Productivity differences among firms in Latin American and the Caribbean

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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 review the existing empirical evidence on the impacts of these factors on firm-level productivity (with a focus on developing countries) and identify knowledge gaps and opportunities for public, private and institutional investments.

JEL Codes: D24, L20, M20, O30, O47, O54.
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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 firmly believed to explain differences across countries 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 laggard 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 all over the world to focus more and more on firm-level productivity as a key driver of aggregate productivity. After all, aggregate productivity is largely based on the sum of the underlying productivity of all firms in the economy.

A firm's productivity is positively correlated with its profits (Foster, Haltiwanger and Syverson, 2008; Chandra et al., 2016), size and growth (Balk, 2001; Wagner, 2002; Koellinger, 2008; Harrison, Martin and Nataraj, 2013), and survival rate (Aw, Chen and Roberts, 2001; Fariñas and Ruano, 2005; Syverson, 2011). More productive firms have also been found to have higher chances of entering export markets (Clerides, Lach and Tybout, 1998; Bernard and Jensen, 1999; Aw, Chen and Roberts, 2000; Bernard et al., 2003; Melitz, 2003; Bernard and Jensen, 2004; Cassiman, Golovko and Martínez-Ros, 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 that has studied how productivity at the firm level relates to 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, Haltiwanger and Krizan, 2001; Hsieh and Klenow, 2009; Brandt, Van Biesebroeck and Zhang, 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, Aghion and Zilibotti, 2006; Restuccia and Rogerson, 2008; Bartelsman, Haltiwanger and Scarpetta, 2013), wages (Van Biesebroeck, 2011; Bartelsman, Dobbelaere and

Peters, 2015; Konings and Vanormelingen, 2015), or employment (Hall, Lotti and Mairesse, 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). We find significant performance differences within two-digit industries in the manufacturing sector: firms in the 90th percentile of the productivity distribution makes 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.[5] 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 firms operate (external factors). Finally, we review the existing empirical evidence on the impacts of these factors on firm-level productivity (with an emphasis on LAC countries and research done in the last decade) and identify knowledge gaps and opportunities for public, private and institutional investments.[6]

2. Documenting PPDs among SSEs

2.1. Productivity as a measure of firm performance

Performance differences at the firm level are largely associated with how successfully firms turn inputs into outputs. Firm productivity refers to efficiency in production, i.e., how much output is obtained from a given set of inputs. In a single-input industry, there is only one possible kind of efficiency for a firm – *technical efficiency*. A firm is considered technically efficient if, given the input and technology, it is producing at the frontier of the industry's technical possibilities. In a multiple-input firm, there is another source of (in)efficiency – *allocative efficiency*. A firm is considered allocatively efficient if, given a fixed amount of output and technology, it combines available inputs in a way that minimizes production costs.

For a single input–single output firm, productivity can be expressed simply as an output–input ratio. That is, single-factor productivity reflects the number of units of output produced per unit of a particular input. The most intuitive example is when a single output is produced only with labor. In this case, firm productivity is measured as labor productivity, estimated as the ratio between total output and total labor employed.

However, given the complementarity of inputs, single-factor productivity is affected by the intensity of use of the excluded inputs – e.g., labor productivity increasing with a firm's capital stock. Therefore, researchers often use TFP, which is invariant to the intensity of use of observable inputs and conceptually reflects shifts in the isoquant of a production function – i.e., changes in *technical*

[5] The 'what-why' distinction is borrowed from Syverson (2011).
[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, Fernandez-Arias and Stein, 2014), and the OECD (OECD, 2015).

efficiency. By contrast, changes in *allocative efficiency* reflect displacement along the isoquant – i.e., cost minimization. We can easily understand TFP by looking at a factor-neutral production function:[7]

$$Y_{it} = A_{it} \times F_{it}(K_{it}, L_{it}, M_{it}) \qquad (1)$$

Productivity is defined only with respect to a specific technology $F(\cdot)$ linking inputs (capital K, labor L, and intermediate inputs M) to output (Y). A is an unobservable productivity term that differs between firms and time periods. Rearranging equation (1), we calculate TFP (A_{it},):

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

A_{it}, 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 $F(\cdot)$. TFP is in itself a residual – the "measure of our ignorance" (Syverson, 2011: 330).

Given that A is not directly observable, we need to estimate it based on the observables Y, K, L, and M. In addition to the challenges of estimating TFP in a multiproduct scenario, there are several empirical issues associated with estimating A.[8] For instance, we need to define the criteria to be used to measure labor, capital and intermediate inputs.[9] We must also determine which functional assumptions and econometric techniques will be used to weigh inputs K, L, and M to construct a single-dimensional input variable.

Van Biesebroeck (2008) classified common methods of estimating TFP into three broad groups – index numbers, non-parametric methods, and parametric methods. Caves et al. (1982) introduced the index number method; its main strength is that it does not make any assumptions about the shape of $F(\cdot)$. However, it requires firms to behave optimally, and assumes perfectly competitive output and input markets to satisfy the optimality condition that marginal productivities equal factor

[7] A production function is Hicks-Neutral when technological change does not affect the balance of inputs, i.e. the average and marginal products of all factors increase in the same proportion. Neither Hicks-Neutrality nor two factors are necessary conditions to assess TFP; the same results can be obtained from more general production functions. See Syverson (2011, p. 330).

[8] In a multiproduct firm, physical output Ycannot be used, so revenues are typically used instead. 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).

[9] Usual measures of labor are number of employees, employee-hours, and quality-adjusted labor. Capital can be taken from firm balance sheets or constructed from historical investment records, and a depreciation rate must also be defined also. Intermediate materials present the same challenges than as multiproduct output because only gross expenditures are usually available. Also, intermediate inputs can also be included into the production function or subtracted from gross output in order to work only with value added.

returns. Nor do non-parametric methods (mainly data envelopment analysis) make any assumptions about the production function. These methods define productivity as the ratio of a linear combination of outputs over a linear combination of inputs (Cooper et al. 2006). Parametric methods are the most popular approach; they involve imposing a shape on $F(\cdot)$, usually Cobb-Douglas ($Y = AK^{\alpha}L^{\beta}M^{\gamma}$), and then estimating its parameters (α, β, γ) using different econometric techniques (ordinary least squares (OLS), fixed effects, instrumental variables, generalized method of moments, etc.). After comparing their performance, Van Biesebroeck concludes that "the choice of estimation 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.

