

Innovation and Productivity in Latin American and Caribbean Firms: Conclusions

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We began this book with two central questions: What is behind the weak performance in Latin America and the Caribbean (LAC)? Why have other regions been able to develop so much more rapidly than LAC? This book goes beyond traditional macroeconomic analyses, investigating the factors preventing faster productivity growth based on the study of firm dynamics in the region. One common argument is that productivity gains may be the result of the reallocation of resources from less productive sectors and firms to more productive ones due to competition and (Schumpeterian) processes of creation and destruction. However, another important source of productivity growth is related to firm improvements in terms of better organization and production methods, new products, learning, and capability development.

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This book provides original evidence on the determinants of firm productivity in LAC based on quantitative analysis, using data from the latest round of the World Bank Enterprise Surveys (WBES) and, in most chapters, other data sources.

In Chap. 1, we detected signals of strong heterogeneity in productivity performance among firms, even firms belonging to the same sector. Also, as suggested in much of the literature, the productivity gap between the most and the least productive firms is much wider in emerging than in advanced economies. Therefore, we argue for the need to seek out explanations that explicitly take into account this heterogeneity. Throughout the book, we show that differences in the business environment, more or less friendly to entrepreneurial activities, are important in setting the stage for business operations, though we only offer a partial explanation of enterprise behavior and ensuing performance. In order to obtain a more complete picture, we have focused on firm-level dynamics.

Innovation is one of the main focuses of this book, and we confirm the general result that it matters for firm productivity. On average, we have found that the labor productivity of innovative firms in Latin America is 50% higher than that of non-innovative firms (Chap. 2). We substantially validate this result by applying the same model in the Caribbean (Chap. 3), where the estimated elasticity is 63%. However, differences in the magnitude of effects in each region indicate that innovation dynamics are very sensitive to the innovation systems where they are located.

The mechanisms that lead to innovation, as well as its impact on performance, vary largely depending on firm capabilities. The same decision to invest in knowledge, as well as the relationship between R&D, innovation outputs, and productivity performance, are significantly correlated with firm characteristics and decisions. On the one hand, some factors, such as size, market diversification, and fixed investment, are important determinants of innovation outputs beyond their influence through R&D investment. On the other hand, we find human capital to be relevant to the intensity of investment in R&D but not to innovation performance, suggesting a complex relationship between human capital and innovation.

Among the various complementary assets that may influence the relationship between innovation investment, innovation results, and productivity dynamics, a key element is human capital, as well as efforts to create and strengthen it through on-the-job training. Results in Chap. 5 show that—regardless of size—the decision to train workers is determined by the firm's demand for skills, which in turn is associated with various measures of innovation and technological development, such as R&D expenditures, improved processes, ISO certificates, and new products.

Another factor that is certainly related to the complex link between innovation and productivity is access to and use of technology, in particular information and communication technologies (ICTs). This relationship is not as simple and linear as expected. In the modern economy, ICTs are often indicated as a key factor in enabling the development of new processes and new work practices. In Chap. 4, we have clearly shown that broadband is an important component of the innovation process, but also that access alone only offers a potential avenue to more innovation. Indeed, broadband needs to be used correctly for its full benefits to be derived. Firms can use it for very different purposes: purchasing, delivering services, or researching. First and foremost, internet use to perform research is positively and significantly related to innovation, not other kinds of internet use. Second, the broader the variety of activities for which broadband is used, the greater the impact on innovation, on top of the overall effects of internet use for research purposes. We also find that the combined use of broadband for various activities has an additional direct positive effect on labor productivity, reinforcing the conclusion that technology needs to be used adequately to exploit its full potential.

Along this line of interpretation, the evidence presented throughout this book suggests that firm performance is the result of processes of cumulative causation and multiple mutually reinforcing factors. Innovation clearly plays a positive and significant role in productivity, but so do other dimensions and complementary assets. Among these factors, it is worth mentioning firm age, access to credit markets, and openness to international relations through, for example, exports, foreign direct investments, and participation in global value chains (GVCs). Because of all of these dimensions, inter-firm differences in productivity and in other aspects of performance are continuing to increase.

The result is that multiple equilibria appear to emerge within the same sectors, and different factors play different roles in the different sets of firms. For example, in Chap. 2, we show that the impact of innovation on productivity is remarkably different across productivity quartiles, being much higher for more productive firms. In other words, innovation has much larger effects on the firms that are already more productive. At the upper end of the distribution (the top 10% in terms of productivity), the increase in productivity due to innovation is much larger than in the lower quartiles (an increase of no less than 65% versus 29 to 34% in the first three quartiles).

