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Productivity Growth in Latin America and the Caribbean: Exploring the Macro- Micro Linkages

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Abstract

This paper brings together the main findings and policy implications of two recent World Bank regional reports on economic growth in Latin America and the Caribbean: Araujo, Vostroknutova, Wacker and Clavijo, eds. (2016) and Araujo, Vostroknutova, Brueckner, Clavijo, and Wacker (2016). In doing so, the paper focuses on finding the right balance between micro- and macro-inference when thinking about growth in Latin America and the Caribbean. The paper documents the region's growth performance over the past decade, highlighting the roles played by the commodity boom, macroeconomic stabilization and structural reforms. It notes that, despite faster growth during the first decade of this century, the region failed to achieve sustained convergence towards higher income levels. The paper points out that the persistent income gap could be reduced through: (i) increasing focus on closing the efficiency gap – beyond mere factor accumulation; (ii) eliminating distortions that cause misallocation of resources will also improve the incentives to innovate; (iii) identifying the main country-specific constraints to growth instead of looking for universal recipes; (iv) containing macroeconomic volatility, thereby alleviating the negative impact of persistent poverty on growth; and (v) improving the composition of public spending.

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Productivity Growth in Latin America and the Caribbean: Exploring the Macro-Micro Linkages

Jorge Thompson Araujo, Ekaterina Vostroknutova, and Konstantin Wacker¹

I. INTRODUCTION

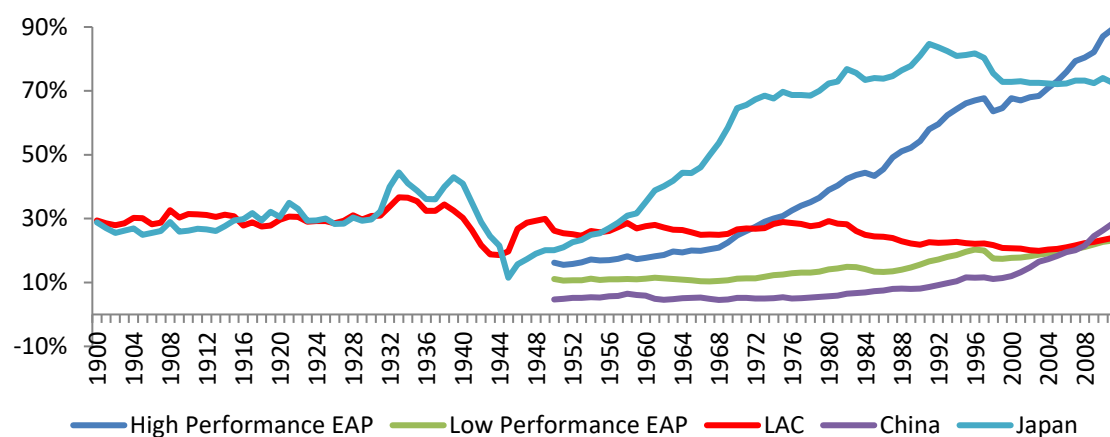
In the first decade of the 21st century, Latin America and the Caribbean enjoyed a remarkable flowering of economic growth. Per capita income and the ranks of the middle class rose. Unemployment and poverty fell. Inflation and wild swings in currency values were held in check. Broad reforms of key institutions, as well as improvement of education and basic services helped to drive the progress. An additional lift came from the world's burgeoning demand for commodities that the region produces, which pushed export income sharply up. Low interest rates, meanwhile, cut borrowing costs and spurred capital inflows.

Results varied country by country, but overall the 600 million people of a region long known for flatline growth and stalled hopes enjoyed a decade of welcome expansion. The growth was particularly pro-poor. People in the bottom 40 percent of the income distribution consistently gained in wealth faster than the region's average, advancing the World Bank's twin goals of shared prosperity and eradication of extreme poverty by 2030.

Half way through the century's second decade, the region faces a very different set of realities. The global commodity "super cycle" is winding down, crimping income from exports. Growth in the region has stalled, as has progress toward income equality: in 2012, for the first time in a decade, inequality did not fall compared to the previous year. The region finds itself unable to converge toward the higher income levels of the United States. Average per capita GDP has been stuck at about 30 percent of U.S. figures for more than a century, in stark contrast to the performance of Japan, the East Asia "Tigers," and, more recently, China (Figure 1).

¹ Araujo and Vostroknutova are respectively Economic Adviser and Lead Economist, World Bank; Wacker is an Assistant Professor at the University of Mainz. We would like to thank our co-authors Markus Brueckner and Mateo Clavijo, as well as all those that contributed to the two research projects: Araujo, Vostroknutova, Wacker and Clavijo, eds. (2016) and Araujo, Vostroknutova, Brueckner, Clavijo, and Wacker (2016) on which this paper is based. All errors and omissions are solely ours.

Figure 1. Latin America has been overtaken by East Asia and Pacific in income per capita convergence
(average GDP per capita relative to the United States)



Source: World Bank 2011.

This paper, drawing on recent World Bank research,² focuses on a key factor holding back Latin America and the Caribbean in the quest for higher income—low productivity. It highlights the macro-micro linkages in understanding the sources of productivity differentials. The studies underpinning this paper expand on macro-level analyses of total factor productivity (TFP) and convergence by presenting sectoral and micro-level evidence about the factors behind low productivity growth in LAC. In fact, restricting attention to purely macro-level factors is unsatisfactory, as macro-level information alone does not suffice to capture household and firm behavior (as well as the incentives and constraints that they are subject to) that may affect productivity growth. The paper looks in particular at shortcomings in the *efficiency* of how the region uses its stock of human and physical capital and proposes broad avenues for reform. Our research confirms the importance of microeconomic reforms for reducing the efficiency gap in Latin America and the Caribbean. But it also shows that governments can facilitate growth at the micro level by fostering a stable and predictable macroeconomic policy environment – since the macro and micro dimensions are inextricably linked.

The remainder of this paper is organized as follows: Section II reviews LAC’s experience during the commodity boom and the role played by structural reforms as well as macroeconomic stabilization during that period. Drawing on evidence at the macroeconomic, sectoral, and microeconomic levels, section III discusses why solid growth performance during the past decade did not suffice to lead to sustained income convergence for the region. Section IV discusses possible ways forward for the region and concludes.

² Araujo, Vostroknutova, Wacker and Clavijo, eds. (2016) and Araujo, Vostroknutova, Brueckner, Clavijo, and Wacker (2016).

II. BEYOND COMMODITIES

Recent growth in the LAC region is often attributed to favorable conditions in the world economy, notably the commodities boom. At the region's ports, carrier vessels bound for China and other fast-industrializing countries took on oil, ore, grain, and other basic fuels of growth, driving up export receipts which rose dramatically. In Venezuela, Guyana, and Chile, average GDP per capita rose by more than two percentage points per year during the boom period due to positive terms of trade.