2.2. Performance differences among SSEs in LAC

In this section we assess whether LAC firms within a given industry achieve different levels of productivity. That is, we explore the *'what'* question on productivity dispersion. 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 details).[10]

To compute TFP we follow a parametric method assuming a Cobb-Douglas production function. We use OLS to estimate the function parameters, and compute the residuals as explained in Section 2.1.[11] Our specification allows us to absorb multidimensional fixed effects from the interaction of a firm's country, sector, year, size, export and legal status, and to control for the firm's age and age squared. For the sake of brevity, we report here only TFP measures constructed using

[10] Data retrieved from http://www.enterprisesurveys.org/ in July 2018. We apply several filters to the dataset to guarantee the quality 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.
[11] We compute revenue-based TFP measures. Data limitations preclude us from computing quantity-based TFP measures.

country-industry average input elasticities. We also computed TFP measures using firm-specific input elasticities and industry average input elasticities, and the results are maintained.[12]

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 $e^{1.905} = 6.72$.[13] 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

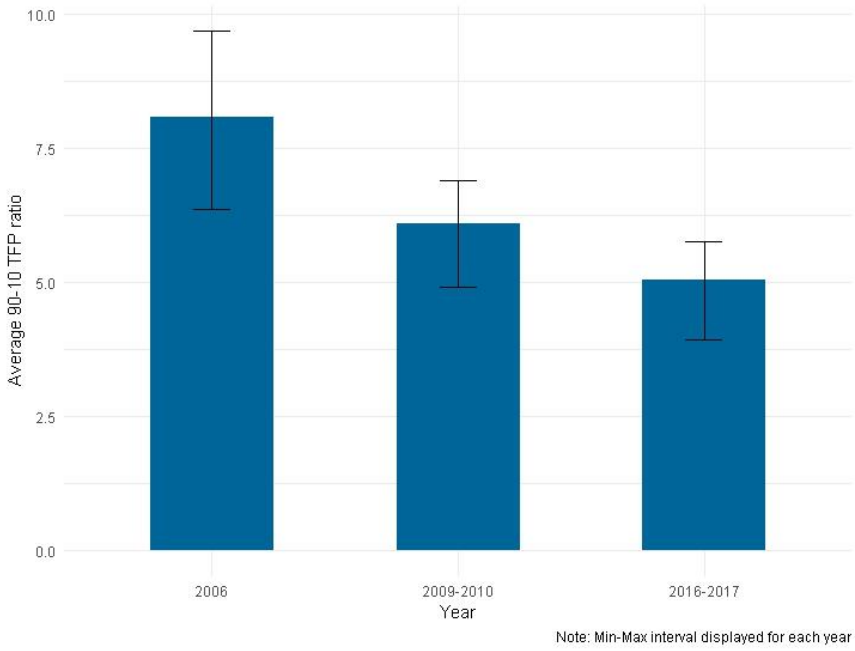
Log TFP	Within-Industry Productivity Moment	Mean	Std. Dev.
Full Sample	Median	-0.034	0.009
	IQ range	0.929	0.067
	90–10 percentile range	1.905	0.103
	95–5 percentile range	2.616	0.183

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 is 2.091 in 2006, 1.806 in 2009–2010, and 1.619 in 2016–2017 (see Figure 2.1). 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.

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

[13] 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.

Figure 2.1. Average 90–10 TFP ratio in LAC over time

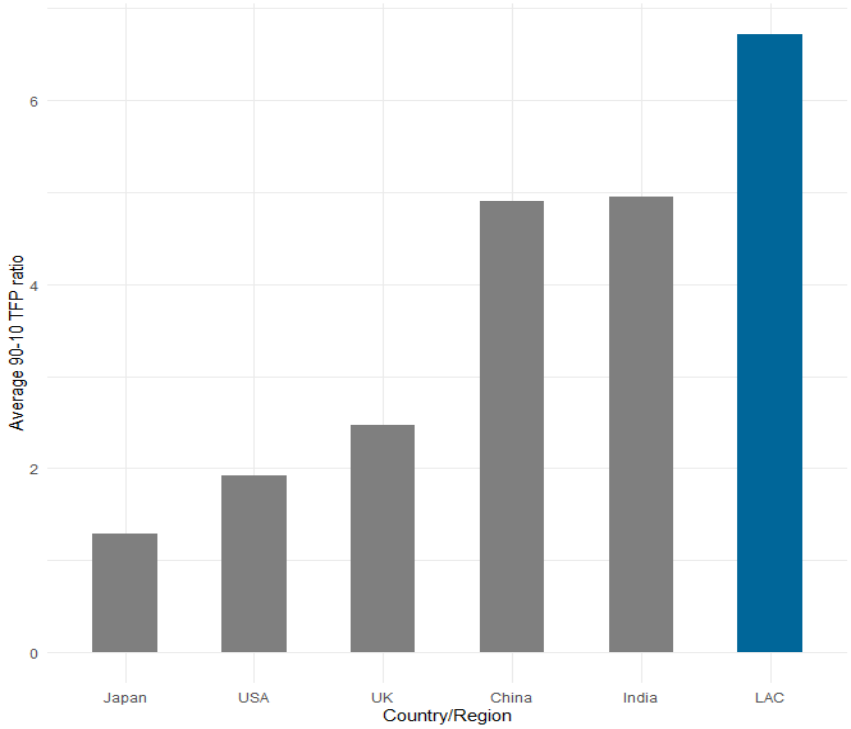


How does the productivity dispersion in LAC compare with other countries or regions? Previous studies have found average differences in logged TFP between an industry's 90th and 10th percentile firms of 0.25 for Japan (Ito and Lechevalier, 2009), 0.651 for USA (Syverson, 2004), 0.906 for UK (Disney et al., 2003), 1.59 for China, and 1.60 for India (Hsieh and Klenow, 2009).[14] These differences generate 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.

These results suggest that the productivity dispersion in LAC is larger than in the USA and 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.

[14] These studies used more narrowly defined industries for their estimates (e.g., four-digit SIC).

Figure 2.2. Average 90–10 TFP ratio by country/region



The broad and representative coverage of the WBES and its use of standard instruments across countries provides 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.

2.3. PPDs and productivity dynamics among SSEs in LAC: the case of Chile

> "In the old days one interpreted productivity change as completely due to and thus identical with technological change. Not so long ago one came to the insight that efficiency change is at least as important as a factor" (Balk, 2001: 160).

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 corresponds to 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.[15]

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 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, Haltiwanger, and Syverson, 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 –

[15] 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.

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:

$$A_{jt} = \sum_{i \in I} s_{it} A_{it} \qquad (3)$$

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):[16]

$$\Delta A_{jt} = \sum_{i \in C} \bar{s}_i \Delta A_{it} + \sum_{i \in C} (\overline{A_i} - \overline{A_J}) \Delta s_{it} + \sum_{i \in N} s_{it} (A_{it} - \overline{A_J}) - \sum_{i \in X} s_{it-1} (A_{it-1} - \overline{A_J}) \qquad (4)$$

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 growth rate of 4.89% over the 1990–2006 period.[17] Our data allows us to decompose productivity growth for 79 sectors for the period 1990–2006. Table 2.2 and Figure 2.3 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.

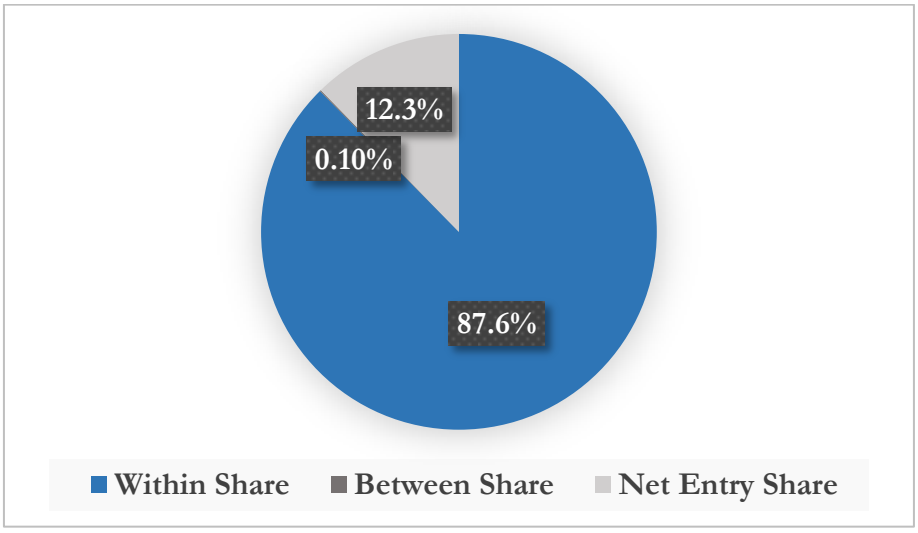
[16] The contribution of various components is sensitive to the decomposition methodology and time period. For a detailed discussion, see Foster et al. (2001).

