Appendix A: English translation of the services questions

1) **In 2014, what best describes what happened at this firm when a problem in its processes arose?**
   Example: a problem with inventories, problems with transportation, technical failures, human resources management, customer services, etc.
   1) We fixed it but did not take further action
   2) We fixed it and took action to make sure that it did not happen again
   3) We fixed it and took action to make sure that it did not happen again, and had a continuous improvement process to anticipate problems like these in advance
   4) No action was taken

2) **In 2014, how many key performance indicators were monitored at this firm?**

Examples, cost, sales, inventory, customer satisfaction, service levels, energy, absenteeism and deliveries on time

   1) 1-2 key performance indicators
   2) 3-9 key performance indicators
   3) 10 or more key performance indicators
   4) No key performance indicators (If no key performance indicators in both years, SKIP to 6)

3) **During 2014, how frequently were the key performance indicators reviewed by managers at this firm?**

A manager is someone who has employees directly reporting to them, with whom they meet on a regular basis, and whose pay and promotion they may be involved with, e.g., Marketing Manager, Human Resources Manager, Sales Manager.

   1) Yearly
   2) Quarterly
   3) Monthly
   4) Weekly
   5) Daily
   6) Hourly or more frequently
   7) Never

4) **During 2014, how frequently were the key performance indicators reviewed by non-managers at this firm?**

Non-managers are all employees at the firm who are not managers as defined in 3.

   1) Yearly
   2) Quarterly
   3) Monthly
   4) Weekly
   5) Daily
   6) Hourly or more frequently
   7) Never

5) **During 2014, where were the display boards/notice board showing key performance indicators located at this firm?**
   1) All display boards were located in one place (e.g., at the warehouse, etc.)
   2) Display boards were located in multiple places (e.g., multiple areas of the firm)
   3) We did not have display boards

6) **In 2014, what best describes the time frame of targets at this firm? Examples of targets are: sales, inventories, service levels, efficiency, on-time delivery.**
   1) Main focus was on short-term (less than one year) targets
   2) Main focus was on long-term (less than one year) targets
   3) Combination of short-term and long-term targets
   4) No targets

7) **In 2014, how easy or difficult was it for the firm to achieve its targets?**
   1) Possible to achieve without much effort
   2) Possible to achieve with some effort
   3) Possible to achieve with normal amount of effort
   4) Possible to achieve with more than normal effort
   5) Only possible to achieve with extraordinary effort

8) **In 2014, who was aware of the targets at this firm?**
   1) Only senior managers
   2) Most managers and some operational level employees
   3) Most managers and most operational level employees
   4) All managers and most operational level employees

9) **In 2014, what were non-managers' performance bonuses usually based on at this firm?**
   1) Their own performance as measured by targets.
   2) Their team or shift performance as measured by targets.
   3) Their establishment's performance as measured by targets.
   4) Their company's performance as measured by targets.
   5) No performance bonuses

10) **In 2014 when targets were met, what percent of non-managers at this firm received performance bonuses?**
   1) 0%
   2) 1-33%
   3) 34-66%
   4) 67-99%
   5) 100%
   6) Production targets not met

11) In 2014, what were managers' performance bonuses usually based on at this firm?

1) Their own performance as measured by targets.
2) Their team or shift performance as measured by targets.
3) Their establishment's performance as measured by targets.
4) Their company's performance as measured by targets.
5) No performance bonuses

12) In 2014 when targets were met, what percent of managers at this firm received performance bonuses?

1) 0%
2) 1-33%
3) 34-66%
4) 67-99%
5) 100%
6) Production targets not met

13) In 2014, what was the primary way non-managers were promoted at this firm?

1) Promotions were based solely on performance and ability
2) Promotions were based partly on performance and ability, and partly on other factors (for example, tenure or family connections)
3) Promotions were based mainly on factors other than performance and ability (for example, tenure or family connections)
4) Non-managers are normally not promoted

14) In 2014, what was the primary way managers were promoted at this firm?

1) Promotions were based solely on performance and ability
2) Promotions were based partly on performance and ability, and partly on other factors (for example, tenure or family connections)
3) Promotions were based mainly on factors other than performance and ability (for example, tenure or family connections)
4) Non-managers are normally not promoted

15) In 2014, when was an under-performing non-manager reassigned or dismissed at this establishment?

