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Development through
the Private Sector Series
February 2020

TN
No. 20

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Authors:
Lucas Figal Garone
Paula A. López Villalba
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Cover page design: Jimena Vazquez

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Lucas Figal Garone[*] Paula A. López Villalba[†]

Alessandro Maffioli[‡] Christian A. Ruzzier[§]

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Abstract

While the accumulation of factors of production, both physical and human capital, has helped Latin America and the Caribbean (LAC) to narrow the income gap with developed economies, aggregate productivity is still relatively low. Although there are numerous determinants of aggregate productivity, it is largely based on the underlying productivity of all firms in the economy. Using firm-level data from several waves of the World Bank Enterprise Survey and Chile's National Manufacturing Survey, we explore the *'what'* question on productivity dispersion in LAC. We document three stylized facts: (i) there are significant differences in firm productivity within industries – the firm at the 90th percentile of the productivity distribution produces almost seven times as much output (using the same measured inputs) as the 10th percentile firm; (ii) productivity differences persist over time – regressing a firm's current productivity on its one-year lagged productivity yields an autoregressive coefficient of around 0.9; and (iii) most of the growth in aggregate productivity comes from improvements in the productivity of existing firms. Next, we discuss the factors that explain these persistent productivity differences – the *'why'* question. We argue that the large productivity differences within industries can be traced back to differences in firm strategy and organization (internal factors), and in the environment in which firms operate (external factors). Finally, we identify knowledge gaps and opportunities for public, private and institutional investments.

JEL Codes: D24, L20, M20, O30, O47, O54
Keywords: Aggregate productivity, firm-level productivity, TFP, Latin America and the Caribbean

[*] Strategy and Development Effectiveness Department, IDB Invest, Buenos Aires, Argentina, and Department of Economics, Universidad de San Andrés, Buenos Aires, Argentina. E-mail: lfigal@iadb.org.
[†] Department of Economics, Universidad de San Andrés, Buenos Aires, Argentina. E-mail: plopez@udesa.edu.ar.
[‡] Strategy and Development Effectiveness Department, IDB Invest, Washington D.C., United States. E-mail: alessandrom@iadb.org.
[§] Department of Economics, Universidad de San Andrés, Buenos Aires, Argentina. E-mail: cruzzier@udesa.edu.ar.

1. Introduction

The field of economics heavily emphasizes productivity. Indeed, a great many books and papers on productivity begin by quoting Paul Krugman's well-known axiom: "Productivity isn't everything, but in the long run it is almost everything." This focus is largely because aggregate productivity is believed to explain cross-country differences in per capita income, economic growth, and, ultimately, standards of living. Nickell (1996: 725) goes so far as to proclaim that "productivity growth […] is the cause of the 'wealth of nations.'" As populations age and countries level out in terms of educational attainments and labor force participation, productivity is likely to be the main driver of future growth and prosperity (OECD, 2015).

There are numerous determinants of aggregate productivity, but the increasing availability of firm-level data is allowing researchers to focus more and more on firm-level productivity as a key driver of aggregate productivity. After all, aggregate productivity must be, to a large extent, the result of the underlying productivity of all firms in the economy.

A firm's productivity is positively correlated with its profits (Foster et al., 2008; Chandra et al., 2016), size and growth (Balk, 2001; Wagner, 2002; Koellinger, 2008; Harrison et al., 2013), and survival rate (Aw et al., 2001; Fariñas and Ruano, 2005; Syverson, 2011). More productive firms have also been found to have higher chances of entering export markets (Bernard et al., 2003; Melitz, 2003; Bernard and Jensen, 2004; Cassiman et al., 2010; Melitz and Redding, 2015) and receiving foreign direct investment (Kimura and Kiyota, 2006; Arnold and Hussinger, 2010; Borin and Mancini, 2016).

In line with this evidence, the literature on the relationship between firm-level productivity and aggregate productivity tends to find that within-firm resource reallocation produces between-firms resource reallocations, which in turn lead to changes in aggregate productivity (Foster et al., 2001; Hsieh and Klenow, 2009; Brandt et al., 2012; Petrin and Levinsohn, 2012). Bloom et al. (2010) and Restuccia and Rogerson (2017) further confirm this finding and point out that cross-country productivity differences can be explained in part by differences in within-firm resource *mis*allocation. Ultimately, increases in firm-level productivity have been related to improvements in countries' living standards, measured using GDP per capita (Acemoglu et al., 2006; Restuccia and Rogerson, 2008; Bartelsman et al., 2013), wages (Van Biesebroeck, 2011; Bartelsman et al., 2015; Konings and Vanormelingen, 2015), or employment (Hall et al., 2008; Harrison et al., 2014; Dachs and Peters, 2014).

Large and persistent differences in firm productivity within narrowly defined industries have been widely documented (see the surveys by Bartelsman and Doms, 2000; and Syverson, 2011). Gibbons and Henderson (2013) refer to these as persistent performance differences (PPDs) among seemingly similar enterprises (SSEs). The existence of such discrepancies implies there may be much to be done to positively affect aggregate productivity through firm-level productivity.

In this paper, we first document the existence of PPDs among SSEs in Latin America and the Caribbean (LAC) – the *'what'* question on productivity dispersion – using novel empirical evidence from firms in the region based on the World Bank Enterprise Survey (WBES).[5] We find significant performance differences within two-digit industries in the manufacturing sector: firms in the 90th percentile of the productivity distribution produce almost seven times as much output with the same measured inputs as firms in the 10th percentile. These productivity differences persist over time, although dispersion seems to have reduced over time: the average 90–10 total factor productivity (TFP) ratios are 8.09, 6.09 and 5.05 for 2006, 2009–10, and 2016–17. These figures are similar to those found in previous studies in developing countries – even though our results could be picking up intrinsic differences in the industries that make up the large two-digit aggregates – but much lower than corresponding figures for developed countries.

Using a narrower (four-digit) definition of industry and data from Chile, we find that productivity differences are somewhat smaller in Chilean manufacturing: the average 90–10 TFP ratio is almost four. The figures change little if we aggregate industries up to two digits, suggesting that aggregation might be explaining only a very small part of the productivity difference, which would reinforce our findings for the LAC region. Performance differences in Chile are also persistent: regressing a producer's current TFP on its one-year-lagged TFP yields an autoregressive coefficient of around 0.9 for every four-digit industry. Using a decomposition of aggregate productivity, we show that most of its growth comes from improvements in the productivity of existing firms, and some from the entry and exit of firms. Little of its growth appears to be due to reallocations of output between firms (i.e., more productive firms growing faster than less productive ones).

Next, we discuss the factors that might explain why these persistent productivity differences exist – the *'why'* question on productivity dispersion. We argue that the large firm-level differences in performance within industries documented in this paper can be traced back to differences in firm strategy and organization (internal factors), and in the environment in which

[5] The 'what-why' distinction is borrowed from Syverson (2011).

firms operate (external factors). We discuss some of these factors and describe the situation across LAC countries. Finally, we identify knowledge gaps and opportunities for public, private and institutional investments.[6]

The contribution of this paper to the existing literature is twofold. First, to the best of our knowledge, this is the first paper that examines productivity dispersion for the LAC region using firm-level data. Until now, most of the studies have focused on developed countries (e.g., Disney et al., 2003; Syverson, 2004; Ábrahám and White. 2006; Ito and Lechevalier, 2009). Second, the study contributes to the debate on how LAC countries can increase their aggregate productivity through improvements in firm-level productivity.

The rest of the paper is organized as follows. Section 2 measures performance differences at the firm level in LAC. Section 3 discusses some of the main internal and external factors explaining firm performance and reviews empirical evidence on their impact. Section 4 concludes.

2. Measuring persistent performance differences

2.1. Performance differences among seemingly similar enterprises in LAC

In this section we assess whether LAC firms within a given industry achieve different levels of productivity. We compute productivity distribution moments for two-digit SIC manufacturing industries using firm-level data from the WBES.

The WBES is a cross-sectional, firm-level survey of a representative sample of an economy's private sector. The questions cover a broad range of business environment topics including access to finance, corruption, infrastructure, crime, competition, and performance measures. In particular, the WBES contains information on value-added, employees, capital, and raw materials, which allows us to construct TFP measures. We use annual production data for 13,501 firms in 19 LAC countries from three waves of the WBES – 2006, 2009–2010, and 2016–2017 (see Annex A for the details).[7]

[6] See, e.g., the public policy emphasis on productivity in recent reports from the World Bank (Alam et al., 2008), the IDB (Pagés, 2010; Crespi, 2014), and the OECD (OECD, 2015).

[7] Data retrieved from http://www.enterprisesurveys.org/ in July 2018. We apply some filters to the dataset to guarantee the consistency of the data. We exclude firms with at least one of the following characteristics: (i) costs of labor or raw materials are higher than sales, (ii) labor productivity is three standard deviations above or below the mean of the firm's sector-country, or (iii) the firm has more than 5,000 employees. We also exclude firms in sectors with less than five observations (within each survey). Finally, we keep only surveys that initially contained more than 100 observations.

Given a factor-neutral production function:[8]

$$Y_{icjt} = A_{icjt} \times F\left(K_{icjt}, L_{icjt}, M_{icjt}\right) \qquad (1)$$

we can calculate TFP (A_{icjt}) as:

$$A_{icjt} = \frac{Y_{icjt}}{F(K_{icjt}, L_{icjt}, M_{icjt})} \qquad (2)$$

where $F(\cdot)$ is a specific technology linking inputs (capital K, labor L, and intermediate inputs M) to output Y, and A is an unobservable productivity term that differs between firms (indexed by i), countries (indexed by c), industries (indexed by j) and time periods (indexed by t). A_{icjt}, expressed as an output–input ratio in equation (2), captures variations in output that are not explained by shifts in the observable inputs combined through technology $F(\cdot)$.