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

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%

Figure 2.3. Decomposition of multifactor productivity growth, 1990–2006



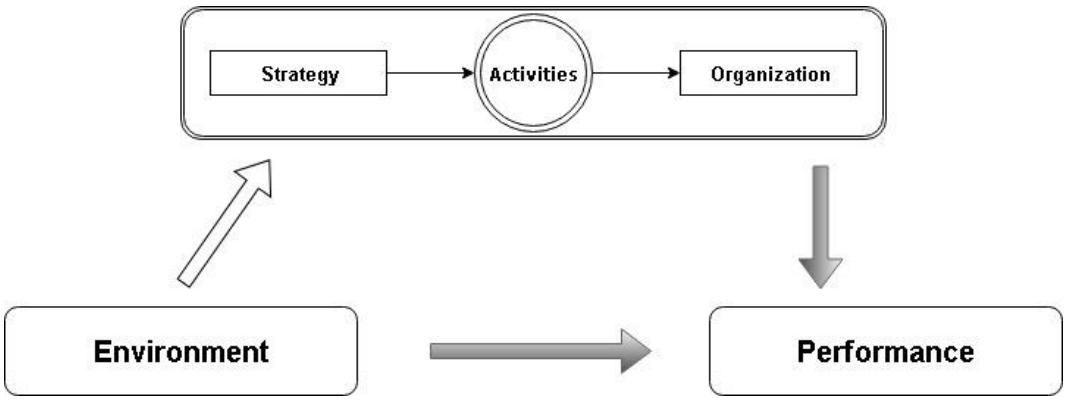
As Foster, Haltiwanger and Krizan (2001) explain, the differences in countries, time periods, frequency of measured changes, productivity concepts (i.e., multifactor vs. labor), and measurement methodologies make it difficult to compare the results from different studies. Nevertheless, one core aspect that is roughly comparable across studies is the within-plant contribution to aggregate productivity growth, which ranges from 23 to 100% across studies. Our results for the Chilean manufacturing sector are within that range.

3. Explaining PPDs among SSEs

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 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 a number of questions. Which element of the strategy-organization-environment triad affects performance the most? How exactly (i.e., through which channels) do these operate? How do complementarities among individual factors affect performance (following the logic of fit)?

Some of the individual factors explaining performance 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), it provides a useful way to organize ideas.[18]

3.1. Internal factors

This subsection discusses factors explaining firm performance that are related to its strategy and organization and emphasizes those that are typically under the direct control of the firm's management (i.e., those about which the firm can do something).

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).[19] 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.[20]

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),[21] Bloom et al. (2013b), and McKenzie and Woodruff (2017).[22]

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[18] Syverson (2011) provides a similar categorization.

[19] 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?"

[20] 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."

[21] 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.

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. Management practices also demonstrate significant cross-country and cross-industry dispersion; firms in developing countries tend to have poorer-quality management than those in advanced industrialized economies. 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.

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) that prevents entrepreneurs and managers from adopting better practices. This information failure 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] 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,[25] firm ownership,[26] and human capital[27] (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.[28] 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.

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[22] 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.

[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] Bloom, Draca, 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.

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

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

[28] 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.

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, Barankay, and Rasul, 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, Shaw and Prennushi (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 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 and boosted organizational efficiency (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 match specificity in productivity, the consequences of which have been studied in the literature on assortative matching in labor markets (see, for instance, Rosen, 1982; Sattinger, 1993; Hamilton et al., 2003). 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.

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 (Guadalupe and Cuñat, 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. Section 4.1.3 discusses whether they have worked.

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 rivals 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.

3.1.4. Corporate governance

Corporate governance refers to the "mechanisms by which stakeholders of a corporation exercise control over corporate insiders and management such that their interests are protected" (John and Senbet, 1998).[29] These mechanisms are either internal (most prominently, the board of directors) or external (markets for corporate control, and ownership structure and concentration). The choice of mechanism depends on the environment and varies over time (Holmström and Kaplan 2001).

Previous research in this area is largely empirical, dealing mainly with the effects of governance systems (most notably, board composition and actions – see, e.g., Hermalin and Weisbach, 2003; and Adams, Hermalin and Weisbach, 2010) on firm value and profitability. Their impact on firm-level productivity has been largely overlooked.[30]

The conventional approach to studying boards' structure, composition, and decisions is optimal contracts theory, which describes how shareholders' and managers' interests can be aligned. An optimal principal–agent contract would generally be chosen if (i) the board were bargaining with the executives at arm's length; (ii) market forces constrain the directors or executives from deviating from optimal compensation contracts; or (iii) shareholders could use the courts or another mechanism to force managers to adopt compensation contracts that maximize shareholder value. However, as Adams, Hermalin, and Weisbach (2010, p. 62) remark, governance structures are second-best solutions to the governance problem where incomplete information makes complete contracts infeasible (Hermalin and Katz, 1993; Harris and Raviv, 2008). The main reason for

[29] See also Shleifer and Vishny (1997) for a survey of other definitions of corporate governance.
[30] See also Gillette, Noe and Rebello (2008) for an experimental examination of the board structure-performance relationship.

incomplete contracts is that boards cannot fully commit to how they will use the information revealed to them or whether it is contractually feasible for them to pay the CEO (or others) enough to induce them to fully revel a competitor's proprietary information. Although there is no consensus regarding why contracts are incomplete, the main theories point to limits on both commitments and transfers.

Hermalin and Weisbach (2003) review the economic literature on corporate governance and highlight the importance of considering the board of directors as an endogenous solution to the governance problem that is affected by restrictions such as managerial labor market imperfections[31] (Bebchuk, Fried, and Walker, 2002) as well as firm characteristics such as risk, indebtedness, and R&D intensity (Coles, Daniel, and Naveen, 2008). Firms where the advisory role of the board is relatively more important, such as those with more intensive risk and R&D, benefit from bigger boards. In addition, firms with greater information asymmetries between board members and managers benefit from having more insider directors on the board.

3.1.5. Value chain and cluster development

Porter (1990) maintains that one broad determinant of productivity is the presence (or absence) of home-based related and supporting industries (especially if they are internationally competitive) in the value chain. These industries provide the advantage of "close working relationships" (Porter, 1990, p. 83): short lines of communication, the quick and constant flow of information, and an ongoing exchange of ideas and innovations. Many micro, small and medium enterprises (MSMEs) increasingly participate in value chains (see, e.g., Pietrobelli and Rabellotti, 2004).

The value chain includes a set of interrelated activities a company uses to create value or a competitive advantage at each stage of a productive chain. The main actors in a value chain are the suppliers of inputs and services, producers, freight carriers and logistic service providers, and wholesale and retail distributors. Greater participation in value chains and an improvement in their performance are essential for economic growth. The available theoretical and empirical evidence indicates that (i) firms that participate in value chains are more productive, and (ii) countries that participate in global value chains have higher productivity and greater economic growth.