Interestingly, the difference in coefficients between the bottom and the top of the distribution is also observed with respect to human capital. In fact, while the premium for having a more educated workforce is 17% for firms at the bottom end of the distribution, it grows to almost 77%

for firms at the top. This result is consistent with the results in Chap. 5 on the relationship between on-the-job training and productivity in LAC. In fact, we find training to have a significant positive effect only for large manufacturing firms: a 1% increase in the proportion of trained employees would raise productivity by 0.7%, but only in firms with more than 100 employees. If we consider that larger firms tend to have a more skilled workforce and that skilled workers receive much more training than unskilled workers, diverging productivity trajectories are bound to emerge.

Our analysis of the dynamics of young firms in the region suggests that firm age may be an additional source of productivity differences (Chap. 6). Generally, young firms are considered a potential engine of economic innovation, rejuvenation, and renewal. However, though they tend to have dynamic growth performance, they appear to be less productive than more mature firms. Their productivity in 2009 was, on average, more than 20% lower than that of mature firms. Looking at the main factors associated with the productivity performance of young firms, it is noteworthy how the introduction of innovations and the adoption of diversification strategies do not seem to affect productivity significantly. Again, the returns on innovation do not seem to be the same for all firms.

Does it follow that in LAC generally “old is beautiful”? Being in the market for many years probably helps in many ways, such as doing more innovation and benefitting more from it, more intensively using new technologies, and having a better trained workforce. We have no information and could not control for competition in markets and market functioning, but we believe we can safely assume that in some markets in LAC, entry and exit do not occur smoothly, and substantial rents and monopolistic niches remain.

This hypothesis seems to be confirmed by our analysis of performance relative to access to finance in the region (Chap. 8). Demand for bank credit is more likely to come from older, larger, and more export-oriented firms, which are consequently less likely to be discouraged and financially constrained. But higher foreign bank penetration and competition are significantly correlated with a lower probability of borrowers being financially constrained. Also, better access to finance is clearly associated with higher productivity.

In an analysis specific to the Caribbean, Chap. 7 has shown that—among firms that report access to finance as the principal obstacle to their operations—only those that record very low or very high productivity underperform with respect to those that do not consider it their main problem. On the contrary, for firms in other parts of the productivity

distribution, there is no evidence of significant differences in performance between enterprises reporting and not reporting credit access as their main obstacle. These findings suggest a low-productivity–financing constraints trap, where low-productivity firms cannot find resources in the financial markets to invest in productivity enhancements. At the opposite end of the distribution, the result relative to the most productive firms can perhaps be related to difficulties finding financing for more sophisticated (and riskier) innovation-related activities essential to their performance.

Credit access is also affected by features of the banking sector, and bank penetration (i.e. the number of branches per capita) is significantly correlated with a lower probability that borrowers are financially constrained or discouraged from asking for financing. The limited distribution of banks in the territory prevents firms from exploiting the opportunity offered by physical proximity to credit markets to mitigate informational asymmetries between lenders and borrowers. When the degree of competition is controlled for, a larger number of branches per capita reduces the average distance between firms and banks, and this in turn reduces informational asymmetries and facilitates the screening and monitoring activities of the banks. Interestingly, the openness to foreign banks can have both positive and negative effects on financing constraints depending on the level of development of the financial markets. Foreign bank penetration has a negative effect on access to credit in less developed and more concentrated markets, while it has a positive influence in more competitive and financially developed markets.

This characteristic of openness of an economy to foreign actors and markets—in this case to foreign banks—and its effect on firm productivity is a notable example of a more general phenomenon. Thus, another important determinant of differences in performance is the linkages that firms themselves have with international markets. This relationship is complex and multifold. The standard result that low-productivity firms stay in the domestic market while those with higher productivity compete successfully in international markets is confirmed by the results of several chapters in the book. However, while firms that are partly (or fully) foreign-owned tend to be more productive, they do not invest more in R&D, they do not use ICTs more intensively, and they are not more innovative. Multinational corporations do not carry out their R&D activities (or even their more knowledge-intensive activities) in LAC, and this poses urgent questions about the approach that countries should follow toward foreign investors.

Chapter 9 confirms the result of positive productivity premiums associated with the participation in trade and inward foreign direct investment, while controlling for firm heterogeneity by using dummies for country and sector. We test this hypothesis for a large sample of LAC countries, using firm-level data. Furthermore, in addition to confirming a well-established result in the literature, we add a new element to the analysis of firm participation in international markets that needs to be considered and better understood: the nature of firm integration in GVCs. Integration has at least two important dimensions: participation in GVCs as such, and position along the chain, whether more upstream (closer to primary resource processing and manufacturing) or downstream (closer to the market, in the assembly and commercial phases of the chain). Focusing on four big Latin American countries (Argentina, Brazil, Chile, and Mexico), Chap. 9 has shown that the actual level of involvement in GVCs matters for the productivity of firms in these countries. Moreover, the key role of the GVC position is highlighted, with a positive impact of upstreamness on firm performance. This means that firms operating in the industries exporting intermediates and primary goods used in other countries' exports tend to be, all else being equal, more productive than firms operating in industries whose value-added comes primarily from imported inputs. Being upstream in a GVC has a positive impact on firm productivity, and firms in resource production and processing in the Latin American countries considered appear to be more productive than those in downstream assembly.