To compute TFP we follow a parametric method under the following assumptions: (i) technology is Cobb-Douglas; (ii) factor prices equal marginal products; and (iii) there are constant returns to scale. Our main measure of productivity is computed as a residual from the estimation of the production function using the ordinary least squares (OLS) log-log regression model specified in equation (3). The elasticities are the factor shares measured at the country and 2-digit sector levels using the mean of plant-specific ratios of input costs over total costs.[9]

$$Y_{icjt} = \beta_1 s_{cj}^K K_{icjt} + \beta_2 s_{cj}^L L_{icjt} + \beta_3 s_{cj}^M M_{icjt} + \gamma X_{icjt} + \alpha_{c,j,z,e,l,t} + \varepsilon_{icjt} \qquad (3)$$

Our specification allows us to absorb multidimensional fixed effects from the interaction of a firm's country, sector, size, export and legal status, and year ($\alpha_{c,j,z,e,l,t}$), and to control for the firm's age and age squared (X_{icjt}). For the sake of brevity, we report here only TFP measures constructed using country-industry average input elasticities (s_{cj}). We also computed TFP measures using firm-specific input elasticities and industry average input elasticities, and the results are maintained.[10] This outcome is consistent with findings by Van Biesebroeck (2008), who compares the performance of common methods of estimating TFP – index numbers, non-parametric methods, and parametric methods – and concludes that "the choice of estimation

[8] The same results can be obtained from more general production functions. See Syverson (2011, p. 330).

[9] Data limitations preclude us from computing quantity-based TFP measures. We thus compute revenue-based TFP measures. This introduces complications because prices change over time, and because the price variability between firms can reflect quality or market power (rather than efficiency) differences. For a detailed discussion please refer to Van Biesebroeck (2008), Balk (2009), and Syverson (2011).

[10] These results are available from the authors upon request.

method for productivity is immaterial to the conclusions" (Van Biesebroeck, 2008: 326) – that is, more productive firms look more productive under any of the commonly used methods.

Table 2.1 shows our results. We find that within two-digit industries in the manufacturing sector in LAC, the average difference in logged TFP between an industry's 90th and 10th percentile firm is 1.905, which corresponds to a TFP ratio of $e^{1.905} = 6.72$.[11] This number implies that the firm at the 90th percentile of the productivity distribution creates almost seven times as much output with the same measured inputs as the 10th percentile firm.

Table 2.1. Within-industry productivity dispersion for manufacturing sector

Log TFP	Within-Industry Productivity Moment	Mean	Std. Dev.
Full Sample	Median	-0.034	0.009
	IQ range	0.929	0.067
	90–10 percentile range	1.905	0.103
	95–5 percentile range	2.616	0.183

The database also allows us to assess the evolution of productivity differences over time, by calculating TFP differences for three different time periods. The average difference in logged TFP between an industry's 90th and 10th percentile firm is 2.091 in 2006, 1.806 in 2009–2010, and 1.619 in 2016–2017. Those differences correspond to average 90–10 TFP ratios of 8.09, 6.09 and 5.05, respectively. Although the three ratios reflect large productivity differences between firms, dispersion seems to have reduced over time. The figures also suggest persistence in the performance differences, which we discuss in more detail in the following section.

How does the productivity dispersion in LAC compare with other countries or regions? Previous studies have found average differences in logged TFP between an industry's 90th and 10th percentile firms of 0.25 for Japan (Ito and Lechevalier, 2009), 0.651 for USA (Syverson, 2004), 0.906 for UK (Disney et al., 2003), 1.59 for China, and 1.60 for India (Hsieh and Klenow, 2009).[12] These differences would translate to 90–10 TFP ratios of 1.284 for Japan, 1.917 for USA, 2.474 for UK, 4.904 for China, and 4.953 for India.

[11] To obtain this general single value, we compute the difference in logged TFP between the 90th and 10th percentile firms for each industry and then calculate a simple average between those differences.
[12] These studies used more narrowly defined industries for their estimates (e.g., four-digit SIC).

These results suggest that the productivity dispersion in LAC is larger than in the USA and the UK and more similar to that of China and India. However, since the WBES database does not allow us to define industries as narrowly as in the aforementioned studies, our results could be picking up intrinsic differences in the industries that make up the large two-digit aggregates. Thus, comparisons should be done with caution.

The broad and representative coverage of the WBES and its use of standard instruments across countries provide an overview of the great differences in productivity of manufacturing firms in the LAC region. One limitation, however, is that it only contains two-digit industry data, which limits the comparability of our results with those of some other studies. In addition, although the WBES surveyed a small number of firms at different points in time, it is mainly a cross-sectional survey, which prevents us from calculating performance measures for the same firm over time to study persistence in performance differences.

2.2. Persistent performance differences and productivity dynamics: the case of Chile

To expand our analysis, we study performance differences in Chile, for which we have panel data and more narrowly defined industries. Although Chile is probably not the most representative LAC country in terms of productivity, its data availability allows us to reinforce the argument of persistent performance differences presented in the preceding section, and to characterize some productivity dynamics.

We analyze performance differences by computing productivity variation within 94 narrowly defined (four-digit SIC) manufacturing industries using firm-level data for Chile. The dataset is coming from the National Annual Manufacturing Survey for the period 1990–2006 and contains all manufacturing firms with 10 or more employees.

In line with the previous section, we compute TFP using a parametric method assuming a Cobb-Douglas production function. However, in this case, a major advantage of using a longitudinal firm-level dataset is that it allows us to estimate the production function using fixed effects at the firm level. We report the results obtained using average region-industry input elasticities.[13]

We find that within four-digit industries in the Chilean manufacturing sector, the average difference in logged TFP between an industry's 90th and 10th percentile plants is 1.31. This

[13] As with the WBES, we have also calculated TFP using firm-specific input elasticities and industry average input elasticities. The results (available upon request) remain similar.

number corresponds to an average 90–10 TFP ratio of 3.70. The results remain the same if we compute TFP ratios using two-digit industries. This suggests that aggregation might be explaining only a very small part of the productivity differences, which reinforces our findings for the LAC region.

The Chilean database also allows us to study persistence in performance differences. This is relevant to explore because it helps us determine whether firms learn by doing or if they are trapped in their way of doing business. Regressing a producer's current TFP on its one-year-lagged TFP yields an autoregressive coefficient of around 0.9. This coefficient is slightly higher than those found for US firms in previous studies (see Ábrahám and White, 2006; Foster et al., 2008) and is not driven by a particular industry: the estimated coefficients show a similar pattern in each four-digit industry. The figures indicate that within-industry productivity rankings are persistent over time.

Finally, we shed some light on productivity dynamics. As Bloom et al. (2013a) pointed out, few studies have investigated this issue in developing countries. There are two processes that could drive changes in productivity dispersion between two periods (Bahar, 2017). The first is reallocation – firms entering and/or exiting the market. The second process is within-firm productivity dynamics – firms at the top becoming more productive than those at the bottom. To characterize these processes, we decompose the time-series changes in aggregate (four-digit-level) productivity into a within component, a between component, and a component that reflects the impact of entering and exiting firms. As Syverson (2011) explains, the within component comes from individual firms becoming more efficient. The between component arises when more efficient firms grow faster than less efficient ones.

We consider the following index of industry-level productivity:

$$A_{jt} = \sum_{i \in I} s_{it} A_{it} \qquad (4)$$

where A_{jt} is the index of industry productivity, s_{it} is the output share of firm i in industry j, and A_{it} is the firm-level TFP.

The decomposition method we follow is from Griliches and Regev (1995):[14]

$$\Delta A_{jt} = \sum_{i \in C} \bar{s}_i \Delta A_{it} + \sum_{i \in C} (\overline{A_\iota} - \overline{A_J}) \Delta s_{it} + \sum_{i \in N} s_{it} (A_{it} - \overline{A_J}) - \sum_{i \in X} s_{it-1} (A_{it-1} - \overline{A_J}) \qquad (5)$$

[14] The contribution of various components is sensitive to the decomposition methodology and time period. For a detailed discussion, see Foster et al. (2001).

where C denotes continuing plants, N denotes entering plants, and X denotes exiting plants. A bar over a variable indicates its average over the base and end years, and Δ denotes changes during the interval between the base and end years. In this decomposition, the first term is the within component, measured as the weighted sum of productivity: the weights are equal to the average (over-time) shares. The second term is the between component, in which changes in the shares are weighed by the deviations of average firm-level productivity from the overall industry average. The third and fourth terms are the entry and exit components.

The Chilean manufacturing sector experienced an average TFP growth rate of 4.89% over the 1990–2006 period.[15] Our data allows us to decompose productivity growth for 79 sectors for the period 1990–2006. Table 2.2 presents the decomposition of industry-level multifactor productivity for the whole period. The results indicate that the within-firm component is large and accounts for almost 88% of the average industry productivity growth, the between-firm component is practically zero, and the net entry component accounts for 12% of the average industry change.

Table 2.2. Decomposition of multifactor productivity growth, 1990–2006

Measure	Weight	Overall Growth	Within Share	Between Share	Net Entry Share
Multifactor productivity	Gross output	4.890	87.6%	0.10%	12.3%

As Foster et al. (2001) explain, the differences in countries, time periods, frequency of measured changes, productivity concepts (i.e., multifactor vs. labor), and measurement methodologies make it difficult to compare the results from different studies. Nevertheless, one core aspect that is roughly comparable across studies is the relevance of within-plant contribution to aggregate productivity growth.