1) Within 6 months of identifying non-manager under-performance
2) After 6 months of identifying non-manager under-performance
3) Rarely or never

16) In 2014, when was an under-performing manager reassigned or dismissed at this establishment?

1) Within 6 months of identifying manager under-performance
2) After 6 months of identifying manager under-performance
3) Rarely or never

Appendix B: Data

B.1. Main data source: ENAPROCE 2015

We use data from the National Survey on Productivity and Competitiveness of Micro, Small, and Medium-size Enterprises 2015 (ENAPROCE), which is the first large-scale representative management survey conducted for Mexico. This survey uses the 4,049,051 establishments included in the 2014 Economic Census as the sample frame. The establishments from the Economic Census were grouped into firms, and then 26,538 firms were chosen through random stratification to allow statistical representativeness at the sectoral-state level for SMEs, and at the sectoral-regional level for microenterprises. From this sample, the non-response rate was of just 4% due to the mandatory nature of the survey as established in article 45 of the Mexican Law of the National System of Statistical and Geographical Information (Appendix Figure A1).

In contrast with the Economic Census and other surveys implemented by INEGI which analyze establishments, ENAPROCE uses the firm as the unit of observation, with a total sample size of 25,456. 90% of the firms in the sample have just one establishment.

Out of the 25,456 firms in the sample, 16,100 have more than ten employees. By design, the ENAPROCE uses a different questionnaire for Microenterprises, considering that these firms have different characteristics. In the case of Management Practices, only a subset of four questions was applied. Therefore, we exclude microenterprises of the analysis to ensure full comparability with the U.S. MOPS.

The sample is further restricted to firms with non-missing sales, employment, capital, and materials data, alongside other key fields like industry classification.

B.1.2. Sectors included in the survey

Firms included in ENAPROCE 2015 were defined according to the North American Industry Classification System (NAICS) sample and consist of the following two-digits codes.

NAICS code	Description
31-33	**Manufacturing**
	Services
43	Wholesale
46	Retail
48-49	Transportation and Warehousing
54	Professional, scientific and technical services
56	Administrative and support, waste management and remediation services
71	Arts, entertainment and recreation
72	Accommodation and food services
81	Other services (except public administration)

**Financial, educational, and government services are excluded from the sample*

B.2. Additional Data Sets

2014 Economic Census: To analyze the robustness of our estimates of the relation between performance and management, we use information from the 2014 Economic Census, INEGI. This is a good robustness test firstly, because the Economic Census includes data for 2013, while ENAPROCE requests data for 2014, secondly, because the unit of observation of the Census is the Establishment while ENAPROCE analyzes the firm, and finally, because though the sample for ENAPROCE is selected using the Economic Census as its sampling framework, the projects are independent.

As the unit of observation of the Economic Censuses is the establishment, establishments were aggregated into firms to make the data entirely comparable with the one from the ENAPROCE 2015.

The share of exports is also obtained from the 2014 Economic Census, INEGI and it is calculated at the 6-digits NAICS level.

Distance to the U.S. border: we calculate the drive time between the municipality in which each firm is located to any of the three most important border crossings between Mexico and the U.S.: Tijuana, El Paso, and Nuevo Laredo. To construct this indicator, as the exact location of each firm is not included in the data set, we calculate the centroid of each municipality and then compute the drive time between it and each of the three border crossings using openstreet map through the Stata command osrmtime. Finally, we take the minimum time to the border in hours.

2010 Population and Housing Census: We obtained population data at the municipality level from the Census. Additionally, income data from this Census was combined with information from the National Survey of Household Income and Expenses (ENIGH) using the Small Areas Estimates Methodology to construct household per capita income.

US MOPS data: The data from the US MOPS that we present in some of our graphs as a comparator for Mexico, was obtained directly from the graphs presented in Bloom et al. (2019) using a program called Plot Digitizer. We never had direct access to the original data from the US MOPS.

MA definitions were obtained from the National Council of Population (MA), while the source for city size definition is the U.S. Census.

