero, Li, and Jeon (2011) have estimated the Panzar and Rosse index for three time periods: 1997-1999, 2000-2002 and 2003-2005, finding that the countries with the greatest competition in the banking sector in the region are Mexico, Uruguay and Paraguay, while those with the least competition are Peru and Bolivia. Bolivia and Chile show the best evolution, from very low values in 1997-1999 (even a negative value for the case of Bolivia) to a value close to 0.9 in 2003-2005; in contrast, Argentina, Brazil, Colombia and Venezuela present a higher index in 1997-1999 than in 2003-2005, indicating a deterioration in their competition levels.<sup>24</sup>

Claessens and Laeven (2004) argue that the degree of concentration<sup>25</sup> is not a good indicator of competition, since a market can operate under competitive conditions if it is well regulated. These authors, as well as Barth, Caprio Jr, and Levine (2004), argue that allowing the participation of foreign banks and removing restrictions on this activity are among the main regulatory actions that favor greater competition. In line with this literature, Jeon, Olivero, and Wu (2011) have compared the effect of the penetration of foreign banks in Latin America and Asia for the period 1997-2008, verifying that the participation of foreign banks promotes competition in the local credit market, with the greatest effects being seen when foreign banks are more efficient. Latin America has a foreign bank presence similar to that of other more developed countries, so this dimension does not seem to present major drawbacks.<sup>26</sup>

Competition in the credit market also interacts with the organizational structure of banks, affecting the characteristics of the loans granted. In

**Removing restrictions on credit activities and allowing the participation of foreign banks are key to promoting competition in the credit market.**

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22. See for example Jeon, Olivero, & Wu (2011), Olivero, Li & Jeon (2011), Barth, Caprio Jr, & Levine (2004), or Claessens & Laeven (2004).

23. This statistic measures percentage changes in bank revenues as a percentage change in input prices, i.e. the income elasticity with respect to the marginal cost of inputs. The statistic varies between negative infinite and 1. A negative statistical value describes monopoly situations. This is given by the price policy applied by a monopolist. If input prices increase, the marginal cost will increase, reducing the amount produced and therefore income. If the statistic is in the (0,1) interval this implies that the market is of monopolistic competition. If the statistic is equal to 1, this indicates that the market operates in perfect competition, since the increase in the price of inputs brings with it a proportional increase in income without distorting the optimal decisions of each individual company.

24. In order to calculate these estimates, bank-level data is needed. Unfortunately, it was not possible to obtain them to update these estimates, but it is undoubtedly a relevant exercise to study the evolution of banking competition in the region during the last decade.

25. In order to measure the degree of concentration, the authors have used different measures of market structures. It should be borne in mind that greater concentration does not mean less competition. For example, in a duopoly where companies compete on prices, both prices and production are the same as in perfect competition.

26. Table A 6.4. in the Appendix presents the evolution of the proportion of foreign banks for a group of countries.

general, evidence suggests that decentralized structures favor small and medium firms, because regional managers have informal information about the firm when setting credit terms.<sup>27</sup> However, Canales, and Nanda (2012) have found that this depends on competitive credit markets: when banks are monopolistic, more decentralized structures lead to greater credit rationing or higher interest rates.

## A multidimensional measure of financial development

In recent years, the literature on financial development has expanded the set of indicators normally used to measure it, such as the credit to GDP ratio or the interest rate spread. For example, Sahay, Cihák, N'Diaye, and Barajas (2015) have performed a main component analysis to construct a financial development index based on three pillars: financial depth, financial accessibility and financial efficiency, both of financial institutions and financial markets.<sup>28,29</sup> This type of index allows for a broader financial development indicator than traditional measures; however, it is also subject to greater measurement problems, especially because in order to be fully comparable among countries it is necessary to have data for all the indicators in each period analyzed, which in some cases is costly and in others impossible.<sup>30</sup>

That said, Table 6.1 shows the value of an index constructed for several Latin American countries and other reference countries (Australia, Canada, Switzerland, and the United States) using available data and the weights proposed by Sahay et al. (2015). Consistent with the traditional indicators already discussed, this index reveals a lower financial development in the countries of the region. Although there is some heterogeneity among Latin American countries (with values ranging from 0.07 for Ecuador to 0.39 for Chile), their performance is always lower than that of other countries (with values above 0.44).

According to the subindexes of financial institutions and financial markets, financial institutions perform better than the financial markets both in the region and in the reference countries, but especially in the region: The value

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27. See Stein (2002), Petersen & Rajan (1994), Berger & Udell (1995), or Berger, Saunders, Scalise, & Udell (1998).

28. While the authors use the term financial markets, most of the indicators included in this category refer to the capital market, while the indicators of financial institutions refer mostly to banking institutions.

29. Four indicators are included to measure the depth of financial institutions: private-sector credit as a percentage of GDP, pension fund assets as a percentage of GDP, mutual fund assets as a percentage of GDP, and insurance premiums as a percentage of GDP. Five variables are used to measure the depth of financial markets: stock market capitalization to GDP, stocks traded to GDP, international debt securities government as a percentage of GDP, total debt securities of nonfinancial corporations as a percentage of GDP, and total debt securities of financial corporations as a percentage of GDP. To measure the accessibility of financial institutions the following are included: bank branches per 100,000 inhabitants and ATMs per 100,000 inhabitants. To measure the accessibility of financial markets, the following are used: percent of market capitalization outside of top 10 largest companies and the total number of debt issuers (domestic and external, financial and non-financial corporations). Finally, to measure the efficiency of institutions, the following are included: net interest margin, lending-deposits spread, non-interest income to total income, overhead costs to total assets, return on assets, and return on equity. To measure the efficiency of the financial markets, the ratio of stocks traded to capitalization is used.

30. An additional problem typical of this type of index has to do with the subjectivity with which the indicators and their weights are chosen.

of the financial institutions index is between 0.3 and 0.4 for most countries (the exceptions are Ecuador with 0.12, El Salvador with 0.15, and Chile with 0.52), while the financial markets index is generally lower than 0.2 and in no case reaches 0.3.

With respect to the operation of financial institutions, most countries perform poorly in terms of depth, with the exception of Chile and Brazil; performance in terms of accessibility is also heterogeneous, with Colombia and Paraguay presenting the greatest problems and, in general, there are no major efficiency problems, with the exception of Brazil and Ecuador. With respect to the operation of financial markets, Chile and Brazil display much better performances than the rest of countries in the region, but in general there is much room for improvement in terms of depth, accessibility and efficiency.

**The financial development index confirms that there is great margin for improvement in depth, access, and efficiency of the financial system.**

**Table 6.1** Financial Development index for selected countries

Country	Financial Development index	Financial Institutions Index	Financial Institutions			Financial Markets Index	Financial Markets		
			Depth	Access	Efficiency		Depth	Access	Efficiency
Argentina	0.24	0.39	0.09	0.33	0.81	0.08	0.02	0.21	0.02
Brazil	0.30	0.32	0.31	0.63	0.05	0.28	0.21	0.35	0.29
Chile	0.39	0.52	0.41	0.39	0.77	0.26	0.31	0.40	0.06
Colombia	0.23	0.34	0.17	0.15	0.70	0.13	0.16	0.18	0.05
Costa Rica	0.20	0.38	0.17	0.45	0.58	0.02	0.01	0.04	0.01
Ecuador	0.07	0.12	0.10	0.24	0.05	0.01	0.02	0.01	0.01
El Salvador	0.11	0.15	0.19	0.22	0.06	0.06	0.07	0.10	0.00
Mexico	0.29	0.39	0.13	0.31	0.78	0.18	0.13	0.31	0.11
Panama	0.26	0.44	0.20	0.42	0.75	0.08	0.08	0.14	0.01
Paraguay	0.15	0.28	0.11	0.18	0.58	0.02	0.01	0.03	0.02
Peru	0.24	0.32	0.14	0.29	0.57	0.15	0.13	0.30	0.02
Uruguay	0.20	0.36	0.14	0.29	0.67	0.04	0.00	0.11	0.00
Australia	0.49	0.56	0.61	0.25	0.77	0.41	0.44	0.52	0.27
Canada	0.44	0.49	0.45	0.20	0.79	0.38	0.24	0.62	0.28
United States	0.55	0.59	0.65	0.29	0.77	0.50	0.34	0.54	0.64
Switzerland	0.48	0.60	0.31	0.81	0.77	0.36	0.39	0.45	0.24

Note: Following the methodology of Sahay, Cihák, N'diaye, & Barajas (2015), the Financial Development Index is a simple average of the Financial Institutions Index and the Financial Markets Index. The Financial Institutions Index is a weighted average of Depth, Access, and Efficiency indicators, with weights of 0.39, 0.28, and 0.33, respectively. The Financial Markets Index is a weighted average of analogous indicators with weights of 0.35, 0.33, and 0.32, respectively. Due to data availability, the index computed here includes 14 of the 20 variables that were originally used. Therefore it was necessary to proportionally recalculate the weights used by Sahay et al. (2015). Details on variables and weights can be seen in the Appendix, Table A 6.2. The reported data are averages of years 2011 to 2015.

Source: Produced by the author based on data from Financial Access Survey (IMF, 2017).

**Firms with access to formal credit increased their sales, their employment, their probability of starting to export, and decreased their probability of ceasing to export.**

## Empirical effects of financial development

How does the development of the financial market affect firms' performance? This section analyzes the performance of firms that used formal sources of financing compared to those that did not.