[31] The managerial labor market has oligopoly features due to the great differentiation between managers. The considerable differences in managers' market power between industries imply not only different degrees of rent extraction by managers but also different optimal board structures.

At the firm level, being part of an effective value chain has several benefits for their participants, specially the smallest ones. It helps them to (i) reduce the cost of doing business, (ii) increase bargaining power, (iii) improve access to knowledge, technology and innovations, and (iv) increase access to finance. Thus, each single participant in the value-chain is better able to overcome traditional limitations to growth and increase revenues and competitiveness.

Global value chains have been a primary booster of global trade over the past two decades. They describe the fragmentation of production processes in which intermediate goods are shipped across borders multiple times, with each exporting country adding value along the production chain to final consumption. Studies have shown that productivity gains associated with global value chains can arise through multiple channels: finer division of labor across countries (Grossman and Rossi-Hansberg, 2008), availability of a greater variety of inputs (Halpern, Koren and Szeidl, 2015), increased competition, learning externalities, and technology spillovers (IDB 2014).

At the country level, participating in global value chains can increase and improve international trade. By increasing their participation in regional and global production networks, LAC countries could significantly boost their exports and diversify into more sophisticated products and take advantage of other benefits that the international organization of production offers, such as transfers of know-how and technology.

The main barriers to value chain development are related to limited access to credit for MSMEs. As discussed in more detail below, this is due to information asymmetry, high transaction costs, and a lack of collateral that characterizes the relationship between MSMEs and financial institutions, and between MSMEs and anchor firms.

Many countries have recently undertaken MSME support policies with an emphasis on value chains. Despite the widespread perception that firm-level productivity depends at least partly on firms' connections with suppliers, there is little evidence of the importance of production networks and buyer–supplier relationships for firm-level performance.

SMEs benefit from other industries in the value chain, as well as from "*clusters* of competitive industries" (Porter, 1990: 86, 1998, 2000). Industries tend to be strongly geographically concentrated (Krugman, 1991; Ellison and Glaeser, 1997). Marshall (1920) first identified the advantages of geographic agglomeration, which originate from production economies (due to increased access to specialized inputs, specialized labor, and knowledge or technology spillovers) and increased demand;

Arrow (1962) and Romer (1986) further explored these benefits. The empirical evidence reviewed in Pietrobelli and Rabellotti (2004) shows that SMEs located in such geographic clusters have a competitive advantage over isolated firms. McCann and Folta (2008) provide a more recent review of the firm-level performance benefits from agglomeration.

Many governments actively support the formation and development of clusters. Cluster development policies aim to solve coordination problems among firms, and between firms and governments, to ensure that the beneficial effects of agglomeration economies are realized. For instance, the French government invested 1.5 billion euros in its "competitiveness clusters" policy from 2005 to 2011 (Martin, Mayer and Mayneris 2011). Despite the scarce evidence on the impact of cluster development policies in LAC, some scholars and policy makers argue that these policies might generate innovation activity of sufficient scale, depth, and diversity to compete at the international level. They might also induce the public sector to utilize, promote, and exploit interdependencies between economic actors to more effectively foster innovation, productivity, and learning (Feser, 2002).

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. Figure 3.1 demonstrates 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 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, Fally and Scarpetta, 2017; Fowowe, 2017), and credit market frictions reduce productivity, especially among MSMEs (Besley, Roland and Van Reenen, 2017), which are likely to find it harder to access credit to finance their investment opportunities. Besley, Roland and Van Reenen (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 SMEs.

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 micro and small enterprises.

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. 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, Maffioli, and Stucchi 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.[32]

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

[32] Arraiz, Henriquez, and Stucchi (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.

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 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 Organization for Economic Co-operation and Development (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, Nicolitsas and Dryden (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). Nickell, Nicolitsas and Patterson (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. OECD regulatory reforms promoted private corporate governance and competition (where viable); Sections 3.1.4 and 3.2.2 discuss their implications for productivity. Scarpetta et al. (2002), Nicoletti and Scarpetta (2003), and Crafts (2006) evaluate industry- and firm-level evidence in OECD countries.

Institutional obstacles to doing business are perceived to be more acute in developing countries than in OECD countries (see Brunetti, Kinsunko and Weder 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 5.1).

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, Fang and Xu (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, Hallward-Driemeier and Pagés (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.

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, Hallward-Driemeier and Pagés, 2009). Consistent with this view, countries with more burdensome entry regulations have larger informal sectors (Djankov et al., 2002). We revisit informality (and ways of dealing with it) in Section 4.2.3.

4. Addressing PPDs among SSEs

In this section we review Randomized Control Trials, impact evaluations, and rigorous empirical studies that assess interventions, changes, and investments at the micro-economic level related to key factors that determine firm performance – that is, interventions that do something about PPDs.

4.1. Internal factors

4.1.1. Management and business practices

Section 3.1.1 reports strong evidence – across industries, countries, and time – that managerial and business practices are robustly associated with firm performance, and that some practices are more effective than others. These facts beg (at least) two important questions. Is the effect of managerial practices on performance causal (as Figure 3.1 implies)? If some practices are better than others, why do best practices not diffuse more rapidly among firms?

The answer to the first question seems to be qualified 'yes' according to three recent randomized studies: after providing management consulting services, the first two found positive effects while one found no effects. First, Bloom et al. (2013a) conducted a field experiment on large textile firms in India, in which they provided free consulting on management practices to randomly chosen (treatment) firms and then compared their results to a set of control plants. Within the first year of adopting these management practices, productivity had raised by 17% (corresponding to an increase of over $300,000 in annual profits). Within three years of the start of the experiment, treated firms had grown faster and opened more production plants. Bloom et al. (2018) revisited the plants in 2017 and found that a significant gap in both practices and performance remained between treated and control plants – suggesting long-lasting effects of interventions in management practices.

Second, Bruhn, Karlan, and Schoar (2013) provided access to management consulting to a randomly selected group of firms out of 432 SMEs in Mexico and found that, after one year, both productivity and financial performance had improved in the treated group (although no impact was found on profits, sales, or employment). Within three years, the number of employees had grown by about 44% (and the total wage bill even more). Third, Karlan, Knight, and Udry (2015), in a randomized trial in Ghana, found no evidence that a consulting treatment had a positive effect on profits in (tailoring) microenterprises.

A possible answer to the second question is that diffusion of best practices may be impeded by a lack of managerial talent or complete information. 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. Several recent studies have concluded that low 'managerial capital' is an important barrier to productivity in firms in developing countries (Bloom and Van Reenen, 2010; Bruhn, Karlan, and Schoar, 2010). Indeed, firms in developing countries have found to be much more poorly managed than those in developed countries (Bloom et al., 2012).

Business training programs have appeared as a policy response to this barrier in many countries. But can such programs overcome the lack of managerial capital? The evidence is mixed: according to a recent review by McKenzie and Woodruff (2014), methodological concerns (small sample sizes, short-run impacts, survey attrition, and measurement of outcomes) and heterogeneity across training content and trainee characteristics make it difficult to draw robust lessons from the existing studies. Even with these caveats in mind, most studies find that business training has only insignificant or very small effects on business start-up and survival, profits, sales, or employment – though typically an effect is found on the adoption of business practices. As McKenzie and Woodruff (2014: 79) conclude, "[m]any of the key questions needed to justify large-scale policy interventions in this area remain unanswered."