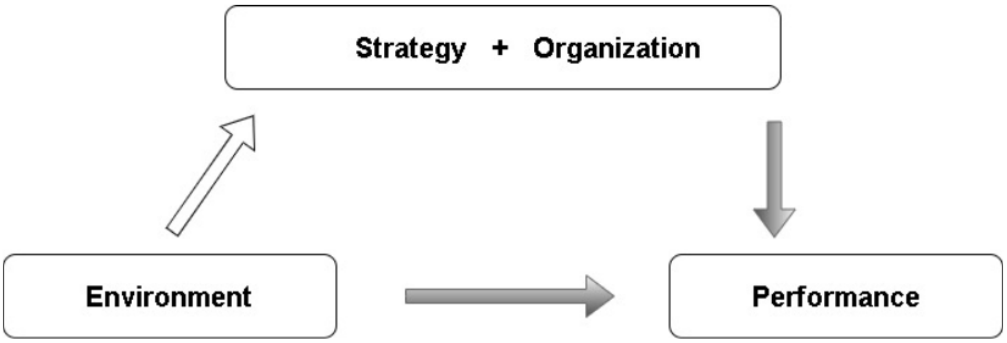
3. Explaining persistent performance differences

What explains the large differences in the performance of firms within industries documented in the previous section? Figure 3.1 illustrates the determinants of firm-level performance. A firm's performance (whether measured as productivity, our main focus in this paper, or based on closely related concepts like profits, survival rates, and employment) depends on its strategy

[15] We compute a single number by calculating the average between component, the average within component, and the average net entry component of the sample.

and a set of activities needed to realize it, organizational design (the means to carry out those activities), and the environment in which it operates – and, crucially, the fit over time among these three elements (Roberts, 2004). The environment may also affect performance either directly (black arrow) or indirectly through changes in the firm's strategy and organization (white arrow).

Figure 3.1. Determinants of firm performance



Source: adapted from Roberts (2004).

The previous section documented significant performance differences among individual firms in LAC countries. If performance can be explained through strategy, organization, and the environment, then it is only natural to assume that differences in performance must be explained by variation in those elements. For instance, Bloom and Van Reenen (2007) show that management practices are strongly associated with firm-level productivity, profitability, Tobin's Q, and survival rates in 732 medium-sized firms in the United States, France, Germany, and the United Kingdom. Consistent with the previous reasoning, management practices display significant cross- and within-country differences in their sample.

This section explores some of the main factors explaining performance at the firm level. It also documents some stylized facts on the individual factors and in LAC. Some of these individual factors are related to strategy and organization and emphasize features that are typically under the direct control of the firm's management – we refer to these as **internal** factors and discuss them in Section 3.1. **External** factors, by contrast, are mostly related to the environment in which the firm operates and are largely outside the firm's control (see Section 3.2). While this classification is somewhat arbitrary (for example, a firm could provide training to

its workers if they are inadequately educated, or a firm may not have access to credit because it has a bad governance structure and so banks are not willing to lend to it), it provides a useful way to organize ideas.[16]

3.1. Internal factors

This subsection discusses factors explaining firm performance that are related to its strategy and organization and that are typically under the direct control of the firm's management.[17]

3.1.1. Management and business practices

Business practices are common methods, rules, and processes used by companies involving activities such as marketing, buying, stock control, costing and recordkeeping, financial planning and human resources management (Borgenvall et al., 1999). These practices are mainly affected by the management practices, i.e. the working methods and innovations that managers use to improve a firm's effectiveness. Bloom et al. (2012) classify management practices along three operations-focused dimensions: (1) performance monitoring (information collection and analysis), (2) target setting (the use of stretching short- and long-run targets), and (3) incentives/people management (rewarding high-performing employees and retraining or moving underperformers).[18] As in Taylor (1911), the objective of this classification is to identify the *best practices* that will allow firms to be more productive, grow faster and survive longer.[19]

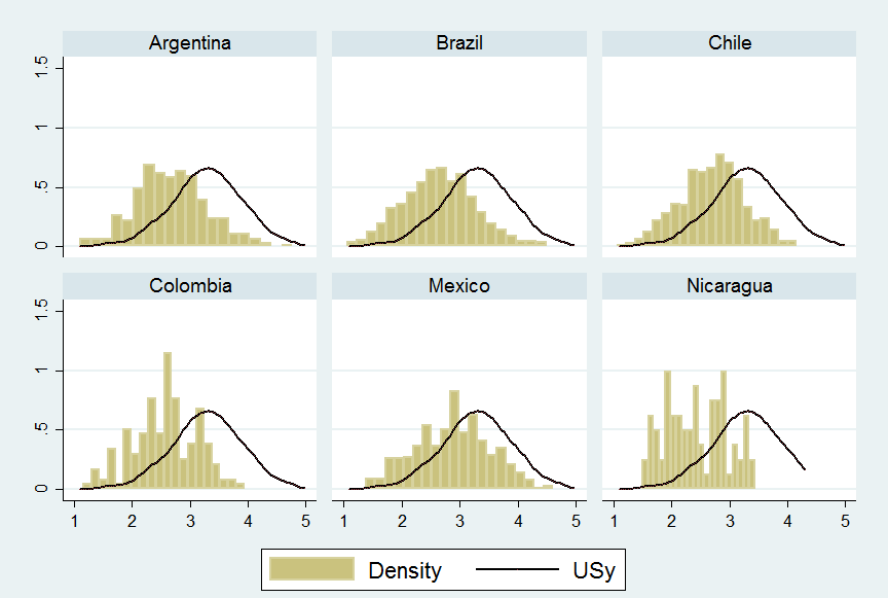
Empirical evidence on the management practices of firms operating in developed and developing countries is now available for different firm sizes and sectors due to the work of Bloom and Van Reenen (2007), Bloom et al. (2012),[20] Bloom et al. (2013b), and McKenzie and

[16] Syverson (2011) provides a similar categorization.
[17] See the working paper version (Figal Garone et al., 2020) for additional factors and further discussion.
[18] Bloom et al. (2012, p. 7) propose questions for each dimension: "First, monitoring: How well do organizations monitor what goes on inside the firm, and use this information for continuous improvement? Second, targets: Do organizations set the right targets, track the right outcomes, and take appropriate action if the two are inconsistent? Third, incentives: Are organizations promoting and rewarding employees based on performance, prioritizing hiring, and trying to keep their best employees?"
[19] As stated in Bloom et al. (2016) this leaves out many important aspects of management like mergers and acquisitions, innovation, pricing, investment, and leadership. The focus is on the operational and human resource side of the business because this is an area where there is stronger consensus over what constitutes a "best practice."
[20] The World Management Survey of Bloom and Van Reenen (2007) and Bloom et al. (2012) defines 18 key management practices and scores them from 1 (worst practice) to 5 (best practice). It was originally conducted for 700 medium-sized firms in the United States, France, Germany, and the United Kingdom, and now covers more than 10,000 organizations across 20 countries, some of them in the developing world.

Woodruff (2017).[21] The main findings from these different data sets are that management practices are strongly correlated with firm-level productivity, profitability, Tobin's Q, survival rates, and sales growth. Furthermore, although large firms are more likely to have higher management scores, the link between management practices with performance extended throughout the firm-size distribution.

Figure 3.2 shows the distribution of management scores for the six LAC countries that appear in the World Management Survey.[22] Management practices demonstrate significant cross-country and cross-industry dispersion. As a best-practice benchmark, the figure includes the corresponding distribution for US firms in the same survey data. Firms in LAC countries tend to have poorer-quality management than those in an advanced industrialized economy like the US: the US distribution is farther to the right in all six cases.

Figure 3.2. Productivity dispersion in selected LAC countries vs. the US

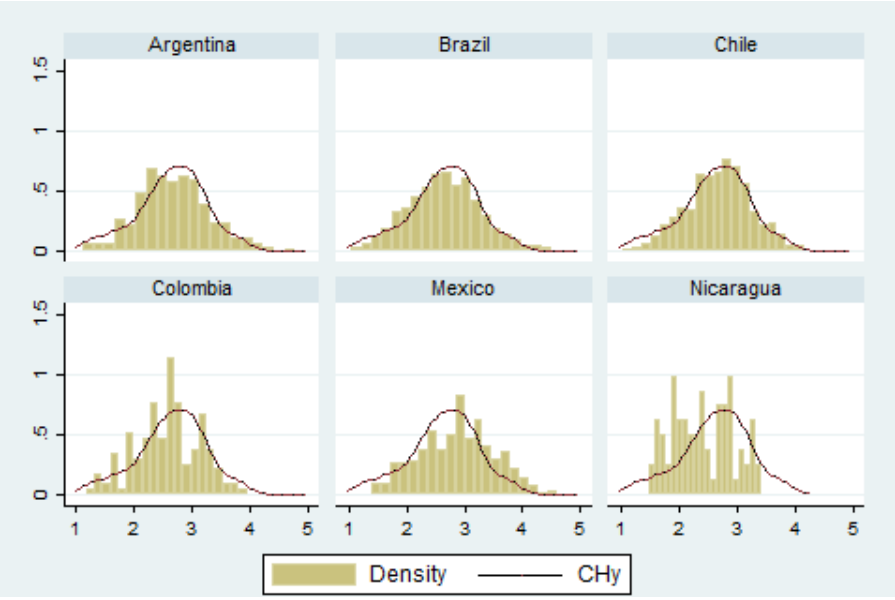


[21] The Management, Organizational Practices Survey (MOPS) used by Bloom et al. (2013b) was a closed ended survey conducted among 35,000 U.S. firms. Similarly, McKenzie and Woodruff (2017) studied a panel survey of microenterprises and small firms in Bangladesh, Chile, Ghana, Kenya, Mexico, Nigeria, and Sri Lanka.

[22] https://worldmanagementsurvey.org/survey-data/download-data/, retrieved on 10/23/2019.

Figure 3.3 performs the same exercise as Figure 3.2, but using China as a benchmark. No significant differences are as evident in this case. These stylized facts are consistent with a positive correlation between management practices and firm-level productivity if we recall from Section 2.1 how productivity dispersion in LAC compared with that in the US and China.