But the region's remarkable growth performance cannot be reduced to the commodity boom. The broad structural reforms and macroeconomic stabilization policies that helped drive the recent growth surge were well underway even before the decade began. Hyperinflation and currency volatility had been tamed. Many countries pressed forward with other difficult reforms, streamlining key economic sectors and upgrading the quality and reach of schools and public services. The net effect was to create an environment more conducive to economic activity. The region's growth champion was Panama, which achieved average annual per capita expansion of 5 percent during the first decade of this century. Large economies such as Mexico and Brazil were rewarded with smaller but still substantial gains from their reforms. Though a few countries, such as Jamaica and Haiti, scene of the horrific earthquake of 2010, slipped backwards, they were very much the exception. For the most part, the countries of the Latin America and Caribbean community were getting their economies in order and reaping the benefits to "grow together."

To better understand the region's growth performance over the past few decades, we investigated growth drivers in various countries in the region using panel regressions. Following rich literature on the subject, these catalysts can be grouped into four broader categories (also shown in Figure 2):³

1. **External development**, which includes commodity prices and terms of trade development.
2. **Structural policies**, which capture progress in deep domestic growth factors such as education, infrastructure, and financial development.
3. **Stabilization policies**, a proxy for macroeconomic short-run management (such as inflation).
4. **Pre-existing conditions, or persistence**, which echoes effects from earlier periods, including past reforms.

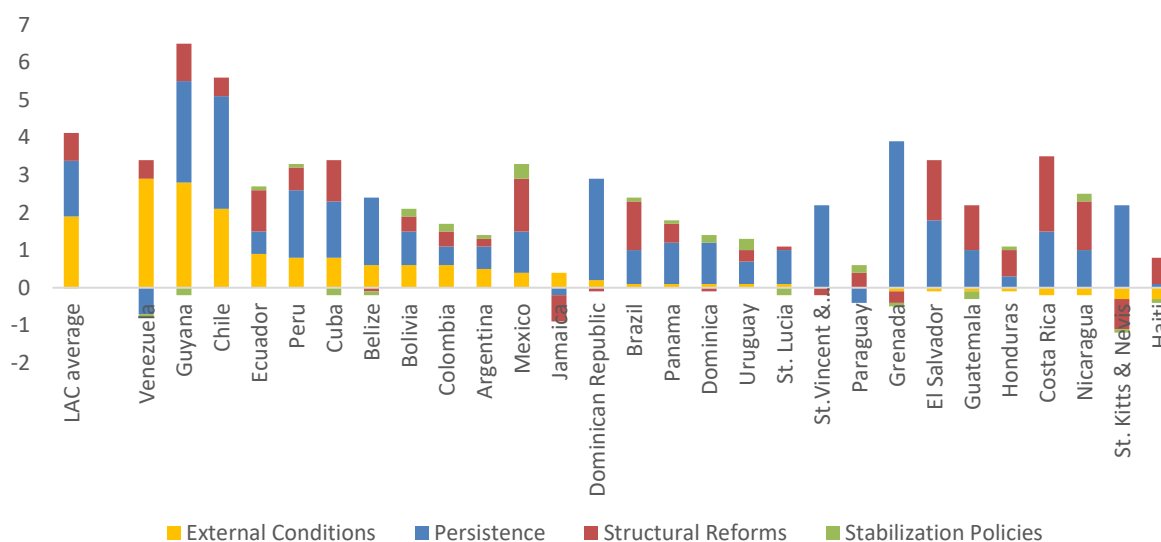
For the regional average, Figure 2 shows that the contribution to growth by external factors between 2000 and 2010 was equal to that of structural policies (0.5 percentage points per year). By subtracting the portions of the bars representing external conditions, we can assess what growth in Latin America would have looked like had commodity prices remained at their low level of the

³The approach of Loayza et al. (2005) is followed, with some modifications in the variables and methods, see Araujo et al. (2016a) for a more in-depth explanation of the methods.

late-1990s. On average, the slowdown in growth for the region would have been relatively small. Figure 2 further shows that stabilization policies had no impact on average.

This suggests a shift in growth drivers compared to the 1990s, which emphasized progress in stabilization-related variables, such as inflation, real-exchange rate appreciation and the incidence of banking crises. It may also reflect the efforts of most Latin American countries to bring their macroeconomic houses in order during the 1990s. In turn, this enabled benefits to be reaped from other, more recent, sources of growth meaning that stabilization policies alone no longer constituted a means of additional growth.

**Figure 2: Predicted growth effect arising from internal and external conditions
2006-2010 vs 1996-2000**
(per annum changes, countries ordered by the contribution of external factors)



Source: Araujo et al. (2016a).

But today the commodity boom is over, as prices and order volumes slip back toward historical levels. Oil's recent fall has been particularly sharp, hitting the region's energy exporters hard. Looking inward for future engines of growth is more important than ever.

III. WHAT WENT WRONG?

Even if macroeconomic stabilization and structural reforms played an important role in explaining the region's growth performance over the last decade, they were clearly insufficient to ensure

sustained convergence towards higher income levels. Why? The answer seems to lie on total factor productivity, or “efficiency”: how well a country harnesses the physical and human capital it has, through such processes as technology adoption, product innovation, the sharing of know-how between firms and sectors, and the mobility of workers.

Following the tradition initiated by Solow’s (1957) seminal paper, we can think of productivity—output per worker—as growing from three elements: human capital (the skills and health of workers), physical capital (the tools and facilities of production) and the efficiency in harnessing the two forms of capital. It follows that growth in output per worker can result from changes in the two forms or from changes in efficiency.

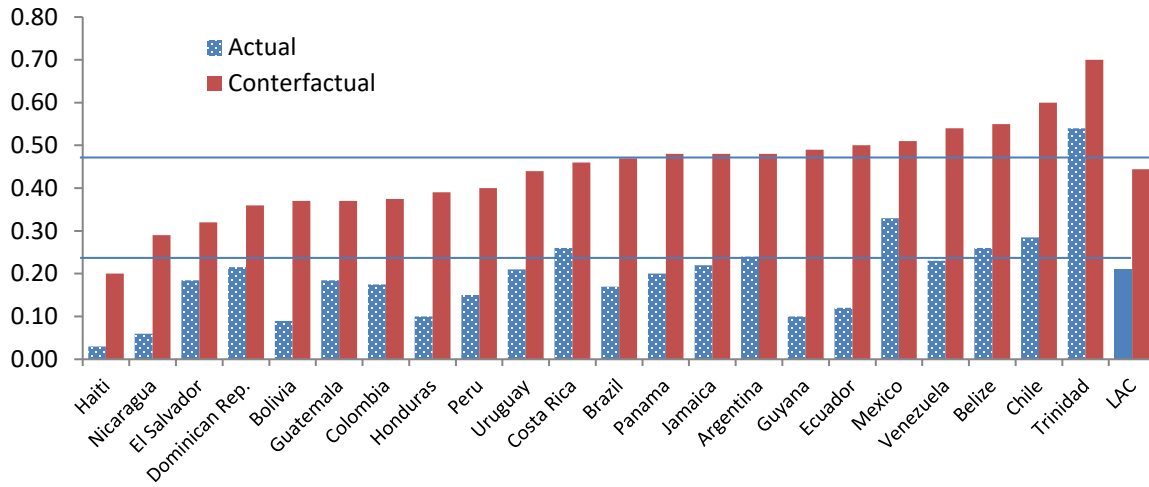
In recent decades, Latin America has made laudable progress in improving both forms of its capital but needs to keep to that upward trend. Mexico’s physical capital per worker, for instance, still stands at only about a quarter of the U.S. level, while its people on average have four fewer years of schooling.