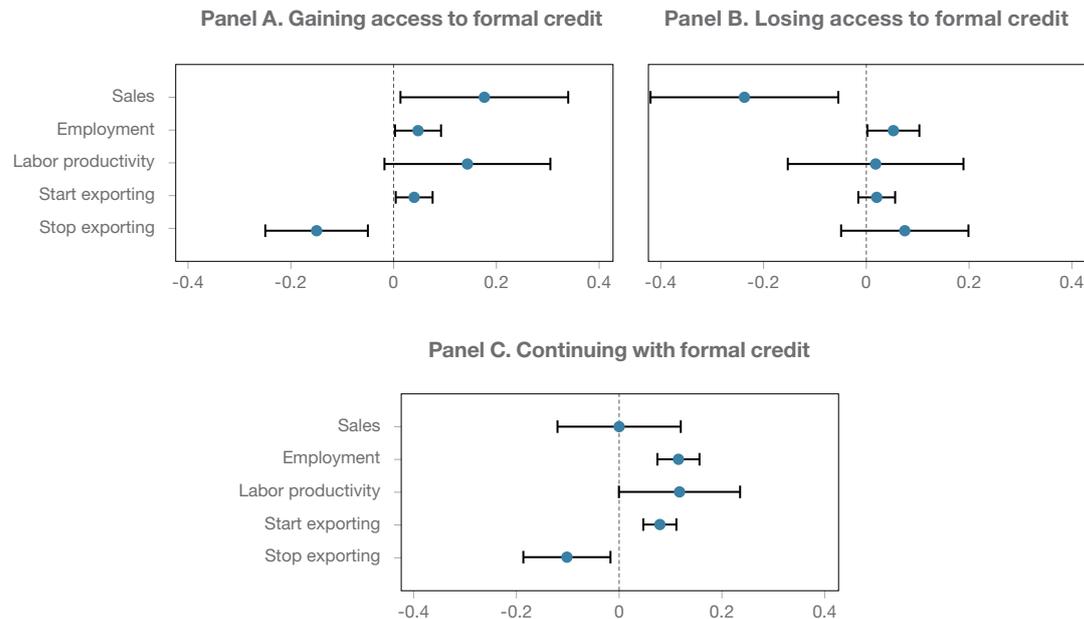
Firms can be financed through different sources, depending on the access they have to them and their cost. The following sources can be noted: 1) bank loan; 2) public loan; 3) non-bank loan.<sup>31</sup> Access to formal sources of credit (bank or public) can lead to better business performance (in terms of sales, size, likelihood of exporting or productivity) because it generally implies a larger and cheaper volume of credit, which allows them to operate on larger scales and face costs that would otherwise be prohibitive (e.g. fixed exporting costs). That said, since institutions that provide formal financing perform a classification of fundable projects as rigorous as possible, it is to be expected that they will choose firms with a better performance as beneficiaries. This makes it difficult to empirically distinguish firms' characteristics before credit from the effect of access to formal credit.<sup>32</sup>

Taking this limitation into account, Graph 6.8 presents the results of a regression analysis that associates different performance indicators of a firm with the use of different sources of financing. The data used comes from the World Bank Enterprise Survey for Latin American countries for which panel data is available. The graph presents the point estimator (represented by a dot) of the credit effect as well as its confidence intervals (represented by a line) for three groups of firms: 1) firms without access to formal credit in the initial period and with access to formal credit in the final period (Panel A); 2) firms with access to formal credit in the initial period and without access to formal credit in the final period (Panel B); and 3) firms with access to formal credit in both periods (Panel C). The coefficients indicate the differential effect of credit on performance of firms with and without access to formal credit in either period. What do they suggest?

First, firms that have access to formal credit in the second period display a greater growth in sales and employment, a greater probability of starting to export, and a lower probability of ceasing to export compared to firms that do not have access to formal sources of financing. The effect on labor productivity is not statistically significant. Second, firms that lose access to formal sources of financing exhibit lower growth in sales and non-significant effects on the rest of the indicators. Finally, firms that have access to formal sources of financing in both periods do not have a higher sales growth than firms without access, but they have higher employment growth, higher labor productivity, a greater probability of starting to export, and a lower probability of ceasing to export.

31. Composed primarily of credit from suppliers and non-financial institutions.

32. This typical endogeneity problem implies that from the proposed regression analysis no causal interpretation can be made of the effects of formal credit on the variables associated with companies' performance.

**Graph 6.8** Performance differential for firms with access to formal credit

Note: The graph shows the coefficients and 95% confidence intervals estimated by ordinary least squares of a categorical variable that reflects transitions in credit access, where the base category refers to firms that have never had access to formal credit. Panel A compares firms with newly gained access to formal credit, with firms in the base category. Panel B compares firms that ceased to have access to credit. Panel C compares firms that had access to credit in all years in the survey. Dependent variables are: sales, employment, labor productivity, export initiation, and export termination. Sales, employment, and labor productivity are expressed in logarithms. Export initiation is a variable that takes on the value of 1 if the firm did not export in the first year and if it did in the final year. Export termination is 1 if the firm exported in the initial year and did not do so in the final year. The regressions includes country fixed effects and an interaction between firm size and sector. Formal credit is defined as access to credit in a private commercial bank or at a state bank. The estimation is carried out for the years 2006 and 2010 for Argentina, Chile, Colombia, Ecuador, Honduras, Mexico, Nicaragua, Panama, Peru, Uruguay, and Venezuela. Years 2006, 2010, and 2016 for El Salvador. Years 2006, 2010, and 2017 for Bolivia and Paraguay. Years 2003 and 2009 for Brazil.

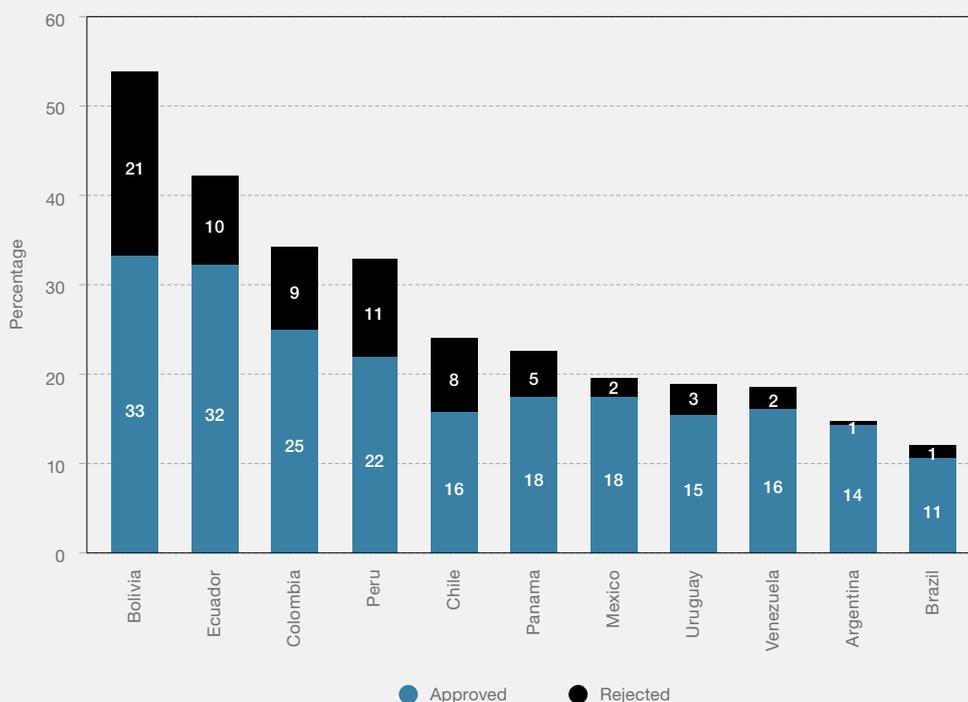
**Source:** Produced by the author based on data from Enterprise Surveys (World Bank, 2017b).

In light of these results, it is surprising that many small businesses do not react as expected (they do not expand their operations) when the restrictions limiting their access to formal credit are relaxed. In addition to the limitations discussed in Text box 6.1, it is possible that certain obstacles or costs common in first contacts with financial intermediaries play a role in explaining why some firms do not take financing from formal sources. Text box 6.4 summarizes evidence in this regard from the CAF 2017 Survey, which shows that, for example, in the case of Bolivia, formal rejection rates are very high and in some cases this could be associated with problems in processing the application for bank financing.

### Text box 6.4 Barriers to formal financing in Latin America

In order to design credit access policies, it is useful to identify the main barriers that limit access to credit. In the CAF Survey (2017), self-employed workers are asked if they have ever applied for a loan, if they were ever rejected, and the reason for the rejection.<sup>a</sup> The results are remarkably heterogeneous in the countries within the region. Bolivia is the country with the highest loan application rate, but also with the highest rejection rate. Approximately 55% of self-employed people say they have applied for a loan, one-third of whom say they have been turned down sometime. At the other end, in Argentina and Brazil less than 15% of self-employed people say they have ever applied for credit, but almost all of them say they have been approved.

Graph 1 Percentage of self-employed workers who applied for loans



Note: The graph shows the percentage of self-employed workers that have requested a loan at least once, distinguishing between people whose request was approved and rejected. The values are rounded off.