Another potential explanation for the lack of results of the interventions surveyed by McKenzie and Woodruff (2014) may relate to the complementarities between human and physical or financial capital (Section 4.3). Some randomized evaluations have analyzed these complementarities (Karlan and Valdivia, 2011; Giné and Mansuri, 2014; Berge, Bjorvatn and Tungodden, 2015; Karlan, Knight and Udry, 2015), with few conclusive results.

Campos et al. (2017) provide an interesting perspective on business training. They randomly assigned microenterprise owners in Togo not only to a business training program, but also alternatively to a personal initiative training program. Two years later, sales, profits, and innovation activities had significantly increased in the group that received the personal initiative training, but no statistically significant effect could be found for the business training group.

4.1.2. Employee selection, incentives, and training

We asserted in Section 3.1.2 that good HRM practices – especially in relation to employee selection and retention – induced higher productivity levels. Both the level and performance sensitivity of wages have been shown to be important in attracting the right kind of workers. Dal Bó,

Finan and Rossi (2013) studied recruiting for public sector positions in Mexico. By randomly assigning different salaries and job offers across recruitment sites, they showed that higher wages attracted more able applicants (as measured by their IQ, personality, and proclivity toward public sector work). Lazear (2000) likewise shows that introducing performance-related pay by shifting from fixed hourly wages to piece rates attracted a more able workforce to the Safelite Glass Corporation and generated a 44% increase in worker productivity; half of this effect could be attributed to the incentive effects on the firm's existing workforce. Shearer (2004) conducted a field experiment in a tree-planting firm and found that a shift from fixed wages to piece rates increased individual worker productivity by around 20%. Shearer's evidence on the productivity gains associated with performance pay is mostly based on data provided by the firms, which could raise concerns about the external validity of the results. However, Booth and Frank (1999) have shown similar qualitative effects across occupations using individual panel data from the British Household Panel Survey.

Individual pay can also be based on the output of other workers, as in team incentives or relative incentives. Under relative incentives, individual effort imposes a negative externality on other workers that is not present in a piece-rate system. Bandiera, Barankay and Rasul (2005) found that worker productivity is at least 50% higher when piece-rate pay is used compared to relative incentives, which they ascribed to workers partially internalizing the negative externality – especially when they can monitor others and be monitored by them. Productivity under relative incentives was also lower the larger the share of friends in the group, and in smaller groups (where monitoring should be easier).

Bandiera, Barankay and Rasul (2013) present evidence from a field experiment on the effects of relative incentives (rank incentives and tournaments) on teams' composition and productivity. Stronger incentives made workers more likely to form teams with individuals of similar ability rather than with their friends, but the introduction of rank incentives reduced average team productivity by 14%, whereas tournaments increased productivity by 24% – suggesting that team-based incentives can sometimes crowd out the productivity-enhancing effects of social ties. Yet providing rank feedback may be counterproductive even when employees are paid based on absolute performance. For example, Barankay (2012) conducted a three-year randomized control trial with full-time furniture salespeople and found that rankings had a stronger effect when sellers had more leeway in substituting across brands, which is consistent with the multitasking model.

Lyons (2017) confirms the importance of team composition: team organization improved outcomes only when workers were from the same country. Relative to sample means, teamwork led to a 30% increase in output and a more than 50% improvement in productivity for nationally homogeneous teams, but to a *decrease* of 34% in output and almost 75% in productivity in nationally diverse teams.

When employees work in a team and are able to observe each other's contributions, they may exert social pressure on each other not to shirk their responsibilities. Mas and Moretti (2009) have shown that peer pressure can partially overcome free-riding incentives in the workplace. They found evidence of strong peer effects associated with the introduction of high-productivity workers into a work group: a 10% increase in coworker productivity resulted in a 1.5% increase in individual productivity, but only among workers who can observe the work of the high-productivity individual. Georganas, Tonin and Vlassopoulos (2015) confirmed in a lab experiment that subjects who observe their coworkers' actions react to what they see – but only when compensation is based on an employee's own performance. They found that subjects respond positively to high performers, as in Mas and Moretti (2009), and negatively to observing low performers. When compensation is team based, the subjects who are observed raise productivity, at least initially.

Behavioral research suggests that providing gifts (both monetary and non-monetary) to employees may affect their performance. Gneezy and List (2006) studied the effect of gifts (higher wages) on worker effort in two different tasks (data entry and door-to-door fundraising) and found that while effort was initially higher in the gift treatment, after a few hours the observed outcomes were indistinguishable from those in the control (non-gift) group. Overall, providing gifts was a losing proposition for the employer: the gift treatment yielded worse aggregate outcomes; better results could have been obtained at the market-clearing wage. Kube, Maréchal and Puppe (2012) ran a controlled field experiment in which they provided workers with monetary and nonmonetary gifts of equivalent value, and found that non-monetary gifts had a much stronger impact (25% increase in work performance). Monetary gifts could achieve similar improvements in worker performance only when the worker was given a choice between non-monetary and monetary gifts (which they tended to prefer), or when the employer invested more time and effort into the gift's presentation – consistent with the idea of reciprocity in employment relations.

Bandiera, Barankay and Rasul (2007, 2009) show that employee productivity may be affected by employee incentive pay as well as their manager's incentive scheme. In a field experiment, the

authors exogenously changed managers' compensation from fixed wages to performance pay based on the *productivity of the workers below him*. This change increased the average productivity of lower-tier workers (+21%) as well as the productivity dispersion (+38%), because managers selected more able workers into the workforce and targeted their efforts towards the ablest. The productivity effect of social connections between managers and workers is also mediated by the managers' incentive scheme: when managers were paid fixed wages, average worker productivity was 9% higher when they were socially connected with the manager, but social connections had no effect on productivity when the manager was compensated based on his subordinates' performance. Moreover, in this setting social connections were detrimental to the firm because they distorted the allocation of managerial effort in favor of lower-ability workers.

Firms around the world are increasingly basing their workers at home. Bloom et al. (2015a) investigated home working through an experiment at Ctrip, a large Chinese travel agency, in which call center employees were randomly assigned either to work from home or in the office for nine months. The firm improved its TFP by 20–30% and saved about $2,000 a year per home worker. About two-thirds of the improvement came from the reduction in office space and the rest from improved individual performance and reduced turnover.

On-the-job training is another way of making employees more productive. De Grip and Sauermann (2012) randomly assigned workers at a call center to a one-week course devised to train call agents in conversation techniques designed to decrease the average handling time of calls while maintaining call quality. Participants performed 10% better after the training than non-participants. There were also some spillover effects: a 10-percentage-point increase in the share of trained peers led to a performance increase of 0.51% among non-participants. Adhvaryu, Kala and Nyshadham (2017) conducted a randomized evaluation of general soft skills training for female garment workers in India and found that treated workers were 12% more productive than their untreated counterparts, and were more likely to be assigned to more complex tasks.

4.1.3. Technology adoption and innovation

Public support for innovation activities is commonplace, but their effectiveness is open to debate. Bronzini and Iachini (2014), for instance, evaluate an R&D subsidy program in Italy using a sharp regression discontinuity design and found no significant increase in R&D investment in subsidized firms. However, the impact was heterogeneous: the subsidies triggered substantial additional investments in small firms, but not in large firms – perhaps due to financial constraints. Crespi et al.