Figure 3.3. Productivity dispersion in selected LAC countries vs. China



McKenzie and Woodruff (2014) suggest several potential constraints or market failures that prevent firms from adopting the best management and business practices. The most accepted constraint is an information failure (Karlan and Valdivia 2011; Bloom et al. 2013a; Bloom et al. 2014), which may result from an inaccurate assessment of the firm's situation,[23] difficulties in understanding the effects of new practices, or even a lack of knowledge about how to implement better practices.[24] The evidence in Bloom et al. (2013a) suggests that informational barriers are the primary impediment to the adoption of best practices. Gibbons and Henderson (2013) and Bahar (2017) offer other explanations for this lack of diffusion.[25] Several recent

[23] Bloom et al. (2013a) find that self-evaluation on management practices is not correlated with TFP. Overperformers tend to underscore their management practices while underperformers do the opposite.
[24] Rivkin (2000) maintains that information failures affect managers' perceptions and motivations.
[25] Bahar (2017) shows that there is no full cross-firm productivity convergence, but rather divergence driven by fast growth of the firms at the frontier leaving the rest behind, generating a "middle productivity trap." Gibbons and Henderson (2013) emphasize that many competitively significant management

studies have concluded that low 'managerial capital' is an important barrier to productivity in firms in developing countries (Bloom and Van Reenen, 2010; Bruhn et al., 2010).

Information failures are related to, and may be exacerbated by, characteristics of the firm, the manager, and the market. Evidence from previous studies suggests that the most important factors affecting management practices are product market competition,[26] firm ownership,[27] and human capital[28] (Bloom et al., 2014). Credit constraints and the lack of developed insurance markets may also be preventing firms, especially small and medium-sized ones, from investing in training and innovating in new practices.[29] Finally, there are supply-side constraints: some sectors or countries lack adequate consulting and training services, making it impossible for firms to acquire such services to improve their practices.

3.1.2. Human capital: Employee selection, incentives, and training

An important element of organizational design relates to human resource management (HRM) – i.e., employee selection, incentives, retention, and training. Hiring new employees involves a costly search process under asymmetric information; firms implement different strategies, such as hiring risky workers (Lazear, 1998), evaluating workers' social networks (Bandiera et al., 2009), and offering salaries above/below the median (Delfgaauw and Dur, 2007). These strategies show large variation across firms, which affects their cost structure and the quality of newly hired workers (Lazear, 2000), and consequently affects firms' productivity (Ichniowski and Shaw, 2003; Oyer and Schaefer, 2011). Incentives include remuneration systems (e.g. individual vs. team incentives, fixed vs. contingent pay), which affect retention through a firm's system of appraisal, promotion, and career advancement (see Bloom and Van Reenen, 2010).

Ichniowski et al. (1997) investigated HRM effects on productivity and found that innovative employment practices (including incentive pay, teams, and training), induce substantially higher productivity levels. Bloom et al. (2013a) report the results of an experiment that involved introducing new management practices in Indian firms. In a follow-up study from 2017, they found that although they detected ongoing effects from the intervention, half of the management

practices rely on relational contracts that themselves are hard to build and change, leading to the slow diffusion of management practices.

[26] Bloom, Draca and Van Reenen (2016) use the growth of Chinese imports as a quasi-experiment for import competition and find that increased competition positively affected management practices.

[27] Family-owned firms were found to perform worse than multi-owned firms.

[28] Manager and non-manager human capital are both positively correlated with management practices.

[29] There is strong evidence that small businesses are credit (De Mel et al., 2009) and risk (Bianchi and Bobba, 2013) constrained. However, there is less evidence indicating that alleviating these constraints leads to more training and process innovation.

practices adopted in the original experiment had been dropped (Bloom et al., 2018). One of the main reasons given for the drop was managerial turnover, which highlights the importance of (key) employee selection and retention. Furthermore, various studies indicate the positive impact of training on employee productivity (see, e.g., Bartel, 1991; Acemoglu and Pischke, 1998; Deardeen et al, 2006; Konings and Vanormelingen, 2015). Increases in employee productivity directly translate into firms' productivity gains, but also indirectly through externalities of training on co-worker productivity (De Grip and Sauerman, 2012).

Several market features affect firms' human capital and HRM. In the labor market, the most relevant is the information asymmetry governing the principal–agent relationship between workers and employers. This fact, combined with firm-level heterogeneity, can lead to negative assortative matching between firms and workers, meaning that high-productivity firms poach low-ability workers, whereas low-productivity firms retain high-ability workers (see, for instance, Rosen, 1982; Sattinger, 1993; Hamilton et al,., 2003; Mendes et al., 2010). Furthermore, theoretical and empirical studies suggest that a compressed wage structure caused by imperfections in the labor market, such as monopsony, encourages firms to invest more in training (Acemoglu and Pischke, 1999; Konings and Vanormelingen, 2015). Firms operating in a competitive labor market do not have incentives to invest in general training because only workers will benefit from their productivity gains via increased salaries. However, with a compressed wage structure, training increases the marginal product of labor more than the wage, which creates incentives for the firm to invest in general training.

Over 53% of LAC firms report in the WBES to have provided formal training for their permanent, full-time employees in the last fiscal year, and roughly 45% of firms have provided formal training to their entire workforces.

Unions may also affect firms' freedom to introduce incentive schemes – and consequently their ability to hire and retain employees. However, empirical studies on the relationship between unions and incentives (Brown, 1990), and unions and productivity (DiNardo and Lee, 2004), have found that unions have little or no effect. The competition and riskiness of the product market in which firms operate are also important for human capital. There is evidence that increased product market competition has a positive effect on best-practice HRM (Cuñat and Guadalupe, 2005, 2009a, 2009b). With imperfect competition, firms can have differential efficiency and still survive in equilibrium. Hence, increases in competition will increase average productivity by reducing the number of less productive firms in an area. Finally, environmental risks affect optimal incentives and monitoring structures, suggesting that riskier markets will

promote decentralized schemes (Prendergast, 2002), but at the same time, they will be less appealing to risk-averse employees, even if they are high performers (Grund and Sliwka, 2010).

3.1.3. Innovation and technology adoption

Innovation is not just about inventing new methods, ideas, etc. (for instance, through research and development (R&D) activities); it also involves adopting processes and technologies used elsewhere.

There is wide consensus that innovation can drive productivity improvements. Hall (2011) surveys the recent empirical evidence on the relationship between innovation and productivity in firms and concludes that "there are substantial positive impacts of product innovation on revenue productivity," though "the impact of process innovation is more ambiguous." Not surprisingly, public initiatives designed to boost innovation activities have blossomed all over the world – although their effectiveness is open to debate (see the evidence surveyed in Crespi et al., 2019).

About 70% of firms in LAC claim to have innovated (in products or processes), and around 53% had introduced new or significantly improved processes in the three years before they were surveyed by the WBES. 40% of LAC firms were engaged in R&D when surveyed.

Profit-driven actors can underinvest in R&D and innovation from a social welfare perspective due to the presence of spillover effects associated with the 'public good' nature of knowledge (Steinmueller, 2010). If knowledge is in fact a non-rival and non-excludable good, then a firm's competitors may be able to free ride on its investments. These spillovers may create a gap between private and social returns, and a disincentive to privately invest in knowledge production. Other market failures, including asymmetric information and uncertainty, affect the financing of innovation activities. R&D and innovation projects are different from other investments in three main ways (Hall and Lerner, 2010): (i) the returns on these investments are more uncertain and take longer to materialize; (ii) innovators may be reluctant to disclose information about their projects due to the risk of spillovers; and (iii) such investments normally involve intangible assets that have very limited use as collateral. For these reasons, firms with limited resources may find it difficult to access financing for innovation projects, even when these have positive expected private rates of return. Thus, some potentially profitable projects will never be carried out.

3.2. External factors

This subsection discusses factors affecting firm performance that are mostly related to the environment in which the firm operates, and which are largely outside the firm's control.[30] Figure 3.1 emphasizes that external factors may affect performance directly or indirectly through changes in the internal factors reviewed above.

3.2.1. Access to credit

Firms need access to adequate financing options to finance fixed assets, working capital, trade, and innovation activities that can improve productivity and promote growth. Firms that lack access to adequate financing are more exposed to economic shocks, may be unable to purchase inventory or make timely payments to suppliers or employees, and may face limits in capital investments and technology adoption. Constraints on access to finance hamper firm entry and growth (Aghion et al., 2017; Fowowe, 2017), and credit market frictions reduce productivity, especially among micro, small and medium enterprises (MSMEs) (Besley et al., 2017), which are likely to find it harder to access credit to finance their investment opportunities. Besley et al. (2017) show that credit frictions can also have severe aggregate effects: the deterioration in country-level productivity in the UK after the 2008 financial crisis was driven almost entirely by tightening credit constraints for MSMEs.

Almost 75% of firms in LAC believe access to finance is an obstacle to their current operations, and 12% state it is the biggest obstacle. Consistent with this, 41% of firms do not have a line of credit or loan from a financial institution, and almost a third of them finance all of their working capital and investment from internal funds and retained earnings.

Banerjee and Duflo (2014) provide direct evidence that firms (at least in low-income countries) are credit constrained. The authors exploited variation in Indian firms' access to a targeted lending program to show that the additional credit was used not as a substitute for other forms of credit, but as a means to finance more production, which indicates that the firms were facing tight credit constraints. Programs designed to increase access to credit are usually targeted at MSMEs. Recently, McKenzie (2017) has shown that the positive effects of relaxing credit constraints can be long-lived: five years after being randomly assigned grants, would-be entrepreneurs in Nigeria were more likely to enter the market; they also experienced higher survival rates, and showed higher profits, sales, and employment.

[30] See the working paper version (Figal Garone et al., 2020) for additional factors and further discussion.

The most important market failure preventing MSMEs from accessing adequate financing is asymmetric information. Because firms asking for financing have better information about their own projects and repayment capacity than financial institutions (FIs), it can be difficult for FIs to determine which projects proposed by borrowers will be profitable. In addition, given that MSMEs tend to be riskier than larger firms, FIs offer them less credit than they would if more information were available. Informality among MSMEs exacerbates the asymmetric information problem.

Another issue in the financial market that affects MSMEs is the presence of economies of scale on the lender side. The proportional scrutiny and evaluation costs of a potential customer increase when the loan size is reduced. Similarly, MSMEs are proportionally more expensive to treat in the case of a default because the fixed costs associated with liquidation proceedings are not lower for smaller loans. Investors and lenders are therefore typically incentivized to focus on larger firms (Ibarraran et al., 2010).