B.3. Variables construction

B.3.1 Performance

Value added/worker: Value added is calculated by subtracting the consumption of materials (M_i) and energy (E_i), which consists of electricity and fuels, from the gross value of production of the firm Q_i , following Bloom et al. (2018b):

$$VA_i = Q_i - M_i - E_i$$

Where Q_i is calculated as the sum of sales and inventories change. Value added is then divided by the total number of employees in the firm.

Total Factor Productivity (TFPR): To construct our measure of TFP, we follow Aw et al. (2000), and we calculate a Törnqvist index as follows:

$$lnTFP_i = \ln(Y_i) - \ln(\bar{Y}) - \frac{1}{2}\left[\sum_{j=1}^{k}(S_{ij} + \bar{S}_j)(\ln(X_{ij}) - \ln(\bar{X}_j))\right]$$

Where

$TFP_i = TFP_i\ index$
$Y_i = Revenue\ of\ firm\ i$
$\bar{Y} = Revenue\ of\ average\ firm$
$S_{ij} = Revenue\ share\ of\ input\ j\ for\ firm\ i$
$\bar{S}_j = Average\ revenue\ share\ of\ input\ j$
$j = Labor, capital, and\ materials\ expenses\ (raw\ materials, fuel, electricity, etc.)$
$X_{ij} = Value\ of\ input\ j\ at\ firm\ i$
$\bar{X}_j = Average\ value\ of\ input\ j$

Profitability: Profitability is measured as operating profits (value added minus wages and salaries) normalized by sales.

Exporters: In Figure 1, the share of firms that export in each decile is measured as the percentage of firms that report exporting in each decile.

R&D expenditure per employee: R&D expenditure is converted into U.S. dollars using the average exchange rate for 2014 (13.03056) and then divided by the number of employees.

Patents: In the case of patents, the question included in ENAPROCE 2015 only asks whether the firm has any patents or not. Therefore, we used this dummy variable to calculate the share of firms in each decile of management practices that have patents.

Number of employees: The number of employees consists of the total number of workers of the firm, including those that do not receive a salary and those that work for the firm but do not have a contract directly with the firm. This is a standard definition of employment in all the projects conducted by INEGI (the Economic Census, other surveys, etc.)

B.3.2 Management score:

The management score is calculated following Bloom et al. (2019). For each of the 16 questions, a score of 1 is associated to the most structured management practices (the one that is more specific, formal, frequent or explicit) and a score of 0 to the less structured practice, with all responses in between receiving a fraction of the score depending on the order. For example, when there are four possible responses for a question, the possible scores are 0, 1/3, 2/3 and 1. Once all responses are scored, the overall management score for a firm is calculated as an unweighted average of the 16 questions. We also calculate the two sub-indexes that Bloom et al. (2019) present, which identify

monitoring practices (i.e., data-driven performance monitoring) and human resources practices (i.e. incentives and targets).

B.3.3 Other characteristics of the firm

Drive time to the border (hrs): As previously mentioned in the data sources, we calculated drive time to the border in hours using the drive time between the centroid of the municipality in which each firm is located to any of the three most important border crossings between Mexico and the U.S.: Tijuana, El Paso, and Nuevo Laredo. Then, we calculated the minimum value of these three drive times and that is the indicator we use in our regressions.

Share of exports from the 2014 Economic Census: As we want to measure the exposure of each sector to the external sector, we wanted to obtain a measure from a different source than ENAPROCE 2015. Therefore, we calculated this using the 2014 Economic Census. We calculate this share using information at the NAICS 6-digits level and it is calculated as exports divided by total sales. Therefore, a 1 percentage point change in this variable is a change of 0.01.

Foreign Direct Investment (FDI): As shown in Table A1 (Descriptive Statistics), we construct two alternative measures of FDI, FDI1, which takes a value of one if the firm has any participation of FDI, and FDI2, which indicates 50% or more of FDI in the firm.

Capital-per-worker: Capital stock of structures and equipment (at present or replacement value) divided by the total number of employees in the firm. As we are only considering one year (2014), our measure does not face the problems of differences in accounting methods over the years.

Share of white-collar workers: It is calculated as the ratio of white-collar workers over total workers.

Share of workers with a college degree: It is calculated as the ratio of workers that obtained a college degree over total workers.