Source: Produced by the author based on CAF Survey data 2017.

What are the main causes of rejection reported by respondents? Considering the region as a whole, the main causes are: 1) having insufficient income, 2) having a negative credit history and 3) having no collateral or guarantees. However, in some countries other reasons

are relevant. For example, not having the necessary documentation was the second most mentioned cause in Colombia and the third in Bolivia, and not having a credit history was the third most important cause in Chile, Ecuador, Peru, and Uruguay.

This suggests that, in order to improve access to formal credit, the State could intervene in two ways. First, to reduce the number of people who fail to access credit because they do not have the necessary documentation, it could simplify bureaucratic requirements and provide advice for people who want to access credit. Second, in order to reduce the number of people who do not have access to credit due to lack of credit information, the operation of existing credit bureaus could be improved and new technology could be incorporated to expand the set of information available from loan takers.<sup>b</sup>

The CAF Survey also asks wage earners whether access to credit is a problem in starting a business. The answers are again very disparate among countries. In Brazil, Peru, and Panama, more than 60% of wage earners say that credit is an impediment to starting a business. On the other hand, less than 30% of wage earners in Argentina, Uruguay, and Venezuela report this as a problem. While it is likely that not all of these employees limited by lack of access to credit would make good entrepreneurs, in some countries it appears to be a major barrier to entrepreneurship. This should not be the case: potential low-productivity entrepreneurs should be discouraged from entrepreneurship, not because of a lack of access to credit, but because of the availability of more profitable alternatives in the labor market. Access to credit should not be the barrier.

a. It should be noted that it would not necessarily be efficient to provide financing to these entrepreneurs. However, credit rationing should not be what discourages this individual from carrying out his or her entrepreneurship, but rather its profitability.

b. For example, Kelly, Ferenzy, & McGrath (2017) have provided some examples of how financial technology (fintech), through the use of a greater amount of available data, is developing products to incorporate into the banking system, through alternative ways of conducting customer credit assessments of people who would not have been able to access banks with traditional assessments.

## The future of financial development

The technological progress of recent years has generated new tools and ways of doing business in many industries, including the financial industry. Fintech, which refers to the use of technology to deliver financial products and services, is a growing industry. Cryptocurrencies, virtual wallets and virtual customer service platforms are some examples of fintech developments. As in other industries, many of the traditional players were initially wary of the emergence of these firms, potential competitors in segments of their businesses. As part of the controversy, many of the products or services offered by fintechs are new, so they are not covered by existing regulation. Over time, however, traditional players have begun to see fintechs as potential allies. Text box 6.5 presents a brief analysis of fintechs and their potential impact on financial development.

**Text box 6.5 Fintechs: A threat or an opportunity for financial development?**

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According to Philippon (2016), for a long time the financial sector has not seen much reduction in costs something typically observed in other industries, such as retail. The costs of financial intermediation are still comparable to those of 1880! This author argues that fintechs could reduce these costs and compete with the traditional financial sector by adapting technological advances for the provision of financial products and services. In addition, fintechs could lead to improvements in financial stability and access to more and better financial services. As fintechs are new firms, with no legacy costs and intensive use of technology, they can operate with lower costs and therefore regulation should promote their entry.

Although this approach suggests that fintechs compete with traditional financial institutions for the same market, some financial institutions have stopped seeing them as competitors and have opted for possible alliances that exploit the strengths of each type of entity. The strengths of traditional financial institutions include their brand, customer base and information, ease of access to funds, and their regulatory license to conduct a broad spectrum of financial operations, particularly deposit taking. Fintechs, on the other hand, have a greater culture of innovation, technological expertise, more modern information technology systems and a greater ability to analyze a large amount of consumer data.

Kelly, Ferenzy, and McGrath (2017) have presented 14 case studies of financial institutions that decided to partner with fintechs in different ways. These financial institutions felt that it was too costly for them to stay at the technological frontier and that this affected their ability to generate new products and services or to reach new customers, so associating with fintechs could contribute to these objectives. Among the cases presented by the authors are fintechs that provide alternative ways of measuring customer risk, allowing financial institutions to reach customers with little or no credit information that would be rejected in a traditional risk analysis. In one case, an associated fintech provides virtual customer service, which speeds up and improves the relationship between the financial institution and its clients. Others offer virtual wallet services, which speed up and reduce the cost for the financial institution to make transfers between its customers.

Kelly et al. (2017) have highlighted four challenges in terms of financial inclusion in emerging markets that financial institutions are trying to meet through partnerships with fintechs: 1) access to new market segments, especially customers that are rejected by traditional risk assessments; 2) creation of new products/services for existing customers; 3) data collection, use and management, and 4) greater customer involvement in the use of products, for which better information and even educating customers in the use of these products is needed.

In conclusion, as in most industries, technological advances unlock a range of possibilities for efficiency gains in the financial industry that should be exploited. In particular, the possibility of partnerships between fintechs and traditional financial institutions seems a promising vehicle for improving and broadening the scope of financial services, with lower costs, new products, and new processes (e.g. ways of rating risk). Even so, these developments may require a regulatory response. The regulation of these new activities should be designed in such a way that, without neglecting the protection of the consumer, in particular the depositor, incentives are generated for the entry of new players and for competition from fintechs, traditional entities, and associations between the two.

## The role of public policies

Public policies can affect the development and functioning of financial systems in many ways. First, in a direct manner through productive financing policies, and second, indirectly through the design and enforcement of laws that regulate different aspects of the financial system, such as bankruptcy laws, prudential regulation, or credit information policies. This section first focuses on how the design of bankruptcy laws can affect both firms' demand for credit and the willingness of suppliers to provide credit, and then analyzes a non-exhaustive set of productive financing policies.

**Bankruptcy laws affect not only the decision to start a new business or to innovate but also the decision of financial institutions to lend.**

### Bankruptcy laws

Bankruptcy laws are a fundamental component of the institutional and regulatory framework of the financial system. On the one hand, they affect a credit provider's ability to recover their capital in an insolvency event. Among other things, these laws specify the procedures to be followed when a debtor goes bankrupt, determining which creditors have priority to collect their funds and affecting the amounts and time span for collection.

On the other hand, bankruptcy laws also influence the decision to start a new business or to innovate, because the penalty that entrepreneurs face in the event that one of their projects fails affects their willingness to carry out new projects. In general, these laws also determine what proportion of the debtor's assets may be appropriated by creditors, how long the debtor will be excluded from credit markets and whether there exists a “fresh start” mechanism.<sup>33</sup>

Bankruptcy laws often provide a legal framework both for the reorganization and for the liquidation of a firm. When a firm files for bankruptcy and liquidation, its assets are sold and creditors are paid according to the priority indicated by law. Alternatively, when a reorganization is requested, the firm's debt is generally restructured and the firm continues to operate. Reorganization is convenient when a firm is economically viable and its problems are mainly short-term liquidity. Across countries, the relevant authorities that may decide whether a reorganization is appropriate vary. In some countries, such as Germany or France, this decision lays on a third party officer. In other countries, such as Argentina or Chile, an impartial and independent manager is assigned who supervises the firm's manager and takes full control in case incompetence, negligence, fraud, or misconduct on his part is proven. Finally, in other countries, such as the United States the decision lays solely on the firm's manager.

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33. A fresh start refers to whether, after bankruptcy has been declared, the debtor fully discharges the debt or whether, on the contrary, the debtor will remain liable for the debt in the future.

**Most countries in the region have low recovery rates and slow liquidation processes compared to the United States.**

Araujo and Funchal (2005) have highlighted the following attributes as desirable ingredients in bankruptcy laws:

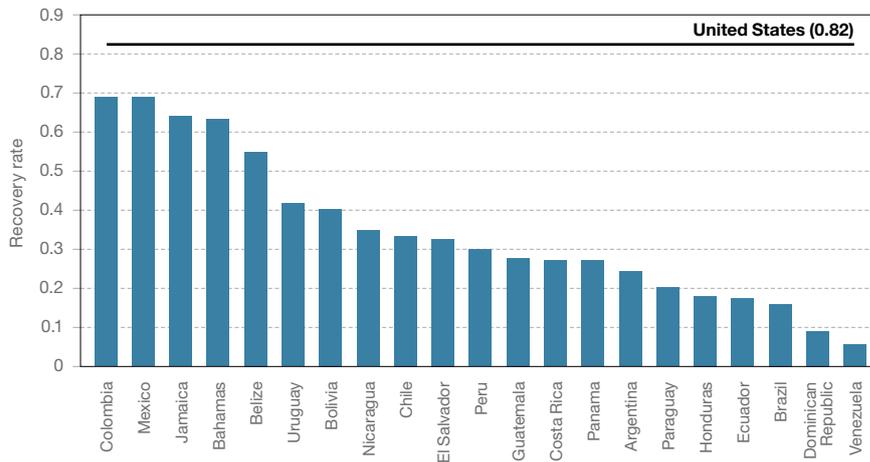
- *Ex post*, a bankruptcy law should maximize the total value of the firm and therefore the amount repaid to creditors. This highlights the importance of the possibility of reorganization.
- *Ex ante*, the bankruptcy law should provide the right incentives for the manager's decision-making. That is, it should minimize incentives for the manager to invest in excessively risky projects, in order to reduce the likelihood of bankruptcy.
- In general, a good bankruptcy law means that managers and shareholders can appropriate part of the bankruptcy value to align their incentives with those of the remaining creditors.
- Generally, mechanisms that allow for a greater involvement of creditors in the bankruptcy process increase the expected value of the bankrupt firm and therefore increase the benefits of greater oversight by creditors, preventing fraud.