Finally, externalities and the corresponding lack of appropriation also affect the provision of financing for MSMEs. This market failure, however, occurs in the non-financial market. In many situations, it is profitable for larger firms to offer financial and technical assistance to suppliers. However, because the benefits of such activities are not fully appropriable by them (since MSMEs might also supply their competitors), the provision of such services is lower than socially desirable.[31]

3.2.2. Product market competition

The market structure and the characteristics of the competitive environment constitute key environmental determinants of firm productivity. Increases in competitive pressure are thought to have been the driving force behind the enormous amount of corporate restructuring that has taken place in the US and Europe over the last four decades. More than half of all Fortune 500 firms have been involved in a takeover attempt or other type of corporate struggle, which has led them to restructure their operations, for example through downsizing, delayering, decentralization of decision making, or worker empowerment (Marin and Verdier, 2008).

Product market competition can affect productivity either directly or by inducing productivity-enhancing changes in organizational structures (Syverson, 2011). The empirical evidence reviewed in Holmes and Schmitz (2010) and Van Reenen (2011) strongly suggests that tougher

[31] Arraiz et al. (2013) show how a public program in Chile that helped anchor firms to provide services to their suppliers improved their performance of both suppliers and anchor firms.

competition indeed increases productivity, and that it does so mainly through improved management practices. Similarly, Bourlés et al. (2013) find evidence that anticompetitive upstream regulations (a proxy for competitive pressure) significantly reduce downstream TFP growth in OECD countries, especially for firms that are close to the productivity frontier.

Several studies have examined the relationship between competition and productivity. For instance, MacDonald (1994), Nickell (1996), Nickell et al. (1997) and Schmitz (2005) all find evidence of a positive relationship, while others have related organization and productivity (e.g., Maksimovic and Phillips, 2002; Schoar, 2002; Bloom and Van Reenen, 2007; Hortaçsu and Syverson, 2007), and competition and organization (Cuñat and Guadalupe, 2005; Guadalupe and Wulf, 2010; Bloom et al., 2015b; Gil and Ruzzier, 2018). Nickell et al. (2001), Bloom and Van Reenen (2007), and Bloom et al. (2012) demonstrate that poor management practices are more prevalent when product market competition is weak, and that increased competition induces management innovations and the reorganization of production.

3.2.3. Business climate and regulatory framework

An adverse business environment and a burdensome regulatory framework can affect firm performance. For example, strict product market regulations and high hiring and firing costs negatively affect productivity, and burdensome regulations on entrepreneurial activity can have a negative effect on firm entry. Eifert (2009) uses a five-year panel of data on regulations and procedures from the World Bank's Doing Business project to demonstrate the negative impact of regulatory barriers on aggregate investment rates and GDP growth. Burdensome regulatory environments may also affect productivity by impeding the adoption of information technologies, as Gust and Marquez (2004) have shown for a panel of 13 industrialized countries in the period 1992 to 1999. Accordingly, deregulation and regulatory reform should boost productivity growth.[32]

Institutional obstacles to doing business are perceived to be more acute in developing countries than in OECD countries (see Brunetti et al. 1997). This is consistent with firms' answers to the WBES questionnaire in LAC, which mention several elements of the business environment that suggest regulation is one of their biggest obstacles (see Table 4.1). More than 80% of firms in LAC report that senior management has spent time in dealing with government regulations, with almost 40% claiming that management spent more than 10% of its time attending these matters.

[32] Scarpetta et al. (2002), Nicoletti and Scarpetta (2003), and Crafts (2006) evaluate industry- and firm-level effects of such policies in OECD countries.

Regulation might negatively affect firm productivity in several ways, such as by reducing the incentives to invest and innovate, or increasing the barriers to entry (Crafts, 2006). Entry-limiting regulation may in turn hinder the adoption of existing technologies, by reducing competitive pressures, technology spillovers, or the entry of new high-tech firms (Nicoletti and Scarpetta 2003). Government officials might also exploit burdensome regulations to extract payments from firms (Eifert, 2009). Such corruption can impede firm growth, as shown by Fisman and Svensson (2007) for Uganda, and Cai et al. (2011) for China. Gaviria (2002) used a survey of private firms to assess the effects of corruption (bribes and illegal payments) on the economic prospects of firms in Latin America and found that corruption substantially reduced sales growth and firm competitiveness. Aterido et al. (2009) analyzed firm-level data on more than 56,000 firms in 85 developing countries and 5 high-income economies, and found that small firms paid more in bribes (as a percentage of sales) than large firms, whereas the latter spent significantly more time dealing with officials and red tape. However, Bloom et al. (2013a) found that larger firms are more likely than smaller firms to report that corruption is an obstacle to firm growth. More than 80% of LAC firms in the WBES report corruption to be an obstacle to their operations, with at least half of them claiming that corruption is a major or very severe obstacle.

Corruption may also induce firms to remain small and informal, thereby limiting their ability to grow and accumulate assets (Eifert, 2009). Regulations can also encourage firms to remain small to avoid regulators' scrutiny (Aterido et al., 2009). Consistent with this view, countries with more burdensome entry regulations have larger informal sectors (Djankov et al., 2002).

Informal firms account for up to 50% of economic activity in developing countries (La Porta and Shleifer, 2008). They also have very low productivity levels; are typically small, inefficient, run by poorly educated entrepreneurs, rarely formalized (even when subsidized to do so), and may operate for years or decades with little growth or improvement (La Porta and Shleifer, 2008). Informality is believed to have a deleterious effect on productivity, accounting for half of the productivity gap between developing and developed countries (Farrell, 2004).

Finding that formal firms are more productive than informal firms does not automatically imply that firms should be encouraged to formalize, however. Indeed, less productive firms may choose to remain informal (McKenzie and Sakho, 2010). The exclusion view (pioneered by De Soto, 1989) posits that informal firms *want* to become formal but are prevented from doing so by excessive entry regulation. Reducing the costs formalizing is a natural way to promote formality, and governments around the world have recently moved in that direction: since 2004, 75% of the countries included in the World Bank/IFC Doing Business survey have adopted at least one

reform making it easier to register a business (De Mel et al., 2013). But have such policies been successful?

Bruhn and McKenzie (2014) review the evidence on the effects of entry reforms and related policy actions on promoting firm formalization. Their main findings run counter to the exclusion view: all of the studies they reviewed find that a large reduction in the cost and time taken to register a firm leads to only a modest increase in the number of formal firms – i.e., most firms choose to remain informal. Providing informal firms with information about how to register and about the possible benefits of formalizing had no effect either.

The evidence more strongly supports a different view of informality: the exit view (Levy, 2008; Maloney, 2004), which states that firms rationally exit (or do not enter) the formal sector when the costs of being formal exceed the benefits (De Mel et al., 2013). According to this view, smaller and less productive firms rationally remain informal, and policy makers should not simply assume that formalization will benefit them (Bruhn and McKenzie, 2014). Indeed, the evidence recollected in Bruhn and McKenzie (2014) shows that informal firms that have been induced to become formal by subsidized costs generally experience little benefit from doing so.

4. Concluding Remarks

This paper provides novel empirical evidence of the existence of PPDs among SSEs in LAC firms. We find significant performance differences within industries in the manufacturing sector that persist over time and are similar to those found in previous studies in developing countries. Average TFP is, however, much lower in LAC than in developed countries. If productivity growth is indeed the cause of the wealth of nations, our results suggest there is room for considerable improvement in LAC.

Before developing policies to reduce PPDs, it is key to understand their causes. We argue that the large differences in the performance of firms within the same industries documented in this paper can be traced back to differences in firm strategy and organization (internal factors), and in the environment in which firms operate (external factors): management and business practices; employee selection, incentives, and training; innovation and technology adoption; access to credit; product market competition; and business climate and regulatory framework – to name a few.

Concerning internal factors, there is very strong evidence that managerial, HRM, and business practices are robustly associated with firm performance, that some practices are better than others, that the effect is causal, and that several factors limit the diffusion of best practices

(such as a lack of managerial capital). While providing management consulting seems to work, providing business training does not seem to be quite as effective.

External factors are more readily influenced by policy. Firms in LAC consider the practices of competitors in the informal sector, access to finance, and tax rates to be the most serious obstacles to their current operations (based on their responses to the WBES survey). While informal competitors are the main hurdle for all firms, finance is a large barrier for micro and small firms, whereas institutional factors (tax rates, political instability, labor regulations) are relatively more important for larger firms.

If competition from informal firms is the biggest obstacle to performance, then encouraging firms to formalize is a natural policy objective, which has been pursued all over the world, for instance through large reductions in the cost and time required to register a firm. The evidence shows, however, that the effects on informality have been modest at best, and that some firms do not benefit from becoming formal due to their low productivity.

Regarding access to finance, there is evidence that public programs to increase access to credit (through direct subsidies or credit guarantees) are effective, although the effects might be heterogeneous across firms. Competition may be an important factor driving productivity improvements (directly or through organizational factors), but much more causal evidence is needed to determine if this is the case.

Addressing PPDs is often complicated by the fact that many of the factors identified above may be interrelated or complementary. If a given set of choice variables yields higher productivity than another set, and choice variables are complementary, then neither small adjustments to the full set of choices, nor any change (however big) to just some subsets of those choices, can improve productivity (Roberts, 2004). Therefore, firms may be trapped in a low-productivity situation if they are unable to make large, coordinated changes in all the dimensions of choice.

Interventions that do not address all of the interrelated factors are prone to failure. For example, there is evidence that training programs may only be effective if they are accompanied by programs to improve access to physical and financial capital (Karlan and Valdivia, 2011; Giné and Mansuri, 2014; Berge et al., 2015; Karlan et al., 2015). Likewise, the stronger incentives provided by piece rates can only work if performance measurement is cheap, there are good performance measures, and quality can be controlled for (Lazear, 2000). Lowering the costs of a better technology increases adoption only if the incentives of the workers who are

adopting the technology are taken into account (Atkin et al., 2017). In addition, the HRM practices discussed in Section 3.1.2 are likely to be complements, and to affect productivity only when used in conjunction (see, e.g., Ichniowski and Shaw, 2003).