But while work to expand capital continues, it would be beneficial to pay close attention to the region’s stubbornly low efficiency in using the capital it already has. Overall, the region’s countries have about *half* the U.S. level of efficiency in capital use. This helps explain why workers in the region on average only produce a fifth of what U.S. workers do.

More importantly, low efficiency tends to generate a vicious cycle: by lowering returns, it reduces incentives to invest in new equipment, infrastructure, and schooling. Lower returns in turn slow capital accumulation. In contrast, higher efficiency can raise productivity—and ultimately reduce the income gap with the United States—by improving returns on existing investments and motivating investors to put increased capital into new factors of production.

Looking at results in Caselli (2016), we find that if the average country in the region closed its efficiency gap relative to the United States, income per worker could *double* from its current level—without any additional accumulation of capital (Figure 3). Improving efficiency, thus, is in many ways the low-cost route to better productivity.

Figure 3. Capital and efficiency gaps are large
(income per worker relative to the United States)



Source: Caselli (2016) in Araujo et al. (2016a).

Note: Values are income per worker in countries in the region relative to the United States. Actual = with current efficiency; counterfactual = with the same efficiency as in the United States. Baseline calibration for the broad sample is used. Horizontal lines show sample means.

The questions, taken up in the two studies are: (i) what are the causes of low efficiency in the region, and (ii) what can be done to correct them? To begin with the causes, they look into two major groups of barriers:⁴

1. Barriers to within-firm productivity growth, such as delayed adoption and poor diffusion of technology, and general lack of innovation; and
2. Poor allocation of resources between firms or sectors, hampering the expansion of more productive firms.⁵

Together, the factors inside and outside the firm impact on productivity growth of individual firms, and through that on overall productivity growth. The speed of technology adoption affects productivity directly, and the ability of each firm to organize itself in the most efficient way thus affects overall productivity.⁶ Misallocation of the factors of production results from barriers that preclude equalization of marginal products of labor and capital across firms. There is a vast literature looking at specific policies or regulations that cause such misallocation. The unifying force behind misallocation is any policy that applies discretionary across types of firms. These can include regulatory barriers, market imperfections, and corruption with any form of state capture.

⁴ In thinking about persistent productivity gaps and their causes, this paper follows recent economic literature, which is reviewed in Jones (2015) or Caselli (2005), among others.

⁵ See Restuccia and Rogerson (2008, 2013) for a broad literature review on misallocation and productivity. They also note the “selection” (i.e. only firms that reach a certain productivity threshold survive) channel that affects the overall level of productivity, along the two mentioned here.

⁶ Note that organizational inefficiency within firms—which can be interpreted as a particular form of resource misallocation—is another barrier discussed in the literature, such as in Bloom et al. (2013), but is not considered in this paper.

This paper looks at an array of possible causes in the context of the Latin America and the Caribbean.⁷

Outdated technology and very little innovation

Latin America has made substantial progress in manufacturing over the past 30 years, developing a relatively diversified production base. Its prospects for further diversification into new and potentially higher technology products are greater than those in other regions such as in the Middle East and North Africa or Sub-Saharan Africa. However, it continues to lag compared to other regions, such as East Asia and Pacific or Europe and Central Asia. The region's average growth of manufacturing labor productivity has been a paltry 1.2 percent p.a., compared with the average 4.2 percent in 104 countries for which there are data.

Overall, the technologies found in the factories of Latin America are far less productive and closer to obsolescence than those in the United States. Innovation would be one way to catch up, but surveys find that firms in the region do very little innovation, gauged as the introduction of new or improved products.⁸ By that definition, only 22 percent of firms in the region innovate, compared with 62 percent of firms in the region of Europe and Central Asia. Even when they do innovate, Latin American firms do it cautiously, even timidly.

One of the region's shortcomings is its tendency to rely on “idiosyncratic” technologies—such as those used in mining and other resource-based operations—that have rigid, single-purpose use. Being locked into underperforming legacy equipment and processes limits capacity to bring in more flexible foreign technologies that can have multiple, spill-over uses—“knowledge applicability”—both within the immediate firm and the larger sector. Among countries in the region, Mexico and Costa Rica are exceptions to this pattern, as the knowledge applicability of their production structures has been rising since the 1990s and today is relatively high. Both countries are among the region's least specialized in primary and resource-based goods.

Quality of technology is part of the reason why Latin America has largely failed to develop integrated regional manufacturing clusters that can feed the evolving needs of both the local and global economies at competitive prices and quality. Mexico has made it part of the way to that goal—it has clusters in automobiles, car parts, and machinery. Still, it has lagged in comparison to other countries of similar income levels. In the study period, for example, Thailand managed to expand the number of electronics products in which it has a “Revealed Comparative Advantage” (RCA) while Mexico was losing RCAs in that sector. In general, the RCAs of Latin America have been concentrated in agricultural and natural resource-related products.

⁷ Looking at very specific issues leading to credit or labor market imperfections, such as was done in Bloom et al. (2013) on managerial quality, Banerjee and Duflo (2005) on credit, is suitable for country-specific studies. At regional level, and with data coverage imperfections, this paper takes a broad approach, and finds common traits across countries, paving the way for more detailed country-level studies.

⁸ Nguyen and Jaramillo (2016) in Araujo et al. (2016b).

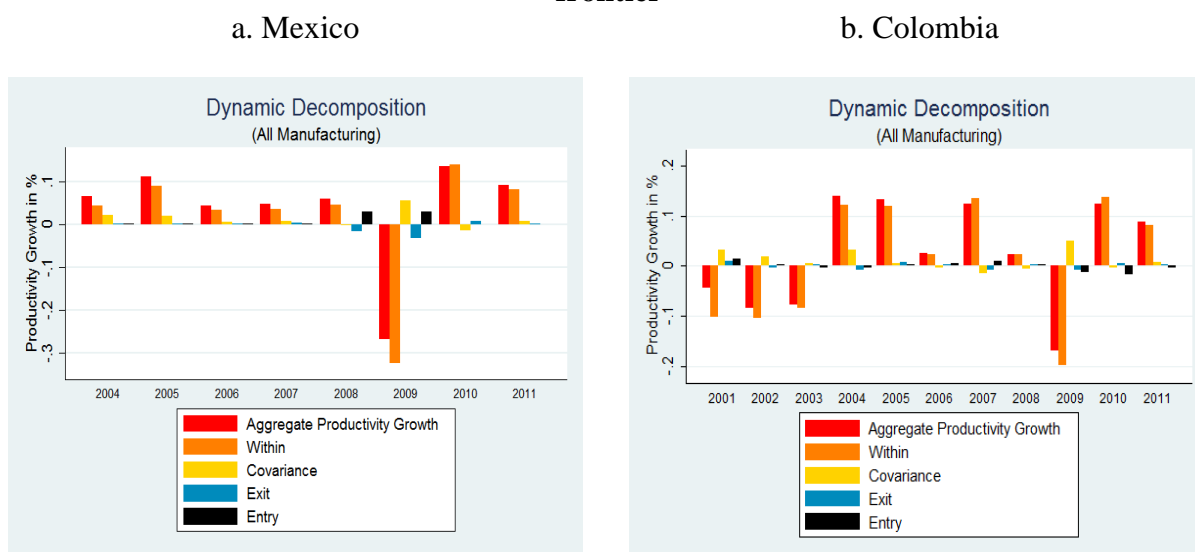
As a group, the region's countries have been out-performed by economies that from the start installed broadly applicable knowledge and technology and used it to rev up an export machine (as shown in Figure 1). The growth success stories of East Asia embody this strategy.