(2015) evaluated the innovation promotion programs administered by COLCIENCIAS (Colombia's innovation agency), which provide financial incentives for R&D. Using longitudinal firm-level data and a fixed-effects identification strategy to control for potential selection biases, Crespi et al. (2015) showed that the program had a significant effect on firms' labor productivity – a maximum of 15% increase in productivity 3–5 years after the treatment. Because this effect remained significant after controlling for capital intensity and employment levels, the results may be construed as evidence of increased TFP. Positive and significant effects on employment were also found, but only six or more years after participation in the program. Castillo et al. (2014) also find increased employment (and wages) resulting from an innovation support program in Argentina (*Programa de Apoyo a la Reestructuración Empresaria*) designed to increase SMEs' competitiveness by co-financing technical assistance for product and process innovation.

Why do firms frequently fail to adopt best practices and technologies? Atkin et al. (2017) studied technology adoption in soccer ball producers in Pakistan. They offered a new cutting technology that significantly reduced the waste of raw materials – for free – to randomly selected producers. Yet more than a year after the intervention, adoption remained very low. The main barrier to adoption was a conflict of interest between employees and owners: the new technology slowed cutters down while they learned how to use the new equipment, which meant reduced compensation given that they were paid piece rates (which provide no incentive to reduce waste). When workers in treated firms were offered a lump-sum payment to master the new technology, the probability of adoption doubled. Jackson and Schneider (2015) also found that moral hazard on the part of workers is a barrier to the adoption of new practices. They conducted a field experiment in which an auto repair firm provided checklists to mechanics. Mechanics' productivity increased significantly when they used the checklist, but they only did so when the firm directly monitored their use.

Sometimes firms do not adopt more efficient technologies, even when they are cheap, due to procrastination. Duflo, Kremer and Robinson (2011) found evidence of such behavior in Kenyan farmers: offering free delivery of fertilizers (a small reduction in the cost) to a randomly selected subset of farmers just after the harvest (when farmers have money) increased fertilizer use by 47–70%. This effect was greater than offering free delivery plus heavy subsidies on fertilizers (50% off) later in the season.

Business owners may also demonstrate learning failures: they may fail to notice important features of the data they possess, even when they have experience. Hanna, Mullainathan, and

Schwartzstein (2014) ran a field experiment with seaweed farmers in Indonesia and found that they optimized their pod spacing, about which all farmers had an opinion, but used suboptimal methods on pod size – on which most of them had no opinion (i.e., they were not attending to this particular input dimension). Simply providing the farmers with the relevant data did not induce learning, but farmers did increase their adoption of better methods once presented with summaries highlighting the previously unattended dimensions.

Social connections can also be a determinant of adoption. Bandiera and Rasul (2006) analyzed how farmers' decisions to adopt a new crop depend on the adoption choices of friends and family, and found the relationship to be inverted-U shaped: positive social effects appear when there are few adopters in the farmer's network of friends and family, especially when they are poorly informed about the new crop. The adoption decisions of farmers in religion-based networks were less correlated.

Two recent papers have shown that networks serve as an important means of accessing information on new technologies. Fafchamps and Quinn (2018) randomly linked managers of African manufacturing firms and found significant diffusion of firm business practices in terms of VAT registration and having a bank account (though no significant effect was found on labor management, relations with clients and suppliers, or innovation) among linked firms. Rather than randomly generating a network, Hardy and McCasland (2017) studied skill-based diffusion in an *existing* network of garment firms in Ghana, and found that competition can be an important barrier to technology diffusion because it makes incumbents less willing to provide information on the new technology to adopters.

Brooks, Donovan and Johnson (2016) randomly matched young microenterprise owners with older, successful local firms in Kenya to study the dynamic responses of matched firms. The interaction proved to be an effective means of increasing business profits among microenterprises: over the 12 months following the treatment, weekly profits were on average 20% higher among mentees than in the control groups, with no effect on mentors – which implies that the matches created by the intervention generated profit, and were not simply a transfer between matched businesses. Cai and Szeidl (2018) organized business associations among owner-managers of young Chinese firms. They randomized firms into small groups whose managers met regularly for one year, and found significant and persistent improvements in sales, profits, innovation, and management

practices. Learning from peers (especially when they were not competitors) and better supplier–client matching were two channels through which those effects operated.

Risk also affects adoption. Giné and Yang (2009) implemented a randomized field experiment to investigate whether providing insurance against a major production risk (rainfall) induced maize and groundnut farmers in Malawi to take out loans to adopt a new crop technology. All farmers were offered a loan to purchase high-yielding seeds, but half of them were also required to purchase a weather insurance policy. Take-up was 33% in the no-insurance group, but only 18% among farmers whose loans were insured against poor rainfall. A potential explanation is that farmers were already implicitly insured by the limited liability clause in the loan contract, so adding formal insurance amounted to a higher interest rate on the loan. Emerick et al. (2016) used a randomized experiment to show that a technological innovation that reduced production risks boosted agricultural productivity through crowding in other investments: the improved technology induced farmers to adopt a more labor-intensive planting method, and to increase their cultivated areas, use of fertilizers, and demand for credit.

4.1.4. Corporate governance

Klapper and Love (2004) found that better corporate governance (as measured by higher firm-level corporate governance rankings) was highly correlated with better operating performance and market valuation in a sample of 374 firms in 14 emerging markets, and that good corporate governance matters more in countries with weak legal environments.

Holmström and Kaplan (2001) argued that the waves of takeovers in the 1980s and 1990s in the United States were motivated by potential efficiency gains, and that the increase in productivity levels in those years was consistent with takeovers improving productivity, but many other explanations are also possible. Tian and Twite (2011) measured firm performance directly through TFP in a sample of Australian companies over the 2000–2005 period, and found no association between the level of industry-level takeover intensity and productivity.

Bertrand and Mullainathan (2003) report direct evidence that takeovers have a beneficial effect on productivity. They exploit variation in corporate governance generated by the adoption of antitakeover laws in US states to investigate the causal impact of antitakeover legislation on plant-level productivity. They found that TFP declined following adoption of such laws in each state. Thus, according to their results, better corporate governance (through the disciplining effect of a

potential takeover) improves economic performance. Employee wages rose when managers were insulated from takeover attempts, and both the rates of plant destruction and creation fell, roughly offsetting each other.

With respect to ownership structure, Yu and Wang (1999) found that labor productivity tended to decline with state shareholding in publicly listed firms in China in the period 1993–95, a pattern that is consistent with the government pursuing political objectives (such as excess employment) rather than profit maximization. Barth, Guldbrandsen and Schonea (2005) documented a negative relationship between family ownership and firm productivity in a panel of Norwegian firms (see also Martikainen, Nikkinen and Vähämaa 2009). Kim (2006), however, found evidence of a positive association between family ownership concentration and firm-level TFP in Korean manufacturing firms.

Chiang and Lin (2007) analyzed the relationship between the ownership structure and TFP of 232 listed Taiwanese firms in the early 2000s. They found a non-monotonic relationship between TFP and inside ownership (proportion of shares owned by directors, top managers and large shareholders): firm productivity first increases with inside ownership, but then decreases. The authors also provided evidence of a positive association between the proportion of shares owned by institutional investors and firm TFP. Köke and Renneboog (2005) found that the presence of a dominant outside shareholder has a significant positive impact on firm productivity in poorly performing UK firms. Finally, Tian and Twite (2011) found only a weak association between a firm's ownership concentration and firm-level TFP, whereas Cowling (2003) found no effect of ownership concentration on the production of SMEs in the UK in 1995.