All of these ingredients lead to a higher expected access to credit for a firm, either because they increase the recovery value in bankruptcy or decrease the likelihood that bankruptcy will occur, thereby reducing the cost of credit in the economy and fostering greater aggregate productivity.

The recovery rate indicates the amount recovered per dollar loaned, by creditors, tax agencies, and employees of an insolvent firm in a bankruptcy process. The higher this rate, the lower the cost of bankruptcy to creditors and therefore the greater the incentive to extend credit. Graph 6.9 shows the recovery rate for selected Latin American countries and the United States. Nowhere in the region is the recovery rate as high as in the United States, at 0.82. Although some countries, such as Colombia and Mexico, have recovery rates higher than 0.6, at the other extreme countries such as Brazil, Ecuador, Paraguay and Venezuela have recovery rates lower than 0.2.

Another important factor is the time it takes to recover funds. Longer times mean higher costs for creditors, proportionate to their share of the liquidation. Graph 6.10 illustrates the time (in years) required for the resolution of an insolvency event in Latin American countries and the United States. As can be seen, conflict resolution takes considerably longer in the region than in the United States, usually more than 2 years. Among the countries with the best performance for this indicator are Bolivia, Colombia, Jamaica, Mexico, and Uruguay, while the countries with the worst performance are Brazil, Ecuador, Honduras, Paraguay, and Venezuela.

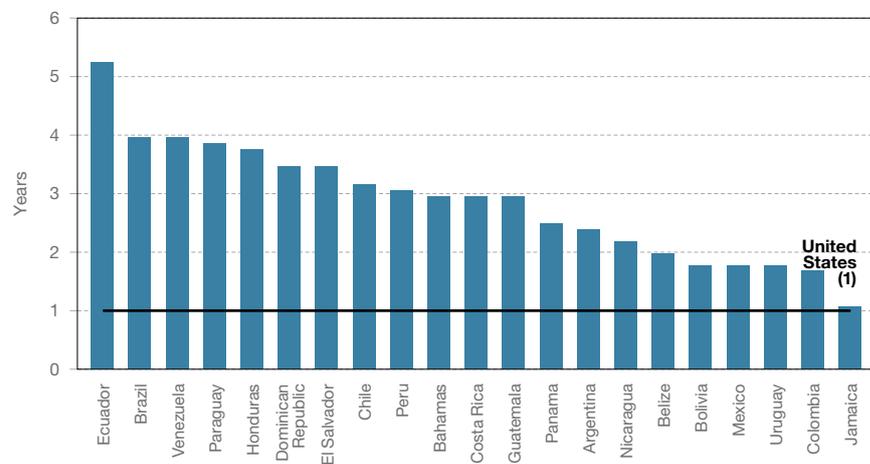
**Graph 6.9** Recovery rates in Latin America



Note: The graph shows the recovery rate in case of insolvency resolution for 2017. The recovery rate is measured as recovered US dollars for every USD owed. The horizontal line is the United States recovery rate.

Source: Produced by the author based on data from Doing Business (World Bank, 2017a).

**Graph 6.10** Time of insolvency proceedings in Latin America



Note: The graph shows the time (years) it takes to resolve insolvency proceedings for the year 2017. The horizontal line represents the resolution time for the United States.

Source: Produced by the author based on data from Doing Business (World Bank, 2017a).

Finally, a general diagnosis of conflict resolution in Latin America can be appraised through the Strength of the Legal Framework index.<sup>34</sup> This index has four components: the procedural opening index, the debtor's asset management index, the reorganization procedure index and the creditor participation index. The index varies between a minimum value of 0 (low strength) and a maximum value of 16 (high strength). Although differences in the absolute value of these indexes should be interpreted with caution, in general, countries in the region show values below 10 points, compared to 15 in the United States. Within the region, the best-performing countries are Brazil, Chile, Colombia, Jamaica and Mexico.<sup>35</sup>

Looking at all the indicators together, Brazil stands out as the best-performing country in the region, in the sense that it displays outstanding performance in all subindexes.<sup>36</sup> Chile also performs well in all subindexes, while Colombia and Mexico perform very well in two of the four subindexes, but perform regularly in the reorganization process and creditor participation subindexes.

Fortunately, Latin American countries are increasingly aware of the importance of bankruptcy laws for the operation of financial systems and productivity. Text box 6.6 develops the main points of the bankruptcy law reform carried out in Brazil in 2005 and illustrates how an improvement in these laws can result in more efficient processes and a better performance of the financial system. Mexico and Colombia also carried out bankruptcy law reforms and showed improvements in these processes.<sup>37</sup>

#### **Text box 6.6** Bankruptcy law reform in Brazil

In order to improve the operation of its financial system, Brazil carried out a major reform of its bankruptcy law in 2005. Prior to that year, most of the current regulation came from a 1945 law. In general, this regulation was very inefficient in maintaining the value of the firm and protecting the rights of creditors, with a very slow liquidation process and a very low recovery rate. In addition to inefficiencies in the process and lack of transparency, the succession process implied that labor, tax and other debts were transferred to the buyer of the assets on liquidation. In addition, the reorganization process was very inefficient (merely postponing debt payments instead of restructuring firms), which promoted informal agreements.

All this resulted in a very long time to resolve insolvencies (twice the average for Latin America and eight times for the OECD) and a very low recovery rate (0.2% compared to 26% on average for Latin America and 72% for the OECD). The low recovery rate was mainly explained by the fact that workers and tax debts took precedence over other creditors.

34. See *Doing Business* (World Bank 2017a).

35. Table A 6.4 in the Appendix presents the detail of each subindex and the aggregate index for a set of countries. The construction of these indexes might be subject to measurement errors and depend on subjective criteria such as the selection and weighting of components. For this reason, while the index is useful as an indicator of the existence of possible problems to address, it should not be considered a complete metric to assess progress in the event of reforms.

36. If a ranking by indicator is performed, Colombia is always among the four best-performing countries.

37. See Giné & Love (2010) and Gamboa-Cavazos & Schneider (2007).

The new law introduced significant changes. First, it integrated bankruptcy into the commercial and legal system, enabling reorganization in and out of court, with a good balance between liquidation and reorganization. In addition, it introduced flexibility to the liquidation process, allowing for the conversion of reorganization processes into liquidations, establishing periods in which debtors can apply for rehabilitation in response to a liquidation previously requested by their creditors and introducing new firm reorganization systems away from the judiciary path. It also introduced a minimum owed amount to file for bankruptcy (final liabilities must exceed 40 minimum wages). Finally, it incorporated six major changes to the liquidation process:

1. Once labor debts per worker exceed 150 times the minimum wage, their priority is reduced to that of unsecured creditors.
2. Secured creditors have priority over tax creditors.
3. Unsecured creditors now have priority over some tax creditors.
4. The struggling firm can be sold before the list of creditors is drawn up, which can help speed up the process and increase the value of the firm in the event of bankruptcy.
5. Tax, labor and other debts are not transferred to the buyer of an asset sold in liquidation.
6. Any new credit taken during the reorganization will have priority in the event of liquidation.

These changes had a positive impact on both the bankruptcy process and the performance of the credit market (although other macroeconomic and regulatory changes may have contributed to this improvement).<sup>a</sup> Regarding the former, the imposition of a minimum owed amount to file for bankruptcy caused an immediate decrease in bankruptcy and reorganization filings, although reorganization gained participation over time. Moreover, recovery rates increased to 12% in 2006 and then continued to increase to values close to 20% in recent years. As for the latter, there was a significant increase in the domestic private credit/GDP ratio and a significant fall in spreads (Table 1). In addition, as Araujo, Ferreira, and Funchal (2012) have shown, the reform had positive effects on the total amount of debt and on long-term debt (although not on short-term debt) and reduced debt-financing costs.

**Table 1.** Credit indicators for Brazil, Latin America, and OECD

<b>(A) Domestic credit to private sector by banks</b>			
Country/Region	2001-2005	2006-2010	2011-2015
Brazil	29.5	44.4	63.5
Latin America	24.4	35.1	47.5
OECD	137.9	147.5	143.0
<b>B) Interest rate spread</b>			
Country/Region	2001-2005	2006-2010	2011-2015
Brazil	41.2	34.4	26.9
Latin America	7.9	7.1	7.0
OECD	3.3	2.7	n/a

**Source:** Produced by the author based on data from World Development Indicators (World Bank, 2018).

a. Araujo, Ferreira, & Funchal (2012) have presented evidence on the causal relationship between the Bankruptcy Law reform, the financing structure of firms, and the cost of debt, supporting the direction of the changes reported in the tables.