It is clear from this study that there are relevant knowledge gaps regarding firms' productivity in the LAC region. An analysis of the relative importance of each of the determinants of productivity (and their interaction) would help inform about mechanisms to jump-start private sector-driven growth in the region. The lack of high-quality and more comprehensive micro-level information has historically limited the possibility of identifying the main factors contributing to the low and highly dispersed productivity documented in this study. In addition, causal evidence on how different changes in these factors affect firm-level productivity is still scarce and mostly from small-scale interventions. Thus, much research is still needed in this area to inform public, private and institutional investments and decision making in LAC.

References

Ábrahám, Árpád, and Kirk White. 2006. “The Dynamics of Plant-Level Productivity in U.S. Manufacturing.” Center for Economic Studies Working Paper 06-20, July.

Acemoglu, Daron, Philippe Aghion, and Fabrizio Zilibotti. 2006. “Distance to Frontier, Selection, and Economic Growth.” *Journal of the European Economic Association* 4(1): 37–74.

Acemoglu, Daron, and Jörn-Steffen Pischke. 1998. “Why Do Firms Train? Theory and Evidence.” *Quarterly Journal of Economics* 113(1): 79–119.

Acemoglu, Daron, and Jörn-Steffen Pischke. 1999. “The Structure of Wages and Investment in General Training.” *Journal of Political Economy* 107: 539–572.

Aghion, Philippe, Thibault Fally, and Stefano Scarpetta. 2017. “Credit Constraints as a Barrier to the Entry and Post-Entry Growth of Firms.” *Economic Policy* 22(52): 732–779.

Alam, Asad, Paloma Anos Casero, Faruk Khan, and Charles Udomsaph. 2008. *Unleashing Prosperity: Productivity Growth in Eastern Europe and the Former Soviet Union*. Washington, DC: World Bank.

Arnold, Jens M., and Katrin Hussinger. 2010. “Exports versus FDI in German Manufacturing: Firm Performance and Participation in International Markets.” *Review of International Economics* 18(4): 595–606.

Arráiz, Irani, Francisca Henríquez, and Rodolfo Stucchi. 2013. “Supplier Development Programs and Firm Performance: Evidence from Chile.” *Small Business Economics* 41(1): 277–293.

Aterido, Reyes, Mary Hallward-Driemeier, and Carmen Pagés. 2009. “Big Constraints to Small Firms’ Growth? Business Environment and Employment Growth across Firms.” Policy Research Working Paper 5032, The World Bank, August.

Atkin, David, Azam Chaudhry, Shamyla Chaudry, Amit K. Khandelwal, and Eric Verhoogen. 2017. “Organizational Barriers to Technology Adoption: Evidence from Soccer-Ball Producers in Pakistan.” *The Quarterly Journal of Economics* 132(3): 1101–1164.

Aw, Bee Yan, Sukkyun Chen, and Mark J. Roberts. 2000. “Productivity and Turnover in the Export Market: Micro-Level Evidence from the Republic of Korea and Taiwan (China).” *The World Bank Economic Review* 14(1): 65–90.

Aw, Bee Yan, Sukkyun Chen, and Mark J. Roberts. 2001. “Firm-Level Evidence on Productivity Differentials and Turnover in Taiwanese Manufacturing.” *Journal of Development Economics* 66(1): 51–86.

Bahar, Dany. 2017. “The Middle Productivity Trap: Dynamics of Productivity Dispersion.” Global Economy & Development Working Paper 107, Brookings Institution, September.

Balk, Bert M. 2001. “Scale Efficiency and Productivity Change.” *Journal of Productivity Analysis* 15(3): 159–183.

Balk, Bert M. 2009. “On the Relation between Gross-output and Value-added Based Productivity Measures: The Importance of the Domar Factor.” *Macroeconomic Dynamics* 13(2): 241–267.

Bandiera, Oriana, Iwan Barankay, and Imran Rasul. 2009. “Social Connections and Incentives in the Workplace: Evidence from Personnel Data.” *Econometrica* 77(4): 1047–1094.

Banerjee, Abhijit V., and Esther Duflo. 2014. “Do Firms Want to Borrow More? Testing Credit Constraints Using a Directed Lending Program.” *The Review of Economic Studies* 81(2): 572–607.

Bartel, A. 1991. “Productivity Gains from the Implementation of Employee Training Programs.” NBER Working Paper No. 3893.

Bartelsman, Eric, Sabien Dobbelaere, and Bettina Peters. 2015. “Allocation of Human Capital and Innovation at the Frontier: Firm-Level Evidence on Germany and the Netherlands.” *Industrial and Corporate Change* 24(5): 875–949.

Bartelsman, Eric, and Mark Doms. 2000. “Understanding Productivity: Lessons from Longitudinal Microdata.” *Journal of Economic Literature* 38(3): 569–594.

Bartelsman, Eric, John Haltiwanger, and Stefano Scarpetta. 2013. “Cross-Country Differences in Productivity: The Role of Allocation and Selection.” *The American Economic Review* 103(1): 305–334.

Berge, Lars I. O., Kjetil Bjorvatn, and Bertil Tungodden. 2015. “Human and Financial Capital for Microenterprise Development: Evidence from a Field and Lab Experiment.” *Management Science* 61(4): 707–722.

Bernard, Andrew B., Jonathan Eaton, J. Bradford Jensen, and Samuel Kortum. 2003. “Plants and Productivity in International Trade.” *The American Economic Review* 93(4): 1268–1290.

Bernard, Andrew B., and J. Bradford Jensen. 1999. “Exceptional Exporter Performance: Cause, Effect, or Both?” *Journal of International Economics* 47(1): 1–25.

Bernard, Andrew B. and J. Bradford Jensen. 2004. “Why Some Firms Export?” *The Review of Economics and Statistics* 86(4): 561–569.

Besley, Timothy, Isabelle Roland, and John Van Reenen. 2017. “The Aggregate Effects of Credit Market Frictions: Evidence from Firm-Level Default Assessments.” Background Paper, Global Forum on Productivity, OECD, November.

Bianchi, Milo, and Matteo Bobba. 2013. “Liquidity, Risk, and Occupational Choices.” *Review of Economic Studies* 80(2): 491–511.

Bloom, Nicholas, Erik Brynjolfsson, Lucia Foster, Ron Jarmin, Megha Patnaik, Itay Saporta-Eksten, and John Van Reenen. 2013b. “Management in America.” Centre for Economic Performance Discussion Paper 1258.

Bloom, Nicholas, Mirko Draca, and John Van Reenen. 2016. “Trade Induced Technical Change? The Impact of Chinese Imports on Innovation, IT and Productivity.” *The Review of Economic Studies* 83(1): 87–117.

Bloom, Nicholas, Benn Eifert, Aprajit Mahajan, David McKenzie, and John Roberts. 2013a. “Does Management Matter? Evidence from India.” *The Quarterly Journal of Economics* 128(1): 1–51.

Bloom, Nicholas, Christos Genakos, Raffaella Sadun, and John Van Reenen. 2012. “Management Practices across Firms and Countries.” *Academy of Management Perspectives* 26(1): 12–33.

Bloom, Nicholas, Renata Lemos, Raffaella Sadun, Daniela Scur, and John Van Reenen. 2014. “JEEA-FBBVA Lecture 2013: The New Empirical Economics of Management.” *Journal of the European Economic Association* 12(4): 835–876.

Bloom, Nicholas, Renata Lemos, Raffaella Sadun, Daniela Scur, and John Van Reenen. 2016. “International Data on Measuring Management Practices.” *American Economic Review* 106(5): 152–156.

Bloom, Nicholas, Aprajit Mahajan, David McKenzie, and John Roberts. 2010. “Why Do Firms in Developing Countries Have Low Productivity?” *The American Economic Review* 100(2): 619–623.

Bloom, Nicholas, Aprajit Mahajan, David McKenzie, and John Roberts. 2018. “Do Management Interventions Last? Evidence from India.” Working Paper 24249, National Bureau of Economic Research, January. Available at: http://www.nber.org/papers/w24249.

Bloom, Nicholas, Carol Propper, Stephan Seiler, and John Van Reenen. 2015. “The Impact of Competition on Management Quality: Evidence from Public Hospitals.” *The Review of Economic Studies* 82(2): 457–489.

Bloom, Nicholas, and John Van Reenen. 2007. “Measuring and Explaining Management Practices across Firms and Countries.” *The Quarterly Journal of Economics* 122(4): 1351–1408.

Bloom, Nicholas, and John Van Reenen. 2010. “Why Do Management Practices Differ across Firms and Countries?” *Journal of Economic Perspectives* 24(1): 203–224.

Borin, Alessandro, and Michele Mancini. 2016. “Foreign Direct Investment and Firm Performance: An Empirical Analysis of Italian Firms.” *Review of World Economics* 152(4): 705–732.

Borgenvall, Mats, Håken Jarskog, Barbara Murray and Cecilia Karlstedt. 1999. *Improve Your Business: Basic*s. International Labour Office, Geneva.

Bourlès, Renaud, Gilbert Cette, Jimmy Lopez, Jacques Mairesse, and Giuseppe Nicoletti. 2013. “Do Product-Market Regulations in Upstream Sectors Curb Productivity Growth? Panel Data Evidence for OECD Countries.” *The Review of Economics and Statistics* 95(5): 1750–1768.

Brandt, Loren, Johannes Van Biesebroeck, and Yifan Zhang. 2012. “Creative Accounting or Creative Destruction? Firm-Level Productivity Growth in Chinese Manufacturing.” *Journal of Development Economics* 97(2): 339–351.

Brown, Charles, 1990. “Firms Choice of Method of Pay.” *Industrial and Labor Relations Review* 43: 165–182.