Concerning internal mechanisms of corporate governance, Klein (1998) documented a positive relationship between the percentage of inside directors (i.e., directors employed by the firm) on productivity committees (finance, investment and strategic issues) and measures of firm performance, such as relative net income, productivity of capital expenditures, and stock market returns, in U.S. S&P 500 firms for 1992 and 1993. Tian and Twite (2011) found that internal corporate governance mechanisms (more efficient boards and greater CEO stock-based compensation) improve firm-level TFP – especially when the firm does not face a very competitive product market, which suggests some substitutability between the two. However, no association was found between industry-level takeover intensity and the effectiveness of internal governance.

We end this subsection with a warning notice. Most of the previous studies document only conditional correlations (at best), so their results should be interpreted with caution given the endogeneity of corporate governance. With this caveat in mind, the existing results are mixed, and some effects are heterogeneous. Thus it is difficult to extract general lessons on the link between corporate governance and productivity. Clearly, much more research is needed in this area.

4.1.5. Value chain development

Arráiz, Henríquez and Stucchi (2013) evaluated the impact of a supplier development program in Chile that was designed to improve productivity by creating backward linkages between large firms and the local SME sector. Using a panel that includes data on the entire population of tax-compliant Chilean firms from 1998 to 2008 to identify the program beneficiaries and construct a pool of potential control firms, the authors showed that both large and small firms benefitted from the program (with effects that were still strong after three years): suppliers increased their sales, employment, salaries, and survival rates, whereas buyers increased their sales and their probability of becoming an exporter, but experienced no effect on employment, salaries, or survival rates. Bernard, Moxnes and Saito (2015) examined the impact of buyer–supplier relationships, geography and the structure of the production network on firm performance using data on supplier–customer links between firms for over 950,000 firms in Japan. By exploiting the 2004 opening of the southern portion of the high-speed rail lines in Japan as an exogenous reduction in search and outsourcing costs, they found that firms near new stations improved their performance after the opening. The accompanying model in their paper suggests that this firm-level performance improvement was due to the increased number of suppliers and sourcing locations, which in turn drove down the firms' marginal production costs.

An important component in some value chains (e.g., agricultural) are middlemen margins. Mitra et al. (2018) studied the determinants of these margins in potato farming in the Indian state of West Bengal. They conducted a field experiment in 2008 in which farmers in randomly chosen villages were provided with daily wholesale price information to mitigate the information asymmetry vis-à-vis middlemen. Providing this information had a zero average treatment effect on farm-gate prices and quantity traded. Their results indicate that middlemen (traders) earned large margins for two reasons: there was limited competition among traders, and farmers had almost no direct access to wholesale or retail potato markets (which prevented them from benefitting from the additional information).

Where written contracts are not enforceable in courts, reputations are important in buyer–supplier relationships. Macchiavello and Morjaria (2015) found evidence of the importance of reputations in the Kenyan rose export sector. They exploited an exogenous supply shock to rose exporters due to intense episodes of ethnic violence in January 2008 in some parts of Kenya. They showed that the volume of trade was constrained by the value of the relationship (which increases with the age of the relationship), and that during the negative supply shock, deliveries were an inverted-U function of the age of the relationship, which is consistent with a model of reputation and relational contracting in which sellers value acquiring and maintaining a reputation for reliability. Ghani and Reed (2018) studied the impact of buyer–supplier relationships (repeated trade between two parties) on manufacturer entry in a vertically related market for ice in Sierra Leone, and found that relationships could be flexible: rather than breaking down when they became less attractive to one party, informal agreements between buyers and suppliers were rapidly replaced by a new informal contract (with the same parties) that exchanged trade credit for loyalty, impeding the entry of new buyers who lacked such relationships.

Cluster development policies are popular among governments. But do they work? Figal Garone et al. (2015) used firm-level administrative data on Brazilian SMEs from 2002 to 2009 to estimate the direct and indirect (i.e., spillover) causal effects of participating in a cluster development program, the *Arranjos Produtivos Locais*, on a series of SMEs' performance indicators (employment, value of exports, and likelihood of exporting). Their findings show that the program had a positive direct impact on all three indicators: employment in direct beneficiary firms increased by 17%, their value of total exports by 90%, and their likelihood of exporting by around 8 percentage points. Furthermore, these positive effects seem to be constant or even increasing over time during the years after receiving the policy benefits. The indirect effects were less clear: the authors found partial evidence of a negative indirect effect on employment in the first year after the policy's implementation, but positive spillover effects on the value of total exports and the likelihood of exporting (especially in the medium and long term, although much smaller than the direct effects).

Aboal, Crespi and Perera (2017) used a synthetic control method to evaluate the impact of a cluster development policy in the tourism industry in the region of Colonia, Uruguay through a comparative analysis of Colonia vs. other tourist regions of the country. Their estimations show that the cluster program produced a 30% increase in the inflow of international tourists to Colonia in the

period 2008–2015, but had no significant impact on total tourist expenditures (i.e., firm revenues), which could be explained by a composition effect in the total number of tourists visiting Colonia.

Our review has demonstrated that there is scare evidence of the impact of cluster development policies in LAC. Further evidence of the positive effects of cluster-oriented policies in the developed world can be found in Falck, Heblich and Kipar (2010) for Germany; Martin, Mayer and Mayneris (2011) for France; and Nishimura and Okamuro (2011) for Japan.

4.2. External factors

4.2.1. Access to credit

McKenzie and Woodruff (2008) ran an experiment that randomly assigned cash and in-kind grants to small retail firms in Mexico and found large increases in monthly profits in treated firms that lasted at least one year after the intervention. The treatment effect was heterogeneous: firms that reported no financial constraints showed only negligible changes in profits, while those that were more financially constrained experienced the largest impacts. De Mel, McKenzie and Woodruff (2008) found similar effects for randomized grants to Sri Lankan microenterprises two years after the treatment. They also discovered other dimensions of heterogeneity in treatment effects; for example, returns were higher for more able entrepreneurs and in enterprises owned by males. Fafchamps et al. (2014) randomly gave cash and in-kind grants to microenterprises in urban Ghana, and found that the latter were more likely to increase their profits – especially among female-owned microenterprises.

Recently, McKenzie (2017) has shown that the positive effects of relaxing credit constraints can be longer 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. Kapoor, Rajan and Raychaudhuri (2012) exploited a natural experiment in India, where a policy change made small firms eligible for subsidized direct credit in 1998, and a subsequent reversal of that policy in 2000 made some of those firms ineligible. Among firms affected by the policy change, the rate of short-term credit increased by 18% and total bank borrowing increased by 20%. More credit also led to a 22% increase in export revenues among these businesses. The policy reversal in 2000 had almost no effect on bank borrowing or export revenues for eligible firms. Given the positive performance of these firms, banks had no reason to reduce their credit limit and firms continued to borrow at the market interest rate.