**State intervention must aim to solve market failures caused by asymmetric information, externalities, or incomplete markets.**

At the beginning of this subsection it was mentioned that bankruptcy laws impact not only on the decision to provide credit but also on the decision to start a business or innovate, two objectives that are in direct opposition. Although to encourage entrepreneurship and innovation there must be a minimum of debtor protection, debtor protection has two opposite effects. On the one hand, reducing the cost of declaring bankruptcy promotes entrepreneurial activity and innovation. On the other hand, because it implies a lower rate of return for the creditor, it can lead to lower volumes of credit and higher financing costs. What effect predominates in practice? Cerqueiro, Hedge, Penas, and Seamans (2017) have demonstrated that greater debtor protection in the United States had a negative effect on the number of small business patents, as well as on their quality, because the lower availability of credit more than offset the incentive to invest and innovate. Cerqueiro and Penas (2017) have also reported that greater debtor protection leads to a redistribution of credit to wealthier families. This is because, by increasing debtor protection, the recovery rate for creditors is higher when they lend to wealthier families than to middle-income families.<sup>38</sup>

## **Productive financing policies**

Why would States consider facilitating access to financing for firms through productive financing policies? An economically sound motive may be that productive financing policies can be framed as productive development policies, which focus on solving market failures to increase the productivity of the economy.

Some of these market failures occur because private agents do not internalize the externalities (positive or negative) they produce in carrying out their activity. This causes the social benefit to be different from the private benefit, and therefore individual analysis may lead to a lower-or higher-than-optimal provision of certain goods or services. Other market failures are related to imperfect information or incomplete markets, i.e. when certain goods or services that would be necessary to achieve efficiency under competitive conditions do not exist. All of this can lead to credit access restrictions. In addition, long-term financing may be limited by macroeconomic or regulatory uncertainty.

In all these cases, state intervention can help improve the allocation of productive resources by addressing these failures and providing access to credit to firms that, because of these failures, are excluded. For example, a financing policy that promotes venture capital may result in improved productivity of the beneficiary firms, as well as having spillover effects on other firms in the sector, or on firms linked to it (suppliers or firms that use their products as inputs).<sup>39</sup>

Nevertheless, state intervention is not free from failure, in this case government failure, that can ultimately increase the very costs they intend to mitigate or cause

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38. The authors have shown that less affluent families are not affected because their level of access to credit is already low and their recovery rate did not change significantly with the reform.

39. Examples of such successful policies are the establishment of YOZMA in Israel or the New Zealand Venture Capital Investment Fund (NZVIF).

bigger problems than they solve. In spite of good intentions, state intervention can lead to unintended outcomes. For example, a subsidized credit line or other type of fiscal benefit for a given sector or industry can generate rents and induce firms to direct their resources to appropriate those rents, with no improvements in the set of goods and services produced. Buera, Moll, and Shin (2013) have demonstrated that well-intended public policies that initially promote business growth can be detrimental if they are not flexible enough to adapt to new scenarios. Designing and implementing policies for productive financing thus require careful consideration.

Another word of caution is due when targeting program beneficiaries based on size, i.e. size-dependent policies which are widely used in many countries. These policies aim to grant subsidies, privileges in access to credit, or tax breaks, usually to small or medium-sized firms. However, the evidence suggests that such policies can have negative effects on the economy. For example, Guner, Ventura, and Xu (2008) find that these policies distort the distribution of firms in the market, causing productivity indicators to drop. Similarly, Restuccia and Rogerson (2008) argue that policies that generate distortions that are positively correlated with firm productivity cause great losses in terms of productivity and output. In the region, according to CAF (2013), most countries focus public spending on financial interventions on micro, small and medium firms.<sup>40</sup> Only Chile and Brazil allocate a significant proportion of spending (around 10%) to start-ups.

While targeting based on size greatly simplifies the implementation of large-scale policies, a more effective strategy would be to target young businesses instead, as they display higher growth rates. However, this proves to be a challenging task.<sup>41</sup> What screening mechanisms can the State implement to focus its funding interventions? Although this issue is still subject to much debate, there are some lessons to be learned from the experience in the region.

#### **Text box 6.7** CAF financial development program

CAF—development bank of Latin America has long considered the development of financial systems a critical path to promote economic development in the region. In line with this vision, CAF's Financial Development Program (FDP) aims to identify and eliminate the constraints to financial development in Latin America. The FDP has four areas of action: 1) consumer protection and financial education, 2) access to financial services and investment finance, 3) risk management, and 4) financial services channels and networks or financial infrastructure.

Through the area of consumer protection and financial education, CAF seeks a better understanding and greater access to and use of the services provided by the financial system. CAF supports public policy through surveys that measure the degree of financial education of different population

40. See Graph 5.3 in CAF (2013).

41. A detailed discussion on this can be found in CAF (2013).

groups, especially the most vulnerable. In addition, CAF will support the implementation of national financial education strategies through the design of follow-up, monitoring and evaluation systems, as well as the strengthening of financial consumer defense and protection mechanisms.

The area of access to financial services and investment financing, on the other hand, seeks to strengthen the supply of financial services in order to improve access to these services by both individuals and firms. This body seeks to promote the expansion of access to financial services in general (of both credit and debit-based products), with a focus on the most vulnerable sectors and on micro, small and medium enterprises, through entities specialized in microfinance. As discussed in Text box 6.1, this objective poses a challenge when selecting the projects to be financed, requiring detailed analysis when selecting the projects in order to identify those that are most productive and with higher growth potential. It also seeks to increase savings and strengthen capital markets in order to increase financing of firms' long-term investments. Finally, it seeks to strengthen the financial sector's regulatory, control and oversight systems at the national and regional levels, improving the system's security through greater transparency.

CAF's risk management area supports public policy to promote an adequate supply of insurance products. It also contemplates supporting the institutionalism of guarantee schemes, on movables, guarantee funds or reciprocal guarantee partnerships. To alleviate the problem of asymmetric information, it plans to promote the development of risk centers and credit bureaus, improving market transparency and the credit standing of compliant borrowers.

Finally, through the area of financial services channels and networks, or financial infrastructure, CAF seeks the institutional strengthening of both high and low-value payment systems, strengthening their design and supporting their regulation as a way to reduce transaction costs, promote the massive use of retail electronic payments and combat the use of cash.

## Productive financing interventions in Latin America

All Latin American countries, to a greater or lesser extent, have financing programs for firms. In fact, in Latin America between 70% and 95% of the public resources allocated to promoting entrepreneurship are related to financing, well above the shares allocated to supporting innovation or promoting better managerial or labor skills (CAF, 2013).

Table 6.2 presents some of the programs in the region. The following sections present the estimated impacts of three types of programs, focused mainly on employment, investment, innovation and productivity: 1) general financing, 2) interest rate subsidies and guarantee schemes, and 3) financing for innovation. It is worth noting that the evaluations of some of these programs were conducted especially for this report,<sup>42</sup> and that as far as possible they construct credible counterfactual scenarios, which allows to attribute certain degree of causality, to the reported estimates.

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42. Butler et al. (2017), Albis, García, Sánchez, & Bayona (2017), and Rocha (2017).

**Table 6.2** Some examples of public financing programs

Type of program	Components	Beneficiaries	Example of programs with this component in the region	Problems attended	Objectives / Mechanisms
Mutual Guarantee Societies	Granting of guarantees to potential creditors of the financial system	SMEs	SGR (Argentina)	Information problems / Lack of collateral	Improve credit access for SMEs by decreasing financing costs
	Financement of exports of goods and associated services	Large firms	FINEM Exim (Brazil)	Barriers to access foreign markets	To promote exports
	Agreements with financial entities, which could offer rates with three percentage points subsidized by the National Treasury	SMEs	Bonus rate regime (Argentina)	Costs associated with access to credit in the financial system	Improve credit access for SMEs by decreasing financing costs
Interest rate subsidies	Subsidized interest rates with grace periods and different types of amortization	No restrictions	FINEM and FINEM automatic (Brazil)	Costs associated with access to credit in the financial system	Finance fixed assets (implementation, expansion, recovery and modernization).
	Subsidized interest rates	No restrictions	FINAME (Brazil)	Costs associated with access to credit in the financial system	Finance the purchase of machinery and equipment (capital).
	Subsidized interest rates	No restrictions	BNDES PSI (Brazil)	Costs associated with access to credit in the financial system	Finance the purchase of capital goods produced in the country.
	Innovation	R&D activities	FONTAR (Argentina)	Positive externalities of innovation	Promote investment in research and development
	Capital contributions or direct financing with a grace period in some cases	SMEs	FONAPyME (Argentina)	High financing costs	Improve credit access for SMEs by decreasing financing costs
Direct Credit	Access to credit and grace period	Micro and small firms. Agriculture and manufacturing sectors	Individual Productive Credit-Productive Development Bank (Bolivia)	Access to credit in the financial system	Credit as an instrument to improve income. Additionally, to generate a social, economic and financial impact by generating new jobs and improving incomes among micro and small producers
	Access to credit	No restrictions	Bancoldex (Colombia)	Access to credit, especially long term credit	Improve the supply of long-term loans, mainly for small and medium sized firms
Tax Benefits	Tax incentives to encourage innovation	Large firms	Lei do Bem (Brazil)	Positive externalities of innovation	Promote investment in research and development
	Shared funds, fiscal credits and subsidized credit	Technological innovation firms	FONTAR (Argentina)	Failures that restrict innovation and the adoption of new technologies	Promote investment in research and development
Direct credit accompanied by technical assistance	Access to credit accompanied by technical assistance	Start-up firms	Buenos Aires Emprénde (Argentina)	Access to credit for new firms	Promote the creation and development of innovative ventures

**Source:** Produced by the author.

**For Latin America, there is mixed-evidence regarding the effects of direct financing programs on productivity. The selection method seems to play a key role.**

## Direct financing

Several countries in the region implement direct credit programs. While these programs have some similarities, there are differences in the beneficiaries targeted and on how loans are granted. In Argentina there is an important program of the type aimed at small and medium firms (FONAPYME);<sup>43</sup> in Bolivia, the Crédito Productivo Individual financing program from Banco de Desarrollo Productivo focuses on micro and small firms;<sup>44</sup> and Colombia maintains a similar program, albeit without size requirements.<sup>45</sup> In Argentina, loans are granted directly by the State; in Bolivia, they are channeled through a government second-tier bank dedicated to financing productive activities; and in Colombia, loans from the Bancóldex (second-tier development bank) are channeled through other financial and non-financial institutions.