More innovation would spur within-firm productivity, the main driver of overall productivity growth

A country's overall productivity can rise because productivity rises inside existing firms (due to innovation, technology adoption, overall higher efficiency in using factors of production, the "within-firm" effect). In addition, the more productive firms in the country could acquire a growing share of the factors of production and expand their output, while less-productive firms decline in importance or go out of business altogether (the "between-firms" effect).

By comparing firm-level manufacturing data for Colombia, Mexico, and the United States, Brown et al. (2016) in Araujo et al. (2016b) looked at what propels manufacturing firms toward the productivity "frontier." The conclusion: In the two above-mentioned Latin American countries, the main driver of productivity after 2000 was growth *within*-firms and not transfer of factors or resources *between*-firms and sectors, to the most productive entities. Figure 4a-b bears that out: within-firm productivity gains of the two countries account for more than two thirds of total gains. In Mexico, on average, changes in allocation of resources between firms accounted for just a fifth of overall productivity growth, and made almost no contribution at all in Colombia. We can infer similar imbalances in other countries of the region. Peru, in particular, has shown serious issues of misallocation of labor to less productive firms (Figure 5).

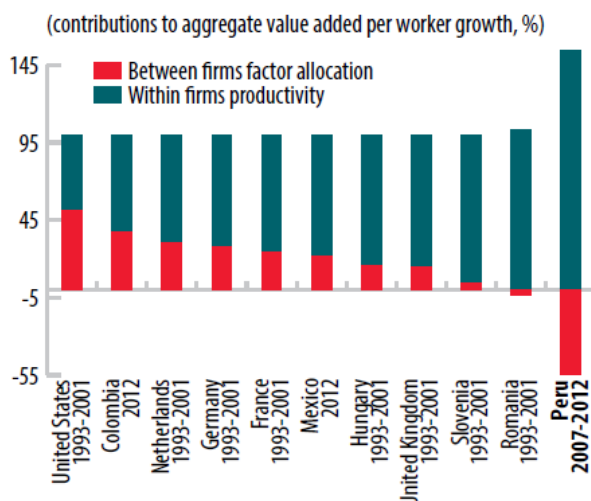
Figure 4. Within-firm productivity is the biggest driver of convergence to the domestic frontier



Source: Brown et al. (2016) in Araujo et al. (2016b).

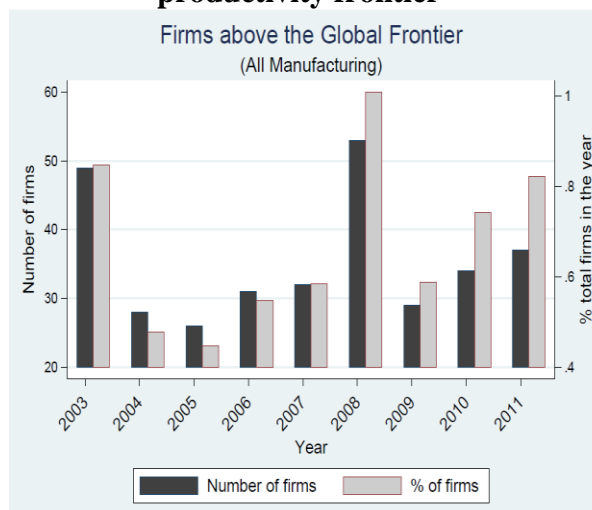
Note: “Dynamic decomposition” accounts for the different channels of productivity growth. The covariance component describes the joint distribution of firms’ productivity and market share, with a larger positive value indicating that more productive firms use higher industry input shares. Increases in the covariance term imply improvements in the allocation of productive inputs (workers) across firms within the industry. Reallocation caused by “churning”—the entry and exit of firms in a sector—may have a positive or negative impact on aggregate productivity growth, depending on the relative productivity of the firms involved.

Figure 5. Between-firm effect is strongly negative in Peru



Source: World Bank (2015), Brown et al. (2016), Bartelsman et al. (2009).

Figure 6. Only a tiny fraction of Mexican firms have caught up with the global productivity frontier



Source: Brown et al. (2016).

Looking at factors that drive up productivity within firms, we found that in these economies innovation of new products and technology is the most important determinant. This is true even among more capital-intensive firms, which generally enjoy higher productivity growth. Engagement in international trade does not seem to drive up productivity in companies of the two Latin American countries, though it does in the United States.

Overall then, in the 2000s Colombia and Mexico did better on innovation and technology adoption than on reducing the misallocation of resources. But despite the progress they were able to make, they were still left with an even larger gap with the international frontier of productivity, which are computed based on U.S. levels: That was because that frontier was advancing much faster than theirs. As Figure 6 shows, only a tiny fraction of manufacturing firms in the countries were productive at the global frontier level: fewer than 40 in Mexico—less than 1 percent of the national total—made that list in 2011.

Incentives to innovate are undermined by weak institutions

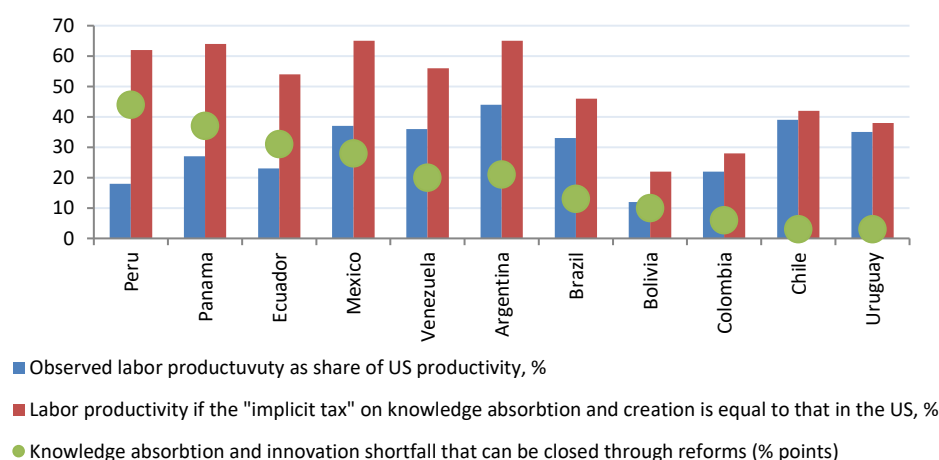
Why do firms rarely innovate and adopt new technology in Latin America? Many analysts have focused on front-end financial and knowledge barriers to obtaining new technology. But Nguyen and Jaramillo (2016) in Araujo et al. (2016b) look at the question from the other end of the manufacturing process—what do firms get in return if they do innovate?