Population density: Population density at the Metropolitan Area (MA) level was obtained by aggregating municipality data on population and the extension of the municipality (in square kilometers) for the municipalities that compose each MA.

Average income: Average income is obtained as an MA level average of the household per capita income estimates at the municipality level using the Small Areas Estimates Methodology, which combines the 2010 Population and Housing Census with information from the 2010 National Survey of Household Income and Expenses (ENIGH).

City size: We follow the definition from the US Census and classify cities according to their population.

Small urban area=population less than or equal to 200,000

Medium urban area=population higher than 200,000 and less than or equal to 500,000

Metropolitan area= population higher than 500,000 and less than or equal to 1,000,000

Large metropolitan area= population higher than 1,000,000

It is important to note that the definition from the OECD is very similar to the one we use.

Regions: Regions used as controls in this paper are based on the classification used by INEGI on its National Account System to summarize the trimester indicator of state economic activity. The regions are defined as follows:

North: Baja California, Baja California Sur, Coahuila, Chihuahua, Nuevo Leon, Sinaloa, Sonora, and Tamaulipas.

Central-North: Aguascalientes, Colima, Durango, Guanajuato, Jalisco, Nayarit, San Luis Potosí, and Zacatecas.

Centre: Mexico City and the State of Mexico.

Central-South: Guerrero, Hidalgo, Michoacan, Morelos, Puebla, Queretaro, and Tlaxcala.

South-Southeast: Campeche, Chiapas, Oaxaca, Quintana Roo, Tabasco, Veracruz, and Yucatan.

After constructing these indicators, all continuous variables were winsorized at the 1% and 99% levels by sectors. For the cases in which there are many zero values in a variable that uses a logarithmic function, we use the inverse hyperbolic sine transformation.

Appendix C: Other results[1]

Correlates of Management

We also briefly analyze some other results that confirm previous studies and a few novel ones that could not be studied previously because of data limitations.

First, we confirm strong differences in management practices by ownership type. In particular, family-owned firms with family CEOs tend to have the worst management practices, while foreign-owned or publicly listed (small shareholder) owned firms tend to have the best management practices. These results are generally robust to controls for industry, size, skills, and capital intensity.

Second, we find strong relationships between employee training and management practices. Firms that report providing training to their employees have significantly higher management scores. This result is robust to a full range of firm and industry controls, including employee education (which training could potentially be a proxy for).

Dynamic analysis of misallocation: Robustness test

To test the robustness of the results presented in Table A4, we analyze an alternative definition of exit. Besides firms that closed permanently and those that couldn't be found, we include firms that have closed temporarily. Our results are not sensitive to the difference in definition; the relationship between management and exit is tighter for manufacturing firms, indicating once again that the selection mechanism is not working that well in the service

[1] Results for this Appendix are not shown here, but are available upon request.

sector, and employment grows more in manufacturing as management practices improve. As in Table A4, we obtain similar results when using labor productivity instead of management.

Finally, we analyze if the results for management are robust to controlling for other measures of performance like labor productivity (value-added per worker) and capital-per-worker. Management remains a relevant measure for both the manufacturing and service sectors, even after accounting for the other performance variables. Furthermore, the coefficients of the management score are still lower for the service sector for both growth and exit, once again indicating that selection and employment growth are lower in this sector, which, as mentioned in the text, can be explained by greater frictions.

Reallocation and Proximity to the US Border: Robustness Tests

First, we test the robustness of our results on the size-management relationship according to proximity to the US border and local market size (Table 3 in the text). Our results do not change much if we exclude our sectoral and geographical controls. The magnitudes of the coefficients associated with the drive time-management and market size-management interactions are very similar to the original specification, and the sectoral differences remain. Furthermore, measuring drive time and market size as continuous variables, as an alternative to our above/below the median dummies, yields qualitatively similar results. Once again, manufacturing firms closer to the US border (especially export-intensive industries) and services firms in larger local markets exhibit a stronger relationship between management and size. Finally, our main results are robust to further controlling for the interactions of our drive-time and market-size dummy variables with other variables correlated with management (capital, share of white-collar workers, and education).