Bruhn, Miriam, Dean Karlan, and Antoinette Schoar. 2010. “What Capital is Missing in Developing Countries?” *The American Economic Review* 100(2): 629–633.

Bruhn, Miriam, and David McKenzie. 2014. “Entry Regulation and the Formalization of Microenterprises in Developing Countries” *The World Bank Research Observer* 29(2): 186–201.

Brunetti, Aymo, Gregory Kisunko, and Beatrice Weder. 1997. “Institutional Obstacles to Doing Business: Region-by-Region Results from a Worldwide Survey of the Private Sector.” Policy Research Working Paper 1759, The World Bank, April.

Cai, Hongbin, Hanming Fang, and Lixin Colin Xu. 2011. “Eat, Drink, Firms, Government: An Investigation of Corruption from the Entertainment and Travel Costs of Chinese Firms.” *The Journal of Law and Economics* 54(1): 55–78.

Cassiman, Bruno, Elena Golovko, and Ester Martínez-Ros. 2010. “Innovation, Exports and Productivity.” *International Journal of Industrial Organization* 28(4): 372–376.

Chandra, Amitabh, Amy Finkelstein, Adam Sacarny, and Chad Syverson. 2016. “Productivity Dispersion in Medicine and Manufacturing.” *The American Economic Review* 106(5): 99–103.

Clerides, Sofronis K., Saul Lach, and James R. Tybout. 1998. “Is “Learning-by-Exporting” Important? Micro-Dynamic Evidence from Colombia, Mexico and Morocco.” *The Quarterly Journal of Economics* 113(3): 903–947.

Crafts, Nicholas. 2006. “Regulation and Productivity Performance.” *Oxford Review of Economic Policy* 22(2): 186–202.

Crespi, Gustavo, Eduardo Fernández-Arias, and Ernesto Stein (Eds.). 2014. *Rethinking Productive Development*. Palgrave Macmillan, New York.

Crespi, Gustavo, Lucas Figal Garone, Alessandro Maffioli, and Ernesto Stein. 2019. “Innovation, Productivity, and Spillover Effects: Evidence from Chile.” IDB Working Paper Series No. 963, Inter-American Development Bank, Washington DC, January.

Cuñat, Vicente, and María Guadalupe. 2005. “How Does Product Market Competition Shape Incentive Contracts?” *Journal of the European Economic Association* 3(5): 1058–1082.

Cuñat, Vicente, and María Guadalupe. 2009a. “Executive Compensation and Competition in the Banking and Financial Sectors.” *Journal of Banking and Finance* 33: 439–474.

Cuñat, Vicente, and María Guadalupe. 2009b. “Globalization and the Provision of Incentives inside the Firm.” *Journal of Labor Economics* 27(2): 179–212.

Dachs, Bernhard, and Bettina Peters. 2014. “Innovation, Employment Growth, and Foreign Ownership of Firms: A European Perspective.” *Research Policy* 43(1): 214–232.

De Grip, Andries, and Jan Sauermann. 2012. “The Effects of Training on Own and Co-worker Productivity: Evidence from a Field Experiment.” *The Economic Journal* 122(560): 376–399.

De Mel, Suresh, David McKenzie, and Christopher Woodruff. 2009. “Measuring Microenterprise Profits: Must We Ask How the Sausage is Made?” *Journal of Development Economics* 88(1): 19–31.

De Mel, Suresh, David McKenzie, and Christopher Woodruff. 2013. “The Demand for, and Consequences of, Formalization among Informal Firms in Sri Lanka.” *American Economic Journal: Applied Economics* 5(2): 122–150.

De Soto, Hernando. 1989. *The Other Path: The Economic Answer to Terrorism*. New York, NY: Harper and Row Publishers.

Dearden, L., H. Reed and J. Van Reenen. 2006. “The Impact of Training on Productivity and Wages: Evidence from British Panel Data.” *Oxford Bulletin of Economics and Statistics* 68: 397–421.

Delfgaauw, J. and Dur, R. 2007, “Signaling and Screening of Workers’ Motivation.” *Journal of Economic Behavior and Organization* 62: 605–624.

DiNardo, John and David Lee. 2004. “Economic Impacts of New Unionization on Private Sector Employers: 1984–2001.” *Quarterly Journal of Economics* 119: 1383–1441.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer. 2002. “The Regulation of Entry.” *The Quarterly Journal of Economics* 117(1): 1–37.

Disney, Richard, Jonathan Haskel, and Ylva Heden. (2003). “Restructuring and Productivity Growth in UK Manufacturing.” *The Economic Journal* 113(489): 666–694.

Eifert, Benjamin P. 2009. “Do Regulatory Reforms Stimulate Investment and Growth? Evidence from the Doing Business Data, 2003–07.” CGD Working Paper Number 159, Center for Global Development, January. Available at http://www.cgdev.org/content/publications/detail/1420894.

Fariñas, Jose C., and Sonia Ruano. 2005. “Firm Productivity, Heterogeneity, Sunk Costs and Market Selection”, *International Journal of Industrial Organization* 23(7–8): 505–534.

Farrell, Diana. 2004. “The Hidden Dangers of the Informal Economy.” *The McKinsey Quarterly* (Number 3), July. Available at https://www.mckinsey.com/featured-insights/employment-and-growth/the-hidden-dangers-of-the-informal-economy.

Figal Garone, Lucas, Alessandro Maffioli, Paula A. López-Villalba, and Christian A. Ruzzier. 2020. “Productivity Differences among Firms in Latin America and the Caribbean.” Working paper No. 136, Universidad de San Andrés, Departamento de Economía, January. Available at https://ideas.repec.org/s/sad/wpaper.html.

Fisman, Raymond, and Jakob Svensson. 2007. “Are Corruption and Taxation Really Harmful to Growth? Firm Level Evidence.” *Journal of Development Economics* 83(1): 63–75.

Foster, Lucia, John Haltiwanger, and C. J. Krizan. 2001. “Aggregate Productivity Growth. Lessons from Microeconomic Evidence.” In Charles R. Hulten, Edwin R. Dean, and Michael J. Harper (eds), *New Developments in Productivity Analysis*. Chicago, IL: University of Chicago Press.

Foster, Lucia, John Haltiwanger, and Chad Syverson. 2008. “Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability?” *The American Economic Review* 98(1): 394–425.

Fowowe, Babajide. 2017. “Access to Finance and Firm Performance: Evidence from African Countries.” *Review of Development Finance* 7(1): 6–17.

Gaviria, Alejandro. 2002. “Assessing the Effects of Corruption and Crime on Firm Performance: Evidence from Latin America.” *Emerging Markets Review* 3(3): 245–268.

Gibbons, Robert, and Rebecca Henderson. 2013. “What Do Managers Do? Exploring Persistent Performance Differences among Seemingly Similar Enterprises.” In Robert Gibbons and John Roberts (eds), *The Handbook of Organizational Economics*. Princeton, NJ: Princeton University Press.

Gil, Ricard, and Christian A. Ruzzier. 2018. “The Impact of Competition on “Make-or-Buy” Decisions: Evidence from the Spanish Local TV Industry.” *Management Science* 64(3): 1121–1135.

Giné, Xavier, and Ghazala Mansuri. 2014. “Money or Ideas? A Field Experiment on Constraints to Entrepreneurship in Rural Pakistan.” Policy Research Working Paper 6959, The World Bank, June.

Griliches, Z., and H. Regev. 1995. “Firm Productivity in Israeli Industry 1979–1988.” *Journal of Econometrics* 65(1): 175–203.

Grund, Christian and Sliwka, Dirk. 2010. “Evidence on Performance Pay and Risk Aversion.” *Economics Letters* 106(1): 8–11.

Guadalupe, María, and Julie Wulf. 2010. “The Flattening Firm and Product Market Competition: The Effect of Trade Liberalization on Corporate Hierarchies.” *American Economic Journal: Applied Economics* 2(4): 105–127.

Gust, Christopher, and Jaime Marquez. 2004. “International Comparisons of Productivity Growth: The Role of Information Technology and Regulatory Practices.” *Labour Economics* 11(1): 33–58.

Hall, Bronwyn H. 2011. “Innovation and Productivity.” Working Paper 24249, National Bureau of Economic Research, June. Available at: http://www.nber.org/papers/w17178.

Hall, Bronwyn. H., and Josh Lerner (2010). The financing of R&D and innovation. In B. Hall & N. Rosenberg (Eds.), *Handbook of the Economics of Innovation*. Elsevier-North Holland.

Hall, Bronwyn H., Francesca Lotti, and Jacques Mairesse. 2008. “Employment, Innovation, and Productivity: Evidence from Italian Microdata.” *Industrial and Corporate Change* 17(4): 813–839.

Hamilton, Barton H., Jack A. Nickerson and Hideo Owan. 2003. “Team Incentives and Worker Heterogeneity: An Empirical Analysis of the Impact of Teams on Productivity and Participation.” *Journal of Political Economy* 111(3): 465–497.

Harrison, Ann E., Leslie A. Martin, and Shanthi Nataraj. 2013. “Learning versus Stealing: How Important Are Market-Share Reallocations to India’s Productivity Growth?” *The World Bank Economic Review* 27(2): 202–228.

Harrison, Rupert, Jordi Jaumandreu, Jacques Mairesse, and Bettina Peters. 2014. “Does Innovation Stimulate Employment? A Firm-Level Analysis using Comparable Micro-Data from Four European Countries.” *International Journal of Industrial Organization* 35: 29–43.

Holmes, Thomas J., and James A. Schmitz, Jr. 2010. “Competition and Productivity: A Review of Evidence.” *Annual Review of Economics* 2: 619–642.

Hortaçsu, Ali, and Chad Syverson. 2007. “Cementing Relationships: Vertical Integration, Foreclosure, Productivity, and Prices.” *The Journal of Political Economy* 115(2): 250–301.

Hsieh, Chang-Tai, and Peter J. Klenow. 2009. “Misallocation and Manufacturing TFP in China and India.” *The Quarterly Journal of Economics* 124(4): 1403–1448.