They examined the experience of 1,879 different firms in Latin America and a second region, Europe and Central Asia. Pooling the numbers from the two regions reveals that innovation makes sales per worker rise by roughly 18 percent. But when we limited analysis to a set of Latin American countries—Brazil, Ecuador, Guatemala, Honduras, Nicaragua, and Venezuela—returns to innovation were found to be practically nil. That is, the difference in sales per worker between firms that do and do not innovate is barely measurable. Managers often seem to conclude that innovating is not worth it, and the firm—and ultimately the national economy as a whole—foregoes the potential productivity gains.

So, why would firms choose not to innovate, even if it brings an increase in productivity? It is often argued that monopolists (enterprises that have no competition) have no incentive to innovate because their product, whether good or bad, is the only one available and must be bought. For example, if poor flight service is the only option available for travelers on a monopolized air route, improved service will not bring many new passengers. Analysis by Nguyen and Jaramillo (2016) shows that the conventional wisdom is correct. After a monopolist innovates, its percentage increase in sales per worker is a full 90 percent lower than the increase for a non-monopolist.

They find that the generally low returns to innovating firms in Latin America stem largely from institutional factors such as weak property rights. If competitors are free to copy a new product, for instance, why should a company make the investment to design and produce it? Weak rule of law and heavy regulatory burden also play a part in suppressing innovation. Together, these factors amount to an implicit tax—and a large one—on innovation. The shortfall caused by these distortions seems to be particularly strong in Peru, Panama, Ecuador, Mexico, and Venezuela, as Figure 6 shows.

Figure 6. Barriers to knowledge absorption reduce productivity



Source: Araujo et al. (2016b) based on Maloney and Rodriguez-Clare (2007).

But this grim picture could change dramatically if countries were to strengthen these institutions so that innovators could rely on fair play from courts and regulators. Modeling suggests that in Latin America, sales-per-worker returns to innovation rise by 7 percent in countries that have better property rights protection and by 11 percent in ones that have better rule of law. Findings like these suggest that policy needs to go beyond addressing obstacles to firms' initial ability to innovate.

Distortions leading to misallocation of factors explain most of the efficiency gap

Technology issues account for about 20 percent of the region's efficiency gap with the United States. This fact grows from not only the volume or quality of the technology but the *speed* of its adoption. The history of technology suggests an ever-accelerating pace of international adoption. While the passenger railroads invented in the first half of the 19th century took close to a hundred years to achieve general adoption in the world, present-day innovations such as personal computers and cellphones migrate across borders much faster. So do production technologies found on the factory floor.

Nonetheless, observations at the macro level suggest that technologies that come into use in the United States still take eight to ten years on average to be fully or nearly-fully adopted by firms in

Latin America. Assuming that the technology frontier in the United States grows about 1 percent per year, an eight-year lag translates into an 8 percentage point widening of the productivity gap. This still leaves 80 percent of the efficiency gap to be explained by distortions that misallocate factors of production. Other studies, using information gathered at the firm level, have put that adoption time lag at about 20 years. But Eden and Nguyen (2016) show that even at that longer delay, the great majority of the efficiency gap flows not from the wait for technology but to inefficiencies in allocating it once it arrives.

Distortions and factors outside the firm hamper productivity growth in manufacturing

Inefficient use of resource is not limited to allocation between sectors. It also undermines productivity *within* sectors. For example, when a sector improves overall productivity, the firms in that sector in that country share in that improvement, but often with great variation in gains among them. The pattern that Brown et al. (2016) identified is that the spillover effect of improved sector-wide productivity dissipates with the firm's distance from the frontier. The further away a firm is from the frontier, that is, the less productive it is to begin with, the less it benefits from sector-wide improvements. Concerning positive spillovers from the global frontier, which is even more distant, there is no evidence that it happens at all for these low-productivity enterprises.

High wage inequality—a big gap between the pay of low-skilled and high-skilled workers—also hinders productivity convergence. An employer who is contemplating the cost of a major technology upgrade may decide against it if the new equipment would require high-skilled workers commanding a sharp premium in wages. Colombia, for instance, has a large wage differential of this kind and it has held back productivity gains. The lesson is that income convergence is slowed in an environment of wage inequality, where high-skilled workers are scarce and very well paid compared to the more numerous low-skilled workers. Productivity, as well as social equality, is enhanced when the wages of skilled and unskilled workers in an economy are a reasonable distance apart.

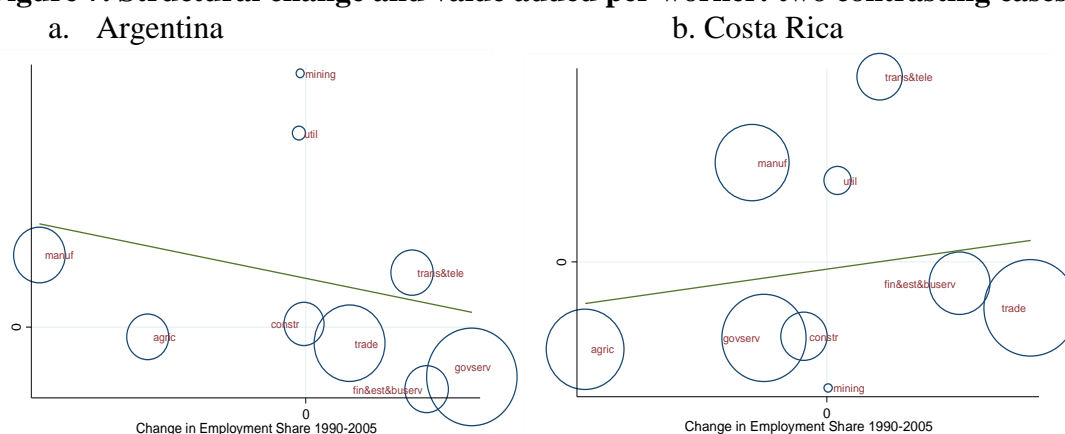
Low labor productivity in “insulated” sectors reduces overall value added per worker

Structural change in Latin America has served to erode productivity growth rates. As is natural for Latin America's level of development, millions of workers have moved from manufacturing and work in agriculture to jobs in service sectors such as retailing, wholesaling, construction, and government. But because of the services sectors' comparatively low productivity, in seven of a sample of nine countries in the region between 1990 and 2005, this shift resulted in lower overall value added per worker, dragging down the average productivity of the entire country (Schiffbauer et al [2016] in Araujo et al. [2016b]). In Argentina, for example, several large service sectors have swelled in recent years, notably government employment (Figure 7). These sectors do provide many jobs, but they are largely insulated from competition whether domestic or international, leaving little potential for market pressure to improve their productivity and value added. In a properly functioning economy, market forces would be steering workers toward higher-

productivity, higher-wage jobs. The fact that this has failed to happen in so many of the region's countries implies the presence of market distortions.