Regarding impacts, these financing programs show an increase in employment and investment in beneficiary firms, but only in the case of Colombia are there positive and significant effects on their overall performance. In Argentina, these programs induce firms to hire more workers, but do not cause significant changes in wages, the probability of accessing credit, or the probability of exporting.<sup>46</sup> In Bolivia, there is an increase in investment in machinery and in production on the manufacturing sector, but no significant impact on the agricultural sector. Finally, in Colombia, there is an increase in output, investment and use of productive factors by beneficiaries. Furthermore, in the case of Colombia the program is not a substitute for private credit, but rather leads to an increase in the relationship between firms and banks, a greater likelihood of receiving loans with longer terms and of obtaining financing from other private intermediaries. Another point worth noting is that the commercial banks through which profits are channeled are responsible for monitoring projects and the percentage of firms that do not repay is very low (less than 0.01%).

## Programs to reduce costs and facilitate access to financing

Many programs in the region aim to make access to financing easier and cheaper rather than providing it directly. They are generally based on interest rate subsidies or guarantee schemes.

In Argentina, the Rate Rebate Regime (RBT, for its acronym in Spanish) consists of granting loans at subsidized interest rates through private banks. The results of their evaluation, in contrast to those of FONAPYME, show positive effects on the number of workers hired, the average wage, the probability of accessing credit, the probability of exporting, and the intensive margin of exports (i.e. an increase in the export volume of firms that already export).<sup>47</sup>

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43. See Butler et al. (2017).

44. Villarroel & Hernani-Limarino (2015).

45. Eslava, Maffioli, & Arjona (2012, 2015) and Eslava & Freixas (2016).

46. Eslava, Maffioli, & Arjona (2012, 2015) and Eslava & Freixas (2016).

47. See Butler et al. (2017).

Also, in Argentina, another important scheme within financing policies is that of the Mutual Guarantee Partnerships (SGR, for its acronym in Spanish). SGRs are constituted with the contribution of a parent firm (whose participation is encouraged by tax benefits) whose mission is to provide guarantees to beneficiary firms so that they can access credit at a lower cost. This scheme has shown positive impacts on the number of workers that these firms employ and on their probability of accessing credit.<sup>48</sup>

What type of firms benefit the most? In order to analyze heterogeneous effects according to firm size, age and sector, Butler et al. (2017) have grouped the beneficiaries of the three abovementioned Argentinean programs (FONAPYME, RBT, and SGR). First, they have found that the major beneficiaries of these programs are micro and small enterprises. Second, while positive effects in firms of all ages have been found, the magnitude of these effects is much greater for younger ones. Finally, they have found positive effects on firms in the industrial sector and non-significant effects on firms in the agricultural sector (in line with the results of Villarroel & Hernani-Limarino, 2015, in the case of Bolivia).

The Banco Nacional de Desenvolvimento Econômico e Social (BNDES), in Brazil, has a long history of financing programs based on rate subsidies.<sup>49</sup> Many of these programs consist of loans through private entities in which BNDES finances the difference between the rate charged and the market rate. In general, the rate charged is based on the Legal Long-Term Interest Rate (TJLP, for its acronym in Portuguese), which BNDES itself sets well below the market rate.<sup>50</sup> Among the most widely used programs are the Programa BNDES de Sustentação do Investimento (PSI),<sup>51</sup> Financiamento a Empreendimentos (FINEM and FINEM Automático),<sup>52</sup> financing of machinery and equipment (FINAME)<sup>53</sup> and export financing (BNDES Exim).

Various studies have evaluated the effects of these programs on the performance of beneficiary firms. Ottaviano and De Sousa (2007) have evaluated the effects of the FINEM and the FINEM Automático financing programs. They have found that beneficiary firms in general have more restrictions on access to credit than non-beneficiaries and that access to credit allows them to reach similar, but not higher, performance levels (measured by different productivity metrics) than non-beneficiaries. The authors suggest that the BNDES should take a more active role in the selection of beneficiary firms' projects, favoring those who plan to introduce

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48. See Butler et al. (2017).

49. See De Bolle (2015) or Frischtak, Pazarbasioglu, Byskov, Hernandez Perez, & Carneiro (2017) for a description of the operation of the BNDES.

50. Figure 7 in Pazarbasioglu et al. (2017) illustrates the evolution of the TJLP along with other reference rates. The TJLP is almost always the lowest rate, even below inflation or the government bond rate.

51. The BNDES PSI (Programa BNDES de Sustentação do Investimento) makes it more attractive to purchase machinery and equipment produced in the country.

52. The FINEM (Financiamento a Empreendimentos) and the FINEM Automático are programs that provide financing for different expenses in the creation of new firms or the expansion of existing ones. Depending on the amount to be financed, the FINEM (if the amount exceeds 10 million Brazilian reais) or the FINEM Automático applies.

53. The FINAME (machinery and equipment financing) and the Leasing FINAME are programs that finance the acquisition (or leasing) of machinery and equipment through subsidized credit.

**Interest rate subsidy programs had positive effects on various performance indicators, such as investment or employment, but marginal effects on productivity.**

new technologies (instead of replacing or expanding existing technology), in order to lower marginal production costs.

Machado and Roitman (2015) and Machado, Grimaldi, Albuquerque, and Santos (2014) have evaluated BNDES PSI, a program that encourages the acquisition of machinery and equipment produced in the country. Machado and Roitman (2015) have studied the effect of the program on investment over time, finding that in the credit period the effect is positive (although not always significant). This shows that there is no contraction of other investments; however, they have found evidence (although not entirely robust) that medium-sized firms anticipate investment, reducing other investments in the years after obtaining a loan. Machado et al. (2014), for their part, have found a positive effect on industrial firms' investment levels.<sup>54</sup>

Finally, Ribeiro, and De Negri (2009) have evaluated the FINAME, a program for the acquisition of machinery, and found no significant effects on productivity.

Other authors have analyzed the effects of BNDES as an institution, beyond the individual effects of its programs. Lazzarini, Musacchio, Bandeira-de-Mello, and Marcon (2015) have explored two hypotheses: on one hand, the industrial approach of the development bank as a facilitator of credit and an engine of greater productivity and production; on the other hand, the political version of the development bank that induces a misallocation of resources, either by saving inefficient firms that would otherwise close or by encouraging the search for rents to maximize private instead of social benefits. The authors have found that the behavior of the BNDES is not consistent with either hypothesis: Its beneficiary firms have neither better nor worse performance in terms of production or investment than comparable non-beneficiaries, so it neither improves nor aggravates the allocation of resources. However, by benefiting firms that could have had access to credit in the market, but preferred to use the cheapest BNDES credit, it excludes good firms from the private credit market, worsens the risk profile of the group of firms that resort to the market for credit, and thus generates a non-trivial effect on their costs. This could help explain Brazil's poor performance in terms of interest rate differentials and amounts of credit to the private sector.

Bonomo, Brito, and Martins (2015) assess the determining factors to obtain a BNDES loan and then studied whether firms that obtain it exhibit better performance. In line with Lazzarini et al. (2015), they find that the main determinants are size, age, and risk, with the largest, oldest, and least risky firms being the most likely to obtain a loan.<sup>55</sup> They find no significant effects on productivity.

Finally, Coelho, and De Negri (2010) study the effects of access to BNDES credit on several variables, both on average and by firm-size quantiles. They find a positive average effect on TFP, labor productivity, number of employees and net sales revenue. These positive effects are maintained even three years after the granting of the loan for all variables, except for the TFP. The effect by quantile is U-shaped

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54. It should be noted that potential selection problems could bias these results.

55. This would be an indicator that the BNDES would not be fulfilling the role of completing the markets, since the firms that should have the greatest problems obtaining credit in the private sector would be the youngest, which in general are those that do not have collateral and are the most risky.

in the case of labor productivity (i.e. it decreases for medium-sized firms and then rises again for large ones) while for the rest of variables it decreases with firm size. The decreasing effect on TFP indicates that firms that benefit most from the BNDES are those that have the lowest rates of productivity growth, and that they coincide with firms that have a high initial productivity level (at the time of taking out the loan).

## Financing innovation

Many countries in the region finance the innovation efforts made by firms. These include the innovation law (known as *lei do bem*) in Brazil,<sup>56</sup> various policies promoted by government and financial agencies in Colombia, such as the Institute for Industrial Development, the National Learning System and the Research and Technological Development Centers,<sup>57</sup> and finally, the programs of the Argentinian Technological Fund (FONTAR, for its acronym in Spanish) and the Buenos Aires Emprende program in Argentina.