Following our analysis of the differences in management practices according to proximity to the border (Figure 7), we further tested the robustness of these results in a regression framework. We estimated regressions of our management score on drive time (hours), including interactions of a manufacturing dummy with drive time as well as with other standard covariates. The coefficient of the manufacturing and drive time interaction is an order of magnitude larger than the linear drive time coefficient. Our results indicate that higher proximity to the US (measured as a lower drive time) is related to a higher management score only in the manufacturing sector. A decrease from the 90th to the 10th percent in drive time is associated with an increase of 0.05 in the management score and a 15% increase in TFP. In services, we see no relationship.

In order to analyze whether the effects of the distance drive our results to the US or by a selection problem in which better-managed firms decided to locate closer to the US border after the entry into force of NAFTA, we restrict our sample to those firms that were alive in 1990 or earlier. Estimating the same equations for this subsample, the results hold, as the coefficient of the drive time to the border variable is only statistically significant for the manufacturing firms, and the magnitudes observed are basically identical to the ones obtained for the whole sample. Repeating this analysis using TFP as the dependent variable, reassuringly, leads to very similar results to those using management, being an almost order of magnitude larger in manufacturing than services.

As our sample is not at the establishment level but at the firm level and the location of the firm for multi-establishment firms is defined as the municipality in where the head office is located, we test the robustness of our results by restricting our sample to those firms that do not have more than one establishment (90% of the sample). Our results are robust to restricting the analysis only to single-plant firms confirming that firms with multiple plants and which location is assigned to their head office are not biasing our results.[2]

We further tested the relevance of being near the US border by constructing a dummy variable that takes the value of one if the municipality is located along the US border or if it is a neighbor of a municipality that shares a border with the US. We identified 72 municipalities that fulfill this requirement. Out of our sample of 16,100 firms for 2014, only 1,315 are located in this area. Once again, we observe that manufacturing firms, without controlling for other factors, tend to have better practices than firms from the services sector, but manufacturing firms located in the border area tend to have more structured practices.

As another robustness test of drive time to the US border as a proxy for market access, we analyzed a variable that takes the minimum between flight time and drive time to the US. The idea is that if proximity represents greater ease of monitoring by a US HQ (see Giroud, 2013), US customers, or even lower costs of obtaining valuable service inputs such as US management consulting, then it should be flight times that dominate. Horse races show that including this variable along with drive time, market access (drive time) is what really matters for manufacturing. Since drive time is most relevant for manufacturing goods, this again supports the competition interpretation of proximity.

Exposure to trade <u>within</u> the Manufacturing sector

The contrast of the proximity results across manufacturing and services is interesting, but of course, there are many other differences between these broad sectors that could be generating the heterogeneity of the drive time coefficient that we have not controlled for. To better test our hypothesis, we build a NAICS-6 digit industry-level indicator of the export share of sales. If our hypothesis that proximity to the US reflects the stronger effects of competition from a bigger market, then the proximity coefficient should be stronger for firms in industries that are more open to international trade.

Adding an interaction between the industries' export intensity and drive time (along with interactions with other observable covariates) shows that US proximity has a significantly stronger association with management for the more export-intensive sectors. We observe the same relationships for TFP as for management.

We tested the robustness of all these results by re-estimating this equation using a ten-year average sectoral share of exports with information from the 2004 and 2014 Economic Censuses as well as export averages using the 2004 and the 2009 Economic Censuses. The results are robust to these changes in the measure of sectoral export orientation.

[2] We also tested the robustness of our result using a different definition of regions, and we observe that the results do not change.

An additional concern is that the results might be driven by the importance of two main states: Mexico City, which is located in the central region of the country, and Nuevo Leon, which is located near the Northern border of the country. According to the 2014 Economic Census, these two states account for 17% of Manufacturing Gross Product and 34% of Services Gross Product. The results do not change significantly when we estimate the same equations but exclude these states.

City Density and Reallocation in the Service Sector: Robustness Tests

Testing the robustness of our results on market size, we estimate the relationship between management and market size in a regression framework. The coefficient on the linear city size variable is small, negative, and insignificant, whereas the interaction between the services dummy and market size is positive, large, and statistically significant. A similar pattern holds when we condition on other covariates or split the sample by manufacturing and service sectors. We further assess the robustness of these results by using alternative proxies for market size based on population size. We use a dummy that indicates whether the municipalities are small urban areas, medium, metropolitan areas, or large metropolitan areas. As the municipalities grow in market size, the management score for the services sector improves, but the same is not observed for manufacturing.