But the experience of Costa Rica shows that growth in services does not have to equate with lower productivity for an economy overall. In that country, service sectors to which workers moved, including business services, telecommunications, and retail, tended to be rising in productivity.⁹ Costa Rica's economy is more open than most in the region; in the retail trade, the presence of large foreign chain stores may have driven up formal employment, which is normally a prelude to higher productivity. Even though manufacturing's share of the total jobs pool shrank, the net effect of the labor structure shift in Costa Rica was an overall boost in value added per worker in the economy at large.

Figure 7. Structural change and value added per worker: two contrasting cases



Source: Schiffbauer, Sahnoun, and Araujo (2016) in Araujo et al. (2016b).

Note: The figures plot the sectoral value added per worker relative to the average across all sectors and the change in the employment share for nine sectors of the two economies between 1990 and 2005. The size of the circle reflects the employment share in 2005. On the vertical axis, sectors above zero are more productive compared with an average sector in the economy. On the horizontal axis, sectors to the right from zero have had increases in their employment shares.

High poverty rates help create pockets of inefficiency – and macroeconomic volatility exacerbates this

High levels of poverty have persisted in many Latin American countries, even as the majority of the population has forged ahead economically: given the aggregate income level, the poverty headcount rate is significantly higher than in other regions. This inequality is another drag on convergence toward U.S. levels of income per capita. Figure 8 shows the relationship: Lower poverty gaps are associated with faster convergence speed, while higher poverty gaps seem to slow that speed down. We estimate that Latin America would converge toward U.S. income levels 20-

⁹ See also Oulton (2016), who argues that increased outsourcing of tasks to service providers may increase aggregate TFP.

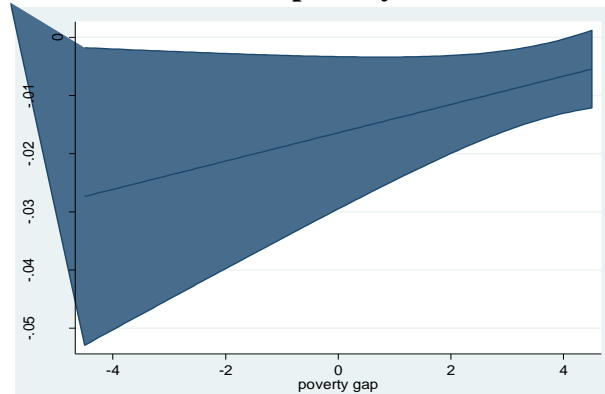
35 percent faster if its poverty gap were at a level appropriate for its income level (Wacker [2016] in Araujo et al. [2016b]).

Poverty reduces opportunities for low- and unskilled workers and favors the development of inefficient insulated sectors. Workers are unable to move into high-productivity jobs, because they lack skills, money for relocation to another part of the country, or even knowledge that those jobs exist. They see no choice but to stay put and get by on subsistence activities such as street vending, day labor, and other informal services. These jobs face no competition from foreign trade or from other sectors of the domestic economy. Trapped in these insulated “pockets of inefficiency,” with scant access to finance, people have little potential for innovation and improved productivity.

Poverty’s drag on growth for an economy at large increases further with macroeconomic volatility and uncertainty. The risk of an investment (e.g. in new skills or for job reallocation) being wiped out by macroeconomic volatility is too high. Households thus settle for a “safe strategy” of not investing. This is another source of allocation inefficiency, which further hobbles growth and poverty reduction. Figure 9 shows the impact of poverty on growth at different levels of macroeconomic volatility. The pattern is clear: poverty imposes greater constraints on growth as GDP volatility increases. For this reason, policies that address poverty not only benefit the people living in it but can strengthen the future of all the people in an economy. For instance, our results suggest that transfer programs such as Brazil’s *Bolsa Familia* and Mexico’s *PROGRESA* can affect growth and income in the long term.

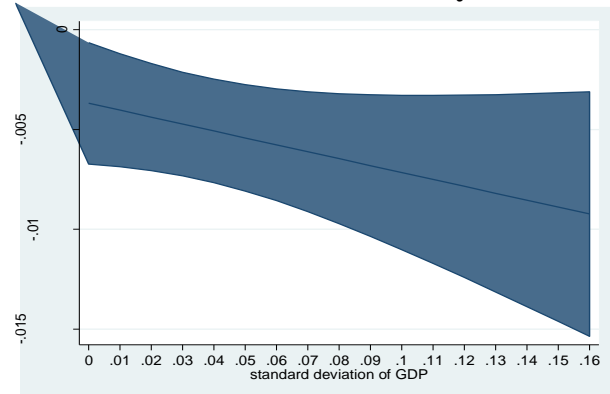
Still, it would be naive to think that the key to solving the problem is to close the monetary gap—say, by lifting every household to the US\$2 per day level. This approach would ignore poverty’s multidimensional nature. Countries in the region need also to address its non-monetary elements, such as poor citizens’ lack of access to quality education, housing, and sanitation. Moreover, the goal should not be short-term alleviation of poverty, such as the temporary surge in income and jobs that a commodity boom can bring, but longer-term structural solutions by which the socio-economic opportunities of the poor improve and they are able to move into higher-productivity occupations.

Figure 8. Convergence speed depends on the initial poverty level



Source: Wacker (2016) in Araujo et al. (2016b).

Figure 9. Poverty's impact on growth increases with volatility



Source: Wacker (2016) in Araujo et al. (2016b).

IV. WAYS FORWARD

Understanding the reasons behind the income gap in Latin America and the Caribbean is a necessary step toward designing appropriate growth strategies. Our analysis points to the following policy directions.

Focus on the efficiency gap

Closing the efficiency gap will bring significant gains in growth and welfare. If Latin America had somehow eliminated its efficiency gap relative to the United States, income per worker would be twice as high as its current level. What is more, this would have been accomplished without requiring a commensurate saving and investment effort to close the related capital gap. By raising returns, efficiency improvements would also have provided new incentives for investments, making investors more willing to commit their funds. Based on this collection of research, several of the following policy directions will help close the gap.

Rein in distortions that misallocate resources and weaken incentives to innovate

Misallocation of labor is a fundamental cause of the region's overall efficiency gap. Barriers blocking the flow of labor and capital to the most productive enterprises reduce aggregate productivity. In sectors where firms operate with markedly varying levels of efficiency, the benefits of knowledge spillovers decline. On the one hand, firms that are farther away from the frontier find innovation efforts too costly and ineffective and so cannot benefit from advances in technology. On the other hand, leading firms find themselves in a monopolistic environment with little incentives to innovate. The current situation in many Latin American economies is converse to a well-functioning policy and market environment, where capital and labor move away from

firms and sectors with low productivity toward firms and sectors with high productivity and where the latter grow and the former shrink (or exit the market altogether).