In Brazil, Rocha (2017) finds that the provision of credit for R&D activities and for angel capitals increased the probability of carrying out such activities, as well as their intensity in firms that already carried them out. He also finds a similar result in the case of direct subsidies to innovation activities. On the contrary, he finds that financing the acquisition of equipment and machinery has a negative effect on private R&D efforts, suggesting that these policies are substitutes and not complements to private investment. The author does not assess the final effect on productivity of these policies.

In Colombia, Albis, García, Sánchez, and Bayona (2017) also find that policies to support innovation had a positive effect on beneficiary firms, in this case not only on their R&D expenditure but also on their productivity.

In Argentina, several authors have studied the effects of FONTAR programs. This agency uses public and private funds to finance innovation projects through three instruments: 1) credits, 2) subsidies (Non-Reimbursable Contributions or ANR, for their acronym in Spanish) and 3) tax credits. Some authors have analyzed the effect of FONTAR instruments together. Sanguinetti (2005) finds that in the period 1996-2001 FONTAR had positive effects on R&D expenditure per worker, but does not find significant effects on total R&D expenditure. López, Reynoso, and Rossi (2010) analyze the period 1998-2005 and, unlike Sanguinetti (2005), find a positive effect on total expenditure on R&D activities, as well as positive effects on the probability of exporting (although not on firm exports or sales per worker). Castillo, Maffioli, Rojo, and Stucchi (2014) analyze the period 2002-2010 and find positive effects on employment, wages, and probability of survival of the direct beneficiaries, as well as on employment, wages and the probability of exporting (but not survival) of the indirect beneficiaries.<sup>58</sup>

**Innovation financing programs show positive results in employment, investment, probability of exporting, and R&D expenditure.**

56. Certain BNDES programs such as INNOVAGRO, PROFARMA, MPME INNOVADORA, PRO BK or THAI were also intended to promote innovation, but unfortunately there are no rigorous evaluations of the effects of these programs on productivity.

57. See Albis, García, Sánchez, & Bayona (2017).

58. The indirect beneficiaries are those who hired qualified workers from firms that were previous beneficiaries of the FONTAR.

Other authors have analyzed the effects of a particular instrument or the individual effect of each instrument. Chudnovsky, López, and Pupato (2006) and Martínez Correa, Pereira, and Scattolo (2017) analyze the effects of the ANRs for the periods 1998-2004 and 2007-2013, respectively. Both papers find a positive effect on total spending on innovation activities as a proportion of total sales. Martínez Correa et al. (2017) indicate that the greatest intensity of innovation seems to come mainly from small firms. Chudnovsky, López, Rossi, and Ubfal (2006) also analyze the effect of ANRs on new product sales and various labor productivity measures, but find no significant effects. For their part, Binelli and Maffioli (2007) study the effect of each instrument on annual R&D expenditure for the period 1996-2003, finding that tax credits and loans had a positive effect, but not finding significant effects in the case of ANRs.

Finally, Butler, Galassi, and Ruffo (2016) analyze the Buenos Aires *Emprende* program, which not only provides financing but also technical assistance to nascent ventures. The authors find that this program increased the likelihood of business creation by 22 percentage points and increased the survival rate from 42% to 92% in 24 months. In addition, each of these new firms promoted the creation of three additional jobs. However, the authors find no significant effects on income or sales.

## **What have we learnt from the Latin American experience?**

Latin America's experience with aid programs to access financing reveals disparate results depending on the type of instrument used, the performance measure considered, the type of firm or project benefited, and the selection process.

In general, interest rate subsidy programs yield increases in investment, yet results in terms of productivity are unclear (with positive results in some cases and no significant results in others). Similarly, innovation support programs lead to an increase in spending on innovation, but do not have clear effects on productivity (possibly because the benefits of innovation may take a few years to be observed). Direct funding programs have effects that appear to depend largely on the selection of beneficiaries.

While many of the region's public productive financing programs are geared toward micro, small, and medium-sized enterprises, these types of programs do not seem to have the expected positive effects on productivity. On the other hand, impacts seem to be higher when they are allocated to start-up firms. A major challenge, then, is to identify and properly support start-up firms, without this resulting in vicious incentives for existing firms (e.g. creating a new firm just to receive the benefit). Beneficiaries should be selected with the aim of solving or compensating for market failures. Therefore, they should be firms that would otherwise be barred from accessing credit and thus unable to carry out their

project or reach an optimal scale on their own. This point is important to avoid a displacement effect of private credit, since benefiting firms with access to private credit deteriorates the risk profile of the group of firms that remain in the private market, therefore increasing their borrowing costs.

Finally, the way in which beneficiaries are selected also seems to be very important. As the Colombian case of Bancóldex shows, delegating this role to private banks seems to result in a better targeting. More importantly, it can contribute to the development of the private credit market, as suggested by the fact that firms benefiting from this program were able to access private credit in subsequent periods.

Looking beyond the benefits obtained, most assessments of productive financing programs fail to analyze the costs that this type of programs impose on the State. Weighting the benefits with the costs involved in these programs is very important to evaluate fully their results. Even when the benefits outweigh the costs, this would help to determine not only the most suitable type of program, but also its optimal scale.

## Final considerations

Financial systems are critical to achieve a good allocation of resources in the economy and therefore boost its productivity. Underdeveloped financial systems negatively affect the selection of entrepreneurs and firms operating in an economy, the allocation of productive resources among these firms, and their level of investment and innovation. These distortions affect the selection of firms, and their scale of operation, result in the economy being run by firms that are not the most productive or that operate at an optimal scale.

Unfortunately, financial systems in Latin America lag far behind those in developed regions. Credit levels and spreads, as well as broader measures such as the financial development index, still indicate a poor performance in most of the region. This poorer performance results in a worse selection of firms, with a higher prevalence of small firms that are less integrated into global markets and have lower levels of innovation, which partly explains the lower levels of productivity in these countries.

Inclusion and financial education is another area in which there is much room for improvement. This would allow not only for an expansion in the beneficiaries of the financial system but also a better use of the available instruments. With these potential benefits in mind, institutions such as CAF-development bank of Latin America are promoting programs to help measure levels of financial education, as well as implementing programs that seek to increase countries' financial inclusion and education.

Finally, the policies that can contribute to the proper operation of financial systems include the design of bankruptcy laws and productive financing policies.

Improvements in the design of bankruptcy laws such as those adopted by Brazil, for example, can lead to a better operation of the credit market. On the other hand, the results of productive financing programs on productivity are unclear, which seem to depend largely on their design. In addition to incorporating lessons from the region to improve the design of these programs, it should be borne in mind that, like many public programs, they often demand considerable resources the State and are subject to government failures. Their benefits must be weighed against their cost as well as against the probability of occurrence of these failures. Thus, public policy can help validate Uche Ugo's ingenious phrase, "money flows in the direction of value", and prevent it from being just another expression of his creativity.

# Appendix

## Countries included in graphs

**Graph 6.3, Panel A:** Includes Albania, Algeria, Argentina, Armenia, Azerbaijan, Belarus, Bolivia, Bosnia-Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Chile, China, Colombia, Costa Rica, Croatia, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Gabon, Georgia, Ghana, Guatemala, Honduras, Hungary, India, Indonesia, Israel, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyzstan, Latvia, Lesotho, Lithuania, Macedonia, Madagascar, Malaysia, Mali, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Namibia, Nepal, Nicaragua, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Russian Federation, Senegal, Serbia, Slovakia, Slovenia, South Africa, Sri Lanka, Sudan, Tajikistan, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Vietnam, and Zambia.

**Graph 6.3, Panel B:** Includes Argentina, Armenia, Bolivia, Cambodia, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Egypt, El Salvador, Ghana, Guatemala, Honduras, India, Indonesia, Mali, Mexico, Mongolia, Namibia, Pakistan, Paraguay, Peru, Senegal, Serbia, South Africa, Tanzania, and Uganda.

**Graphs 6.1, 6.2, 6.4, 6.6 and 6.7:** Produced from the list of 117 countries detailed below, with exceptions due to lack of information:

**Africa** includes Algeria, Botswana, Burkina Faso, Burundi, Egypt, Gabon, Ghana, Kenya, Lesotho, Madagascar, Mali, Mauritius, Morocco, Namibia, Nigeria, Senegal, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda, and Zambia,

**Asia** includes Armenia, Azerbaijan, Cambodia, China, Georgia, Hong Kong, India, Indonesia, Japan, Kazakhstan, Kyrgyzstan, Malaysia, Mongolia, Nepal, Pakistan, Philippines, Singapore, South Korea, Sri Lanka, Tajikistan, Thailand, and Vietnam.

**Europe** includes Albania, Austria, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Montenegro, Netherlands, Norway, Poland, Portugal, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, and United Kingdom.

**Latin America and the Caribbean** includes Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, and Venezuela.

**Middle East** includes United Arab Emirates, Cyprus, Israel, Jordan, Oman, Iraq, Saudi Arabia, and Bahrain.

**North America** includes Canada and the United States.

**Oceania** includes Australia and New Zealand.

***Exceptions due to lack of information:***

**Graph 6.1** Panel A. Does not include Canada or the United Kingdom.

**Graph 6.2** Does not include Canada or New Zealand.

**Graph 6.4 Panel A.** Does not include Bahrain, Burundi, Cambodia, Canada, China, Ecuador, Egypt, Honduras Mali, Nicaragua, New Zealand, Paraguay, Peru, Saudi Arabia, Sudan, Tanzania, Trinidad and Tobago, United States, Venezuela, or Vietnam.