Ibarraran, Pablo, Alessandro Maffioli, and Rodolfo Stucchi. 2010. “Big Questions about Small Firms.” In C. Pages (Ed.) *The Age of Productivity: Transforming Economies from the Bottom Up*. Basingstoke: Palgrave MacMillan

Ichniowski, Casey, and Kathryn Shaw. 2003. “Beyond Incentive Pay: Insiders’ Estimates of the Value of Complementary Human Resource Management Practices.” *Journal of Economic Perspectives* 17(1): 155–180.

Ichniowski, Casey, Kathryn Shaw, and Giovanna Prennushi. 1997. “The Effects of Human Resource Management Practices on Productivity: A Study of Steel Finishing Lines.” *The American Economic Review* 87(3): 291–313.

Ito, K., and Lechevalier, S. 2009. “The Evolution of the Productivity Dispersion of Firms: A Reevaluation of its Determinants in the Case of Japan.” *Review of World Economics* 145(3): 405–429.

Karlan, Dean, Ryan Knight, and Christopher Udry. 2015. “Consulting and Capital Experiments with Microenterprise Tailors in Ghana.” *Journal of Economic Behavior & Organization* 118(Oct.): 281–302.

Karlan, Dean, and Martin Valdivia. 2011. “Teaching Entrepreneurship: Impact of Business Training on Microfinance Clients and Institutions.” *The Review of Economics and Statistics* 93(2): 510–527.

Kimura, Fukunari, and Koso Kiyota. 2006. “Exports, FDI, and Productivity: Dynamic Evidence from Japanese Firms.” *Review of World Economics* 142(4): 695–719.

Koellinger, Philipp. 2008. “The Relationship between Technology, Innovation, and Firm Performance—Empirical Evidence from E-Business in Europe.” *Research Policy* 37(8): 1317–1328.

Konings, Jozef, and Stijn Vanormelingen. 2015. “The Impact of Training on Productivity and Wages: Firm Level Evidence.” *The Review of Economics and Statistics* 97(2): 485–497.

La Porta, Rafael, and Andrei Shleifer. 2008. “Informality and Development.” *Journal of Economic Perspectives* 28(3): 109–126.

Lazear, Edward P. 1998. “Hiring Risky Workers.” In I. Ohashi and T. Tachibanaki (eds), *Internal Labor Market, Incentives and Employment*. New York: St. Martin’s.

Lazear, Edward P. 2000. “Performance Pay and Productivity.” *The American Economic Review* 90(5): 1346–1361.

Levy, Santiago. 2008. *Good Intentions, Bad Outcomes: Social Policy, Informality and Economic Growth in Mexico*. Washington, DC: Brookings Institution Press.

MacDonald, James M. 1994. “Does Import Competition Force Efficient Production?” *The Review of Economics and Statistics* 76(4): 721–727.

Maksimovic, Vojislav, and Gordon Phillips. 2002. “Do Conglomerate Firms Allocate Resources Inefficiently across Industries? Theory and Evidence.” *The Journal of Finance* 57(2): 721–767.

Maloney, William F. 2004. “Informality Revisited.” *World Development* 32 (7): 1159–1178.

Marin, Dalia, and Thierry Verdier. 2008. “Power Inside the Firm and the Market: A General Equilibrium Approach.” *Journal of the European Economic Association* 6(4): 752–788.

McKenzie, David. 2017. “Identifying and Spurring High-Growth Entrepreneurship: Experimental Evidence from a Business Plan Competition.” *The American Economic Review* 107(8): 2278–2307.

McKenzie, David, and Yaye Seynabou Sakho. 2010. “Does It Pay Firms to Register for Taxes? The Impact of Formality on Firm Profitability.” *Journal of Development Economics* 91(1): 15–24.

McKenzie, David, and Christopher Woodruff. 2014. “What Are We Learning from Business Training and Entrepreneurship Evaluations around the Developing World?” *The World Bank Research Observer* 29(1): 48–82.

McKenzie, David, and Christopher Woodruff. 2017. “Business Practices in Small Firms in Developing Countries.” *Management Science* 63(9): 2967–2981.

Melitz, Marc J. 2003. “The Impact of Trade on Intra-Industry Reallocations and Aggregate Productivity.” *Econometrica* 71(6): 1695–1725.

Melitz, Mark, and Stephen J. Redding. 2015. “New Trade Models, New Welfare Implications.” *The American Economic Review* 105(3): 1105–1146.

Mendes, Rute, Gerad J. van den Berg, and Maarten Lindeboom. 2010. “An Empirical Assessment of Assortative Matching in the Labor Market.” *Labour Economics* 17(6): 919–929.

Nickell, Stephen J. 1996. “Competition and Corporate Performance.” *The Journal of Political Economy* 104(4): 724–746.

Nickell, Stephen J., Daphne Nicolitsas, and Neil Dryden. 1997. “What Makes Firms Perform Well?” *European Economic Review* 41(3-5): 783–796.

Nickell, Stephen J., Daphne Nicolitsas, and Malcolm Patterson. 2001. “Does Doing Badly Encourage Management Innovation?” *Oxford Bulletin of Economics and Statistics* 63(1): 5–28.

Nicoletti, Giuseppe, and Stefano Scarpetta. 2003. “Regulation, Productivity and Growth: OECD Evidence.” *Economic Policy* 18(36): 9–72.

OECD. 2015. *The Future of Productivity*. Paris: OECD Publishing.

Oyer, P. and S. Schaefer. 2011. “Personnel Economics: Hiring and Incentives.” *Handbook of Labor Economics* 4: 1769–1823.

Pagés, Carmen (Ed.). 2010. *The Age of Productivity: Transforming Economies from the Bottom Up*. Basingstoke: Palgrave MacMillan

Petrin, Amil, and James Levinsohn. 2012. “Measuring Aggregate Productivity Growth Using Plant-Level Data.” *The RAND Journal of Economics* 43(4): 705–725.

Prendergast, Canice, 2002. “Uncertainty and Incentives.” *Journal of Labor Economics* 20(2): S115–S137.

Restuccia, Diego, and Richard Rogerson. 2008. “Policy Distortions and Aggregate Productivity with Heterogeneous Plants.” *Review of Economic Dynamics* 11(4): 707–720.

Restuccia, Diego, and Richard Rogerson. 2017. “The Causes and Costs of Misallocation.” *Journal of Economic Perspectives* 31(3): 151–174.

Rivkin, Jan. 2000. “Imitation of Complex Strategies.” *Science* 46: 824–844.

Roberts, John. 2004. *The Modern Firm*. *Organizational Design for Performance and Growth*. New York, NY: Oxford University Press.

Rosen, S. 1982. “Authority, Control and the Distribution of Earnings.” *Bell Journal of Economics* 13: 311–323.

Sattinger, M. 1993, “Assignment Models of the Distribution of Earnings.” *Journal of Economic Literature* 31: 831–880.

Scarpetta, Stefano, Philip Hemmings, Thierry Tressel, and Jaejoon Woo. 2002. “The Role of Policy and Institutions for Productivity and Firm Dynamics: Evidence from Micro and Industry Data.” OECD Economics Department Working Paper No. 329, Organization for Economic Co-operation and Development, April.

Schmitz, James A., Jr. 2005. “What Determines Productivity? Lessons from the Dramatic Recovery of the U.S. and Canadian Iron Ore Industries following Their Early 1980s Crisis.” *The Journal of Political Economy* 113(3): 582–625.

Schoar, Antoinette. 2002. “Effects of Corporate Diversification on Productivity.” *The Journal of Finance* 57(6): 2379–2403.

Steinmueller, W. Edward. 2010. Economics of Technology Policy. In B. Hall & N. Rosenberg (Eds.), *Handbook of the Economics of Innovation*. Elsevier.

Syverson, Chad. 2004. “Product Substitutability and Productivity Dispersion.” *The Review of Economics and Statistics* 86(2): 534–550.

Syverson, Chad. 2011. “What Determines Productivity?” *Journal of Economic Literature* 49(2): 326–365.

Taylor, Frederick. 1911. *Principles of Scientific Management*. New York and London: Harper and Brothers.

Van Biesebroeck, Johannes. 2008. “The Sensitivity of Productivity Estimates: Revisiting Three Important Debates.” *Journal of Business & Economic Statistics* 26(3): 311–328.

Van Biesebroeck, Johannes. 2011. “Wages Equal Productivity. Fact or Fiction? Evidence from Sub Saharan Africa.” *World Development* 39(8): 1333–1346.

Van Reenen, John. 2011. “Does Competition Raise Productivity through Improving Management Quality?” *International Journal of Industrial Organization* 29(3): 306–316.

Wagner, Joachim. 2002. “The Causal Effects of Exports on Firm Size and Labor Productivity: First Evidence from a Matching Approach.” *Economics Letters* 77(2): 287–292.

Annex A: WBES data

	Survey year					
Country	**2006**	**2009**	**2010**	**2016**	**2017**	**Total**
Argentina	583	0	703	0	549	1,835
Bolivia	285	0	96	0	94	475
Brazil	0	713	0	0	0	713
Chile	569	0	685	0	0	1,254
Colombia	578	0	646	0	0	1,224
Costa Rica	0	0	252	0	0	252
Dominican Republic	0	0	110	76	0	186
Ecuador	306	0	114	0	102	522
El Salvador	317	0	98	259	0	674
Guatemala	278	0	246	0	0	524
Honduras	222	0	133	0	0	355
Jamaica	0	0	106	0	0	106
Mexico	925	0	1,068	0	0	1,993
Nicaragua	272	0	119	86	0	477
Panama	181	0	0	0	0	181
Paraguay	263	0	147	0	99	509
Peru	317	0	697	0	469	1,483
Trinidad and Tobago	0	0	109	0	0	109
Uruguay	267	0	283	0	79	629
Total	**5,363**	**713**	**5,612**	**421**	**1,392**	**13,501**