The countries of Latin America and the Caribbean need to identify and address country-specific distortions that impede these flows. These barriers reduce productivity by giving inordinate market share to less productive firms, while restricting the growth of the more productive ones. Some barriers that policy-makers may want to consider taking steps toward eliminating are:

- Limited competition in key industries such as transport, financial, telecommunications, logistics, communications, and distribution;
- Limited labor market flexibility, including skill mismatches and social barriers that block qualified workers from certain employment based on gender, age, or ethnic group;
- Informational frictions such as complex tax regimes and regulations;
- Credit rationing for would-be entrepreneurs.

Searching for an optimal economic structure for the region may well be futile. Rather than trying to protect the declining manufacturing sector and prevent it from shedding jobs, the goal should be to lift productivity in lagging sectors that are receiving labor, such as services, and upgrade human capital across the board. Newly unemployed workers should receive help in finding jobs in more productive sectors.

At the sector level, the following considerations emerge from our analysis:

- Higher-productivity services could help drive convergence. Given the relatively low levels of service exports in the region, a key policy goal would be to make the services sector more productive, so it provides adequate inputs into the production of goods, and tradables.
- Insulated economic activities—particularly in the service sector—are less productive but provide a large number of jobs. Enhancing product and labor-market competition can remove these sectors' protection and reduce resource misallocation.
- Natural resource wealth, if managed well, can generate economy-wide benefits. Chile makes this point: although its economy is missing an industrialized manufacturing core, its economic performance overall has been impressive.

Innovation is the main driver of firm-level convergence, but certain factors prevent firms from absorbing even technology that is readily available. Knowledge applicability is a key growth engine. Yet it takes about eight years for frontier technologies to find their way to Latin America and have an impact on efficiency. Moreover, macro-level factors, such as poor rule of law and

protection of property rights, have greater force in Latin America than elsewhere in reducing firms' incentives to innovate.

Countries in the region need to invest more in human capital because it will lower the price of skilled labor and thus allow more enterprises to take advantage of productivity-raising technology. The region's schools and universities have made major progress in recent years but the system still has significant shortcomings in such issues as coverage, skills mismatch, and inequality between the institutions that serve rich and poor.¹⁰

Manage macroeconomic volatility

The countries of Latin America have a bigger poverty gap than most countries at a similar income level. People trapped at the lowest reaches of the economic scale are unable to make investments in skills and relocation that could unleash their potential for higher productivity. Programs to attack poverty pockets and foster shared prosperity, therefore, are crucial to the future well-being of all income levels. Moreover, governments may do well to keep in mind the importance of controlling macroeconomic volatility, because it making the poor even more reluctant to invest their paltry assets, thus holding back growth and convergence. While several countries in the region has improved in containing macroeconomic volatility since 2000 (Vegh, 2015), there is still scope for refinement. For example, progressively designed automatic stabilizers may kill two birds with one stone: it would tame macroeconomic shocks and support the poor in investing to escape poverty.

Improve the composition of public spending

Our empirical findings also provide a glimpse into the potential role of governments in facilitating growth.¹¹ On the one hand, education attainment and infrastructure services – which are at least partly funded by public sectors – would have a positive impact on growth. As mentioned, well-designed social and stabilization policies will also support growth and potential output. On the other hand, government consumption has a negative impact on long-run growth to the extent that it may be associated with crowding-out of private investments (if it leads to higher interest rates through debt-financing of the public deficit), distortions (e.g., high taxes) or inefficiencies (e.g., a bloated public bureaucracy), without generating clear social returns. Therefore, *the composition of public spending matters for growth*: Its impact will only be positive if it helps support the accumulation of human capital (through education), the allocative efficiency of the economy, or physical capital (e.g. through infrastructure).^{12,13} More broadly, governments can also facilitate

¹⁰ Ferreyra et al. (2017).

¹¹ Given the high level of aggregation of the data used in the empirical analysis, this study does not provide much insight into the potential role of industrial or sector-specific policies.

¹² It is also conceivable that government spending on education may positively affect growth through total factor productivity, by means of human capital externalities.

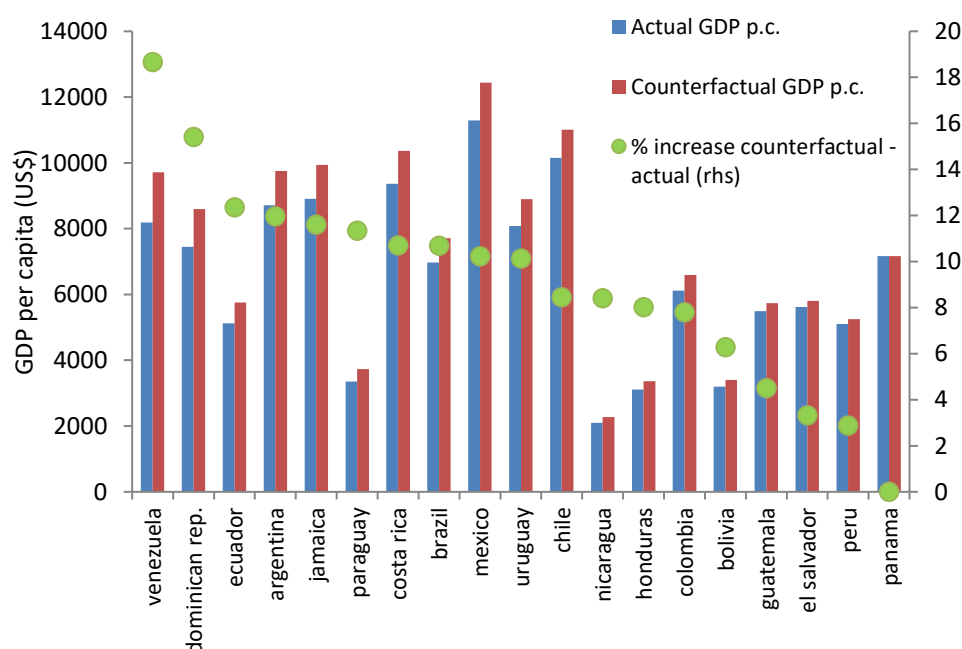
¹³ In the short term, increases in government consumption – as part of a fiscal stimulus package – can have an impact on output during a cyclical downturn (and especially so in the context of the zero-lower bound), depending on the size of the fiscal multiplier.

growth by maintaining a stable and predictable policy environment, both at macro and microeconomic levels.

No size fits all: econometric analysis can help sequence and prioritize interventions

The econometric analysis carried out in our studies can help each country select strategies that will give “the biggest bang for the buck” in its particular mix of economic and social factors. In doing so, it supports a pragmatic approach to sequencing and prioritization of reforms – as opposed to ready-made development recipes. To see how this could work, we conduct a benchmarking exercise that identifies the potential income effects when countries would close the gap to top-performers in terms of certain variables that are found to have an impact on growth and income. For Guatemala, for instance, raising average years of schooling holds particular promise. Getting its schooling figure to the level of Brazil, the region’s top performer in that indicator, would boost Guatemala’s per capita GDP by an additional 5 percent. Venezuela could gain 20 percent in GDP just through better financial development. Argentina, meanwhile, stands out as a country where inflation control would yield big benefits—a 12 percent higher GDP level if controls were on par with the region’s best (Figure 10).