In an alternative specification using the TFP index as the dependent variable, we find that local city size matters for productivity in services, but not in manufacturing. The absence of a city-size effect on productivity may appear surprising, as there is a vast economic geography literature that argues for higher productivity effects in large cities. It is worth noting, however, that most individuals and firms are not in manufacturing, so some of the existing empirical studies are likely driven by the services sector.[3] Furthermore, most of the studies are in high-wage countries where agglomeration effects may be stronger than in a middle-income country like Mexico.

One concern with our results is that the average income could reflect the presence of more skilled potential employees. We disaggregate our market size measures by including income and population density as separate variables to address this. We find that our local size effects are driven by population density that has a similar statistically significant coefficient, but income is insignificant.[4]

It is possible that these results are driven by reverse causality or omitted location-specific confounders. To partially address this, we use population density and income in the 1990 Population and Housing Census as an instrument for the 2010 market size data. The results do not change much.

Finally, we estimated the same equations again, excluding Mexico City and Nuevo Leon, and confirm that our results are robust to excluding these two main cities.

[3] A smaller literature uses plant and firm level data in manufacturing. Some of these studies do find significant and positive city size effects, but all the ones that we know of are in high wage countries (e.g., Combes et al., 2012).

[4] As before, the variables are insignificant in the manufacturing sector.

Institutional Frictions and Misallocation: Robustness Tests

We analyze the robustness of the results presented in Figure 12 and Table 4, by using a different threshold (5%) to define a high level of contract enforcement problems, kidnapping, corruption, and our business crime composite index. Our results are robust to using this alternative threshold.

Appendix D: Municipalities analysis

As previously mentioned, out of the 2,456 municipalities in Mexico, the sample of SMEs and large manufacturing and services firms covers only 254 municipalities. Furthermore, in the case of the Manufacturing sector, 100 municipalities cover 89% of the firms in the sample. Except for Mexico City, State of Mexico, Jalisco, Nuevo Leon, and Guanajuato, all the states have five municipalities or less among these 100 municipalities.

Similar information is observed for the Services sector, where 100 municipalities concentrate 88.3% of the sample. Ten states have more than ten municipalities with firms of the services and commerce sectors. Furthermore, most of these main 100 municipalities are the same identified for manufacturing.

Considering this distribution of firms across municipalities and states, we decided to use regional effects in our estimates instead of state effects.

Appendix E: A Simple Model

Baseline Model

Consider a Production Function for firm *i* in an industry (for brevity, we keep the industry subscripts on parameters implicit):

$$Q_i = M_i {L_i}^{\alpha} \tag{E1}$$

Where Q is output, L is labor, and M is managerial quality. This follows the Lucas (1978) span of control model where α is the managerial span of control ($\alpha < 1$ represents the degree of managerial overload which generates decreasing returns to scale).

We allow for imperfect competition in the product market. Consider monopolistic competition with Dixit-Stiglitz preferences. This generates an iso-elastic product demand function:

$$Q_i = B {P_i}^{-\eta} \tag{E2}$$

Where B is a demand shifter[5], P is product price, and η is consumer price-sensitivity, $\eta > 1$.

[5] This would be $B = \tilde{B}\mathrm{QP}^{\eta}$ in the model of Alessandria and Choi (2007) where Q = industry output and P = industry price.

We assume that input markets are competitive, so firms face a common equilibrium wage (W). We model distortions as an implicit tax on revenues, as many/most regulations explicitly or implicitly bite more strongly on larger firms.[6] Formally, denote this implicit tax, $\tau \geq 1$ if $\tau = 1$ we are in an undistorted economy, but as τ gets larger, the economy is increasingly distorted through a higher implicit tax. Hence, profits for a firm are:

$$\Pi_i = (P_i Q_i)^{\frac{1}{\tau}} - WL_i \tag{E3}$$

Substituting in the (inverse) demand function for price ($P_i = B^{\frac{1}{\eta}} Q_i^{-\frac{1}{\eta}}$)

$$\Pi_i = \mathrm{B}^{\frac{1}{\tau\eta}} Q_i^{\frac{\eta-1}{\tau\eta}} - WL_i$$

Maximizing profits with respect to labor gives the first-order condition:

$$l_i = w + \left(\frac{\eta-1}{\tau\eta}\right) q_i + \frac{1}{\tau\eta} b + ln\alpha + ln\left(\frac{1}{\tau} - \frac{1}{\tau\eta}\right)$$

where lower case letters denote logs (e.g., $q = logQ$).