So, what are the policy insights offered by the studies in this book? Although the book does not primarily address policy-related questions, the authors still offer useful considerations for policymaking. All chapters suggest that achieving efficiency improvements within firms often requires detailed microeconomic policies that address the factors hindering firm-level innovation, technology, management and organization improvements, and technical human capital development.

However, our evidence reveals that, in Latin America, few firms get access to public policy programs, even if—once access is granted—it appears to have a positive impact on innovation decisions, such as investing in R&D. Moreover, we find positive and significant spillover relationships between R&D performed by other firms in the same sector and country and the economic performance of a firm, and this further strengthens the justification for public policies to foster innovation.

The inter-firm heterogeneity in productivity performance that we have shown and analyzed in the book calls for specific policies for specific kinds

of firms. For example, the lower returns on innovation investment at the bottom of the productivity distribution presented in Chap. 2 suggest that the constraints on innovation for these firms are not primarily financial. These firms are innovating (i.e. they have the financial resources to innovate), but innovation does not have much impact on their productivity. This has to do with some firm characteristics, for instance the lack of complementary assets (e.g. capital, technical skills, and infrastructure) or the lack of an adequate system to protect and promote innovation (e.g. rules governing the appropriability of the results from innovation and intellectual property rights regimes). Therefore, public programs should be tailored to distinct firm needs. Detailed research and impact evaluations should provide more information on what kind of tools need to be employed in each case. However, the need for a *balanced* policy mix with different policies for different kinds of firms is clear from the notable heterogeneity that we document in this book. For the numerous low-productivity firms, information asymmetries and externalities would call for technology extension services, technical training, and easier access to common knowledge and technology. On the other hand, a variety of tools are available for the few higher productivity firms, such as facilitating and promoting university–industry collaborations, contract research with specialized technology centers, and advanced technical human capital formation—and the choice will depend on the context and on rigorous analyses.

Very few firms access public training programs, and many find their workers to be adequately trained. The policy implication is that it does not make much sense to subsidize on-the-job training in the absence of demand, when demand is limited by the absence of innovative skill-intensive technologies. Thus, rather than directly subsidizing on-the-job training, public policy should promote increased innovativeness, which would raise demand for skilled labor and training.

The evidence we find regarding young firms also suggests that generic and uniform strategies that assume a one-type-fits-all strategy should be avoided, since not all young firms are equipped to grow and increase their productivity. A broader strategic vision aimed at enlarging the competitive enterprise sector by segmenting the programs, setting objectives, and implementing instruments adjusted for each segment should be preferred. Moreover our research finds that workforce training and technical assistance are positively associated with productivity in young manufacturing firms. Mentoring programs and networking activities can help access to *know how* and *know who*, and to quality technical assistance

for management. Public resources are not used much, not even by small firms, thus currently they do not represent a factor in balancing the gap. Governments provide some training opportunities, but these are not used much.

However, the data on access to publicly supported programs do not assess the quality and design of these policies and programs. In other words, it is not clear whether these programs address the right problems, whether their design is coherent with a correct diagnosis of the factors hindering enterprise performance in LAC, or indeed, whether the quality of policy design is responsible for much of the success and failure of many policies in the region.

For many years, the priority given to macroeconomic reforms has shifted interest away from the microeconomic dimension in LAC, leading many governments to place microeconomic concerns further down the policy agenda. Therefore, while the consensus on the appropriate macroeconomic policies is widespread, the variety and the ongoing experimentation with many different microeconomic policies reveal that the issue is far from being settled. A better understanding of the factors that foster firm performance is increasingly important for policy design and implementation. This book offers new insights here.

The book also points to further research in several areas that could not be analyzed here. The list is long and far from being complete, but it would include more analyses focused on the services sector and on different subsectors (e.g. high- versus low-tech manufacturing), complementary research on the informal sector that is so relevant in Latin America, deeper analyses of GVCs and the constraints on their integration, and the role of complementarities in factors affecting performance (e.g. human capital, organizational innovations, and ICT adoption). New methods could be used to address the issue of dispersion and heterogeneity in productivity (e.g. quantile regressions), as well as panel data to add a time dimension to these analyses.



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