Figure 10: Counterfactual GDP per capita of better performance in inflation

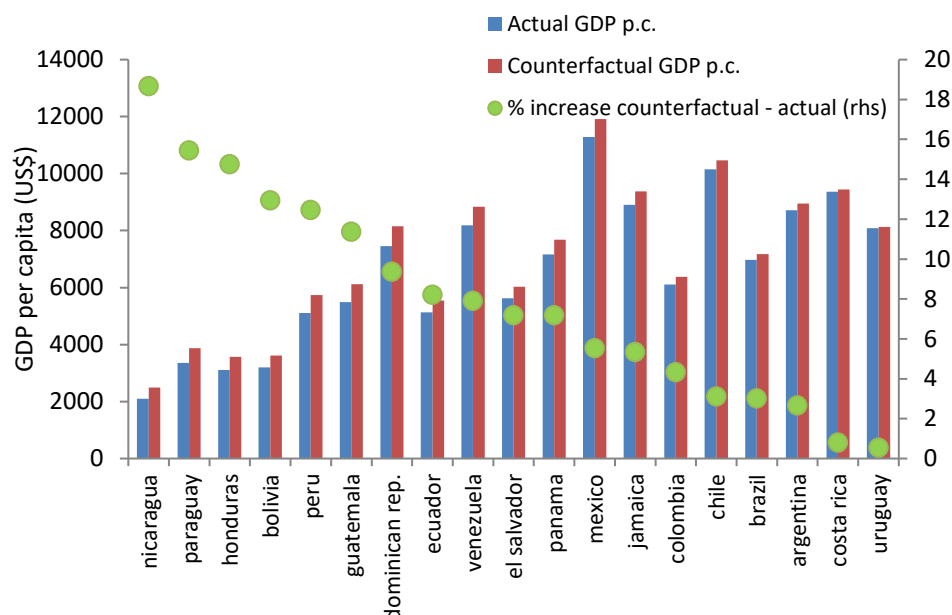


Source: Araujo et al (2016a).

In infrastructure, a clear pattern appears: countries that now have the lowest per capita income have the most to gain by improving their roads, ports and other networks. Nicaragua’s GDP, for

example, could rise by 19 percent if it could upgrade its infrastructure to the region's top levels. Mexico could gain more than 5 percent (Figure 11).

Figure 11. Counterfactual GDP per capita of better performance in infrastructure



Source: WBG staff calculations.

The findings of the research discussed in this paper highlight the need for a renewed effort on the structural reform front in LAC. Productivity is not a given, but rather an *outcome* of the functioning of an economy – both at the micro and macro levels. Therefore, a better understanding of the macro-micro linkages is crucial for the region's ability to accelerate economic growth on a sustained manner.

References

- Araujo, J.T., E. Vostroknutova, K. Wacker, M. Brueckner and M. Clavijo (2016a). Beyond Commodities: The Growth Challenge in Latin America and the Caribbean. Latin America Development Forum. The World Bank.
- Araujo, J.T., E. Vostroknutova, K. Wacker, and M. Clavijo (eds.) (2016b). Understanding the Income and Efficiency Gap in Latin America and the Caribbean. Directions in Development Series. The World Bank.
- Banerjee, A. V., E. Duflo (2005) “Growth Theory through the Lens of Development Economics.” In Handbook of Economic Growth, Vol. 1, Part A, edited by P. Aghion and S. N. Durlauf, 473–552. North Holland.
- Bartelsman, E., J. Haltiwanger, and S. Scarpetta. 2009. “Cross-Country Differences in Productivity: The Role of Allocation and Selection.” Working Paper 15490, National Bureau of Economic Research, Cambridge, MA.
- Bloom, N., B. Eifert, A. Mahajan, D. McKenzie, and J. Roberts. 2013. “Does Management Matter? Evidence from India.” Quarterly Journal of Economics 128(1): 1–51.
- Brown, J.D., G. A. Crespi, L. Iacovone and L. Marcolin (2016). “Productivity Convergence at Firm Level: New Evidence from Americas”. In Araujo et al. (eds.). Op. cit. 2016b.
- Caselli, Francesco. 2005. “Accounting for Cross-Country Income Differences.” Handbook of Economic Growth, Vol. 1, Part A, edited by Philippe Aghion and Steven N. Durlauf, 679–741. North Holland.
- Caselli, F. (2016). “The Latin American Efficiency Gap”. In Araujo et al. (eds.). Op. cit. 2016b.
- Ferreira, M. M., C. Avitabile, J.B. Álvarez, F. Haimovich Paz, and S. Urzúa. (2017). *At a Crossroads: Higher Education in Latin America*. World Bank, Washington, DC.
- Jones, C. I. (2015) The Facts of Economic Growth, NBER Working Paper 21142, NBER
- Loayza, N., P. Fajnzylber, and C. Calderón (2005) “Economic Growth in Latin America and the Caribbean: Stylized Facts, Explanations, and Forecasts”. Washington, DC: World Bank Group.
- Maloney, W. and A. Rodriguez-Clare (2007) “Innovation Shortfalls”, Review of Developing Economics 11(4): 665-684.
- Nguyen, H. and M. Eden (2016). “Reconciling Micro- and Macro-Based Estimates of Technology Adoption Lags in a Model of Endogenous Technology Adoption”. In Araujo et al. (eds.). Op. cit. 2016b.
- Nguyen, H. and P. Jaramillo (2016). “Institutions and Return to Firms’ Innovation with a focus in Latin America”. In Araujo et al. (eds.). Op. cit. 2016b.
- Oulton, Nicholas (2016): “The Mystery of TFP.” International Productivity Monitor 31: 68-87.

Restuccia, Diego, and Richard Rogerson (2008) “Policy Distortions and Aggregate Productivity with Heterogeneous Establishments.” *Review of Economic Dynamics* 11(4): 707–20.

Restuccia, Diego, and Richard Rogerson (2013) “Misallocation and Productivity: Editorial.” *Review of Economic Dynamics* 16(1): 1–10.

Schiffbauer, M., H. Sahnoun, and J.T. Araujo (2016). “Structural change in Latin America: Does the allocation of resources across sectors, products, and technologies explain the region’s slow productivity growth?” In Araujo et al. (eds.). *Op. cit.* 2016b.

Solow, R. (1957). “Technical Change and the Aggregate Production Function”. *Review of Economics and Statistics* 39 (August): 312-20.

Vegh, Carlos (2015): *Fiscal Policy in Emerging Markets: Procyclicality and Graduation*. NBER Reporter, No. 4.

Wacker, K. (2016). “Convergence, Poverty, and Macroeconomic Volatility: A Latin American Perspective”. In Araujo et al. (eds.). *Op. cit.* 2016b.

World Bank (2015) Peru. *Building on Success. Boosting Productivity for Faster growth*. World Bank, Washington DC, Report No. 99400-PE.