Providing directed credit is not the only intervention a government can undertake to increase firms' access to credit; it might not even be the most important mechanism. According to Beck et al. (2008), banks all over the world rate government-backed partial credit guarantees above directed credit and interest rate subsidies. Credit guarantee programs are used to address firms' lack of adequate collateral, by partially substituting the risk of the borrower with government risk. The evidence on the effect of such programs is mixed (Boocock and Shariff, 2005; Kang and Heshmati, 2008; Oh et al., 2009; Lelarge, Sraer and Thesmar, 2010; Chandler, 2012; and Arráiz, Meléndez and Stucchi, 2014). For instance, Arráiz, Meléndez and Stucchi (2014) found that firms in Colombia that benefitted from a credit guarantee program grew larger (both in terms of output and employment) than those that did not receive the government guarantee. However, the aid had no discernible effect on productivity, wages, or investment.

Firms can also be financially constrained in their access to insurance. Karlan, Knight and Udry (2015) exemplified the importance of correctly identifying which constraint is most binding when designing appropriate public interventions. They randomly assigned farmers in Ghana to receive cash grants, rainfall insurance grants, or a combination of both, and found that there were strong responses in agricultural investments to the insurance grant, but relatively small effects of cash grants – suggesting that uninsured risk was the binding constraint on farmer investment.

However, even among firms with access to credit under the classic microfinance model, this access might *dis*courage entrepreneurship. In a field experiment in India, Field et al. (2013) randomly allowed a two-month grace period in microfinance contracts and compared them to classic contracts (which require repayment to start immediately after disbursement). Clients who received loans with a two-month grace period invested approximately 6% more in their businesses, were more than twice as likely to start a new business, and had 41% higher weekly profits after nearly three years. However, clients who received a grace period were also more than three times as likely to default on their loans, possibly because the delay encouraged them to make riskier business decisions. These results suggest that the traditional microfinance model may reduce the risk of default, but also inhibit the growth of microenterprises.

4.2.2. Product market competition

Bloom et al. (2015b) exploit institutional features of the British public hospital and electoral systems (whereby public hospitals in areas where the central government is expecting a tight election are much less likely to be closed) to instrument for the number of hospitals (their measure of

competition) in a geographical area. The results indicate that more competition leads to improved hospital management and better hospital performance (in terms of quality, productivity, and staff satisfaction).

Cuñat and Guadalupe (2005) use the sudden appreciation of the British pound (interpreted as an increase in competition) in 1996 as a quasi-natural experiment, and exploit differences in the degree of openness to trade (a measure of exposure to foreign competition) across UK industries to implement a difference-in-differences strategy to study the causal effect of product market competition on the explicit compensation packages of CEOs, executives, and workers. Their results show that competition increases the slope of performance-related pay, especially for executives.

Aghion et al. (2005) investigate the link between competition and innovation using panel data from UK firms, and find strong evidence of an inverted-U relationship, which their instrumental variable approach suggests is causal. To address endogeneity concerns, the authors exploit major policy reforms that drastically altered the strength of competition across industries and over time. Aghion et al. (2018) report very similar results in two laboratory experiments that provide exogenous control over the degree of competition – thus lending further support to a causal interpretation. Bloom, Draca and Van Reenen (2016) use the removal of product-specific quotas after China entered the World Trade Organization in 2001 as a quasi-natural experiment to obtain a source of exogenous variation in competition. They find that competition had a robust effect on innovation in the firms most affected by competition from Chinese imports. Interestingly, the effect is heterogeneous: innovation increased in surviving (high-tech) firms, but employment and survival rates were reduced in low-tech firms.

Guadalupe and Wulf (2010) show that global competition among corporations shapes the internal organization of firms. They use trade liberalization as a quasi-natural experiment and tariff differentials across a broad set of manufacturing industries to implement a difference-in-differences strategy. They find that increased competition leads firms to flatten, i.e., reduce depth (the number of management levels) and increase breadth (the CEO's span of control). Gil and Ruzzier (2018) also provide evidence that competition has a causal effect on firm organization. Exploiting regulation-induced shocks to entry barriers and differences in regulation enforcement across cities to obtain exogenous variation in competition, the authors empirically investigate whether changes in product market competition affect firm boundaries. They find that competition has a negative causal

effect (through reduced entry barriers and a larger number of rival firms) on vertical integration in the setting of the Spanish local television industry.

4.2.3. Business climate and regulatory framework

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, and 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, McKenzie and Woodruff, 2013). But have such policies been successful?

Perry et al. (2007) distinguish between two competing views of reforms designed to encourage firms to formalize: exclusion and exit. 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. This is consistent with the responses of informal micro-firms in Mexico: 75% think that informality is just not worth it, whereas fewer than 15% believe that becoming formal is either too expensive or time consuming (McKenzie and Woodruff, 2006). This conclusion is also consistent with La Porta and Shleifer's (2008) finding that the main competitive problem of small informal firms is not government regulation, but the fact that they add very little value.

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, McKenzie and Woodruff, 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.

4.3. Fit among internal and external factors

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, Section 4.1.1 pointed out 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, Bjorvatn and Tungodden, 2015; Karlan, Knight and Udry, 2015). Likewise, Section 4.1.2 highlighted that 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). Section 4.1.3 demonstrated that 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).

5. 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, but

much lower than corresponding figures for 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; corporate governance; value chain development; access to credit; product market competition; and business climate and regulatory framework. The relative importance of each of these determinants is an empirical matter that we leave to future studies.

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. The little evidence that is available, however, is from small-scale interventions. Thus, much research is still needed in this area to support public policy and firm-level decision making.

External factors are more readily influenced by policy. Table 5.1 reports which external factors firms consider the most serious obstacles to their current operations based on their responses to the WBES survey. The most frequently mentioned obstacle is the practices of competitors in the informal sector, followed by access to finance and tax rates. Table 5.2 lists the five biggest obstacles by firm size: 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.

Finally, lessening PPDs is complicated by complementarities among the many factors identified in this paper. Firms may be trapped in a low-productivity situation if they are unable to make large, coordinated changes in all of the interrelated factors. As Bloom et al. (2013: 28) put it, "[a]ttacking single constraints in a disjointed way is unlikely to work."

Table 5.1. Biggest Obstacles Affecting Firms' Operations

Biggest Obstacle	Freq.	Percent
Practices of competitors in the informal sector	2,674	20.0%
Access to finance	1,642	12.3%
Tax rates	1,372	10.3%
Political instability	1,145	8.6%
Electricity	1,102	8.3%
Inadequately educated workforce	1,055	7.9%
Labor regulations	1,044	7.8%
Corruption	888	6.6%
Crime, theft and disorder	670	5.0%
Tax administration	523	3.9%
Business licensing and permits	418	3.1%
Customs and trade regulations	322	2.4%
Transport	220	1.6%
Access to land	141	1.1%
Courts	140	1.0%
Total	**13,356**	**100.0%**

Source: WBES

Table 5.2. Five Biggest Obstacles by Firm Size

Micro		Small	
5 Biggest Obstacles		**5 Biggest Obstacles**	
Practices of competitors in the informal sector		Practices of competitors in the informal sector	
Access to finance		Access to finance	
Electricity		Tax rates	
Corruption		Electricity	
Tax rates		Political instability	
Cum. Percentage	**64%**	**Cum. Percentage**	**61%**

Medium		Large	
5 Biggest Obstacles		**5 Biggest Obstacles**	
Practices of competitors in the informal sector		Practices of competitors in the informal sector	
Tax rates		Political instability	
Access to finance		Labor regulations	
Inadequately educated workforce		Tax rates	
Political instability		Access to finance	
Cum. Percentage	**58%**	**Cum. Percentage**	**56%**

Source: WBES

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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**