Now using the production function to substitute for output, q, and simplifying, we obtain:

$$l_i = \frac{\frac{1}{\eta\tau} b + ln\alpha + ln\left(\frac{\eta-1}{\tau\eta}\right)}{1-\alpha\left(\frac{\eta-1}{\tau\eta}\right)} + \frac{\left(\frac{\eta-1}{\tau\eta}\right)}{1-\alpha\left(\frac{\eta-1}{\tau\eta}\right)} m_i - \frac{1}{1-\alpha\left(\frac{\eta-1}{\tau\eta}\right)} w$$

or

$$l_i = \kappa + \frac{1}{d-\alpha} m_i - \frac{\alpha}{d-\alpha} w$$

where $\kappa = \frac{\frac{1}{\eta\tau} b + ln\alpha + ln\left(\frac{\eta-1}{\tau\eta}\right)}{1-\alpha\left(\frac{\eta-1}{\tau\eta}\right)}$, $d = \frac{\tau}{\left(1-\frac{1}{\eta}\right)}$ and $\mu = \frac{P}{c} = \frac{1}{\left(1-\frac{1}{\eta}\right)}$ is the firm's price-cost margin that increases as competition falls. We can think of d as a composite of frictions from the product market (i.e., monopoly power indexed by μ) and/or from regulatory/institutional distortions (τ). In the absence of frictions $d = 1$.

Proposition 1. $\frac{\partial l_i}{\partial m_i} > 0$ *Better Managed firms will be larger*

[6] This is because many smaller firms are exempt from regulations – see the discussion in Garicano et al (2016) on labor laws for example. Moreover, even when laws and regulations are not explicitly size contigent, they tend to be enforced more strictly for larger firms who are more visible to the authorities. See also Levy (2018) on the Latin American case and Hsieh and Olken (2014) for a general discussion. For similar approaches to modelling regulations see, for example, Guner et al (2006, 2008).

Proof. The elasticity of log employment size, l with respect to management quality, m is $\frac{\partial l}{\partial m_i} = \frac{1}{d-\alpha}$. Since $d \geq 1$ and $\alpha < 1$, this is positive.

Proposition 2. $\frac{\partial^2 l_i}{\partial m_i \partial d} < 0$. *The impact of management quality on firm employment size is decreasing in the degree of frictions.*

Proof. This can be directly seen from Proposition 1. The magnitude of the employment-management elasticity is decreasing with the size of frictions, d.

Corollary. $\frac{\partial^2 l_i}{\partial m_i \partial \mu} < 0$ and $\frac{\partial^2 l_i}{\partial m \partial \tau} < 0$. Increases in firm market power (falls in η cause a rise in margins μ) and increases in distortions (τ) reduce the elasticity of employment with respect to managerial quality. This is the key idea: as frictions increase, the impact of better management on firm size, although remaining positive, will decline.

Mapping the model to the empirics

There is a straightforward mapping of this set-up to the empirics. Table 1 on the production functions is the multi-factor extension to equation (E1) where we also allow for capital and skills to be other factors of production (this is a trivial extension to the production function). Propositions (1) – (2) are unaffected by including extra factors, so long as they are all statically optimized (see below for a discussion of adjustment costs and dynamic factors).[7]

The positive relationship between employment and management is shown in all of the tables as well as Figures 1 and 3. The intuition behind the stronger relationship between employment and management in the US than Mexico is that competition is higher and market distortions lower in the US, as in Proposition 2. In this case, τ and μ have (implicitly) country-specific subscripts. Similarly, the stronger relationship between size and management in the Mexican Manufacturing sector than in the Services sector (Table 2 and Figure 3) is that competition is stronger (due to international trade) and distortions lower (due to fewer regulations) in manufacturing. In this case, τ and μ have (implicitly) sector-specific subscripts.