**Graph 6.4 Panel B.** Does not include Algeria, Canada, Dominican Republic, Haiti, Honduras, Jamaica, New Zealand, Peru, Sudan, or Venezuela.

**Graph 6.6:** Does not include Bahrain, Canada, Denmark, Iceland, Iraq, New Zealand, or Venezuela.

**Graph 6.7:** Does not include Burundi, Iceland, Jamaica, Oman, Sudan, or Venezuela.

**Graph 6.2:** The 21 countries considered as Latin America are Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

**Table A 6.1** Measurement of Financial Capabilities Survey

Number	Type	Question	Answers	Score
1	Division	Imagine that five brothers receive a donation/gift of \$1000. If they have to share the money equally, how much does each one get?	Open-ended response <b>\$200</b>	Score 1 for correct answer. Score 0 otherwise.
2	Value of money over time	Now imagine that the brothers have to wait a year to get their share of X amount and inflation is at 2% per year. After a year, what will they be able to buy...? In the case of Bolivia, 3% inflation is applied.	a. More than what they could buy today with their share of the money b. The same amount <b>c. Less than what they could buy today.</b> d. It depends on the things they want to buy.	Score 1 for correct answer. Score 0 otherwise.
3	Interest paid	You loaned X amount to a friend one night and he returned X amount the next day. Did your friend pay interest for this loan?	Spontaneous response <b>He didn't pay interest</b>	Score 1 for correct answer. Score 0 otherwise.
4	Simple interest calculation	Suppose you put \$100 in a savings account with an interest rate of 2% per year. You do not make any other payments to this account and do not withdraw money. How much would be in the account at the end of the first year, once interest has been paid?	Open-ended response <b>\$102</b>	Score 1 for correct answer. Score 0 otherwise.
5	Compound interest calculation	And with the same interest rate of 2%, how much would the account contain after five years? It would be...	a. <b>More than \$110</b> b. Exactly \$110 c. Less than \$110 d. It is impossible to say with the information provided	Score 1 for correct answer. Score 0 otherwise.
6	Risk and investment	When you invest a lot of money, there is also the possibility of losing a lot of money.	False <b>True</b>	Score 1 for correct answer. Score 0 otherwise.

Note: The correct answers are highlighted.

Source: Produced by the author based on Mejia, Pallot, & Egúsqiza (2015).

**Table A 6.2** Financial Development Index: variables and weights

	A) Financial Institutions	B) Financial Markets
Depth	1) Credit to the private sector (% of GDP). Weight: 0.28 2) Pension fund assets (% of GDP). Weight: 0.22 3) Mutual fund assets (% of GDP). Weight: 0.25 4) Life and other insurance premiums (% of GDP). Weight: 0.25	1) Stock market Capitalization (% of GDP). Weight: 0.50 2) Stocks traded (% of GDP). Weight: 0.50
Access	1) Commercial bank branches per 100,000 adults. Weight: 0.50 2) ATM machines per 100,000 adults. Weight: 0.50	1) Percent of market capitalization outside of top 10 largest companies. Weight: 0.50 2) Total number of issuers of debt (domestic and external, nonfinancial, and financial corporations). Weight: 0.50
Efficiency	1) Lending-deposits spread. Weight: 0.86 2) Non-interest income to total income. Weight: 0.06 3) Overhead costs to total assets. Weight: 0.08	1) Stock market turnover ratio (stocks traded to capitalization). Weight: 1

Source: Produced by the author based on Sahay, Cihák, N'diaye, & Barajas (2015).

## Composition of the Financial Development Index

The Financial Development Index is constructed based on the methodology of Sahay et al. (2015). As can be seen in Table A 6.2, it is made up of 14 variables classified into two categories: A) Financial Institutions and B) Financial Markets. The 14 variables are classified as variables that measure Depth, Access or Efficiency. The classification of each variable is presented below:

Each of the 14 variables is ordered according to percentiles and values not in the range of 5th to 95th percentiles are excluded. Subsequently, each indicator is normalized between 0 and 1, using the following procedure:

$$I_x = \frac{x - x_{min}}{x_{max} - x_{min}}$$

Where  $I_x$  is the normalized variable,  $x$  is the value of the variable and  $x_{max}$  and  $x_{min}$  are the maximum and minimum values observed for each variable. Subsequently, indexes are constructed as weighted averages of each  $I_x$ . These are presented below.

The two aggregate indexes are constructed from this weighting: A) Financial institutions and B) Financial markets. The Financial institutions index includes banks, insurance firms, pension funds and mutual funds. The index is a weighted average of the depth, access, and efficiency indexes, with weights of 0.39, 0.28, and 0.33, respectively. The Financial markets index, which includes mainly the stock and bond markets, is a weighted average of similar indicators with weights of 0.35, 0.33, and 0.32, respectively. Finally, the Financial Development Index is a simple average of the Financial Institutions Index and the Financial Markets Index.

**Table A 6.3** Foreign banks as a percentage of total active banks

Selected countries	2000	2008	2013
Argentina	36.7	32.8	31.7
Bolivia	45.5	40.0	30.0
Brazil	34.1	37.5	40.0
Chile	45.5	45.2	41.4
Colombia	28.1	33.3	42.1
Ecuador	22.6	16.0	22.2
El Salvador	53.8	90.0	90.9
Honduras	22.7	52.9	52.9
Jamaica	33.3	75.0	75.0
Mexico	44.4	40.4	37.2
Panama	57.1	63.6	67.2
Paraguay	60.0	61.5	63.6
Uruguay	73.2	78.6	78.3

Continued >

Selected countries	2000	2008	2013
Venezuela	24.5	27.3	26.9
Germany	12.2	14.3	14.4
Canada	40.0	39.6	37.3
China	8.0	17.8	19.7
Italy	5.3	9.7	11.7
Spain	5.2	7.0	13.0
United States	18.5	27.5	31.0

Notes: Values are percentages.

Source: Produced by the author based on Claessens & Van Horen (2015).

**Table A 6.4** Strength of Insolvency Framework Index

Country	Strength of Insolvency Framework Index (0-16)	Commencement of proceedings index (0-3)	Management of debtor's assets index (0-6)	Reorganization proceedings index (0-3)	Creditor participation index (0-4)
Argentina	9.5	2.5	4.0	2.0	1.0
Bahamas	6.0	2.0	3.0	0.0	1.0
Belize	5.0	2.0	1.0	0.0	2.0
Bolivia	6.5	2.5	3.0	1.0	0.0
Brazil	13.0	2.5	5.5	2.0	3.0
Chile	12.0	2.5	4.5	2.0	3.0
Colombia	11.0	3.0	5.5	1.5	1.0
Costa Rica	6.0	3.0	2.0	0.0	1.0
Dominican Republic	10.5	2.5	5.5	0.5	2.0
Ecuador	5.0	2.0	2.0	0.0	1.0
El Salvador	9.0	2.0	4.0	0.0	3.0
Guatemala	4.0	2.0	0.0	0.0	2.0
Honduras	7.0	2.0	4.0	0.0	1.0
Jamaica	11.0	2.5	4.5	1.0	3.0
Mexico	11.5	2.5	5.5	1.5	2.0
Panama	8.0	2.5	3.0	0.5	2.0
Paraguay	9.5	2.5	4.0	1.0	2.0
Peru	9.5	2.5	3.5	0.5	3.0
Uruguay	9.5	2.5	6.0	1.0	0.0
Venezuela	5.0	2.0	2.0	0.0	1.0
United States	15.0	3.0	6.0	3.0	3.0

Note: The index shown in the first column is made up of four subindexes which are detailed in subsequent columns. The values used are from 0 (weak) to 16 (strong). The data refers to the year 2018.

Source: Produced by the author based on data from Doing Business (World Bank, 2017a).

**Table A 6.5** Country codes

<b>Code</b>	<b>Country</b>
ARG	Argentina
BOL	Bolivia
BRA	Brazil
CHL	Chile
COL	Colombia
CRI	Costa Rica
DOM	Dominican Republic
ECU	Ecuador
GTM	Guatemala
HND	Honduras
HTI	Haiti
JAM	Jamaica
MEX	Mexico
NIC	Nicaragua
PAN	Panama
PER	Peru
PRY	Paraguay
SLV	El Salvador
TTO	Trinidad and Tobago
URY	Uruguay
VEN	Venezuela

Note: Based on 3-character ISO codes.





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This book was printed  
in March 2019  
in Bogota, Colombia.  
This edition includes  
200 copies.



In 1960, average income in Latin America was 20% of that in the United States. Today, the situation remains practically unchanged. By contrast, other countries have shown significant progress in the same period: South Korea, for example, increased its relative income per capita from 7% to 67% in that period.

The source of this persistent lag in per capita income is the low aggregate productivity of economies in the region. In turn, the main reason for this low productivity is not that productive resources in Latin American countries are particularly concentrated in low productivity sectors, but that productivity is low across all activity sectors instead.

This evidence implies that the search for the fundamental causes of low productivity should focus on the institutions that shape the productive environment of firms, regardless of the sector in which they operate. The report focuses on four realms of firm interaction in that productive environment: competition, access to inputs and cooperation between firms, employment, and financing. In each case, it points to institutions that shape the policies and regulations that affect productivity through three distinct mechanisms: the process of firm entry and exit (selection), innovation, and the allocation of productive resources among firms.