The bulk of the paper uses other observables to shift τ and μ. In Table 3, we argue that the drive time to the border is a municipality-specific indicator of competition. Firms located closer to the US face effectively a greater degree of potential competition from US firms, with a larger substitution possible for consumers (Proposition 2). Hence, μ is lower, for these Mexican firms, so the relationship between employment size and management is stronger. This is equivalent to introducing an area subscript, i.e., $\tau = \tau_0 + \tau Drive_m$ where $Drive_m$ is the drive time to the US border in municipality m. Similarly, the argument that a larger market size in a city c will mean greater density and therefore more spatial competition in

[7] There are analogous conditions for capital inputs and output. Capital is harder to measure of course as it the volume of output as we do not have firm specific price deflators. This is why we prefer to focus on labor as our key firm size measure.

the Service sector (which, unlike manufacturing, is predominately locally traded), assumes $\mu = \mu_0 + \mu Size_c$. Finally, the frictions in Table 4 are also assuming that the distortions are shifted by the institutional environment in a geographical area.

Some Theoretical Extensions

There are multiple extensions one could make to the baseline model.

First, the simplest approach to extending the model, is to consider a sunk cost to entry before firms observe their realization of (stochastic) management as in the Melitz (2003) model. In this way, we observe young firms for a period before they exit if they have a low draw of management. The implication of this type of model is that (i) older surviving firms will have on average higher management scores and (ii) the variance of management practices for a cohort will shrink over time, as the lower tail of worst managed firms exits. The empirical moments in Figure 4 are consistent with point (i) and those of Figure 5 with point (ii).

Second, note that the set-up in Bartelsman et al. (2013) is close to our approach here as it emphasizes the robustness of the "Olley-Pakes moment" - the positive relationship between relative size and productivity – as a measure of reallocation. This is the same as our approach, except we have explicitly substituted in management rather than used productivity proxies as they do. Their framework generalizes our approach as in addition to the sunk cost of entry (as in the previous paragraph), they also allow for adjustment costs in capital. This creates a dynamic optimization problem for capital investments. Since there is no closed-form solution, they use numerical simulations to show similar results to our Proposition 2: in environments with greater distortions, there will be a weaker relationship between management (TFP in their model) and firm size.

Bartelsman et al. (2013) keep TFP/management exogenous. Bloom et al. (2017) generalize their approach even further by allowing management to be endogenously chosen with adjustment costs (like capital investment). The dynamic optimization problem generates a policy correspondence for the investment decisions of both dynamic factors. The state variables are managerial capital, non-managerial capital, and TFP (which is modelled as an exogenous Markov process). Even in this much more complex set-up, they show that the key intuition behind propositions (1) and (2) as well as the dynamic implications between firm age and the level and variance of management in Figures 4 and 5.

Appendix Figures

Figure A1: Articles of the Law of the National System of Statistical and Geograhical information

INEGI
INSTITUTO NACIONAL DE ESTADÍSTICA Y GEOGRAFÍA

Encuesta Nacional sobre Productividad y Competitividad de las Empresas

ENAPROCE 2015

Empresas Manufacturas

Mnemónicos

Este cuestionario deberá ser devuelto a más tardar el día _____ de _____ de 2015.

Confidencialidad y obligatoriedad

Conforme con las disposiciones de la Ley del Sistema Nacional de Información Estadística y Geográfica en vigor:

Artículo 37. "Los datos que proporcionen para fines estadísticos los informantes del Sistema a las Unidades en términos de la presente Ley, serán estrictamente confidenciales y bajo ninguna circunstancia podrán utilizarse para otro fin que no sea el estadístico".

Artículo 38. "Los datos e informes que los informantes del Sistema proporcionen para fines estadísticos y que provengan de registros administrativos, serán manejados observando los principios de confidencialidad y reserva, por lo que no podrán divulgarse en ningún caso en forma nominativa o individualizada, ni harán prueba ante autoridad judicial o administrativa, incluyendo la fiscal, en juicio o fuera de él".

Artículo 45. "Los informantes del Sistema estarán obligados a proporcionar, con veracidad y oportunidad, los datos e informes que les soliciten las autoridades competentes para fines estadísticos, censales y geográficos, y prestarán apoyo a las mismas".

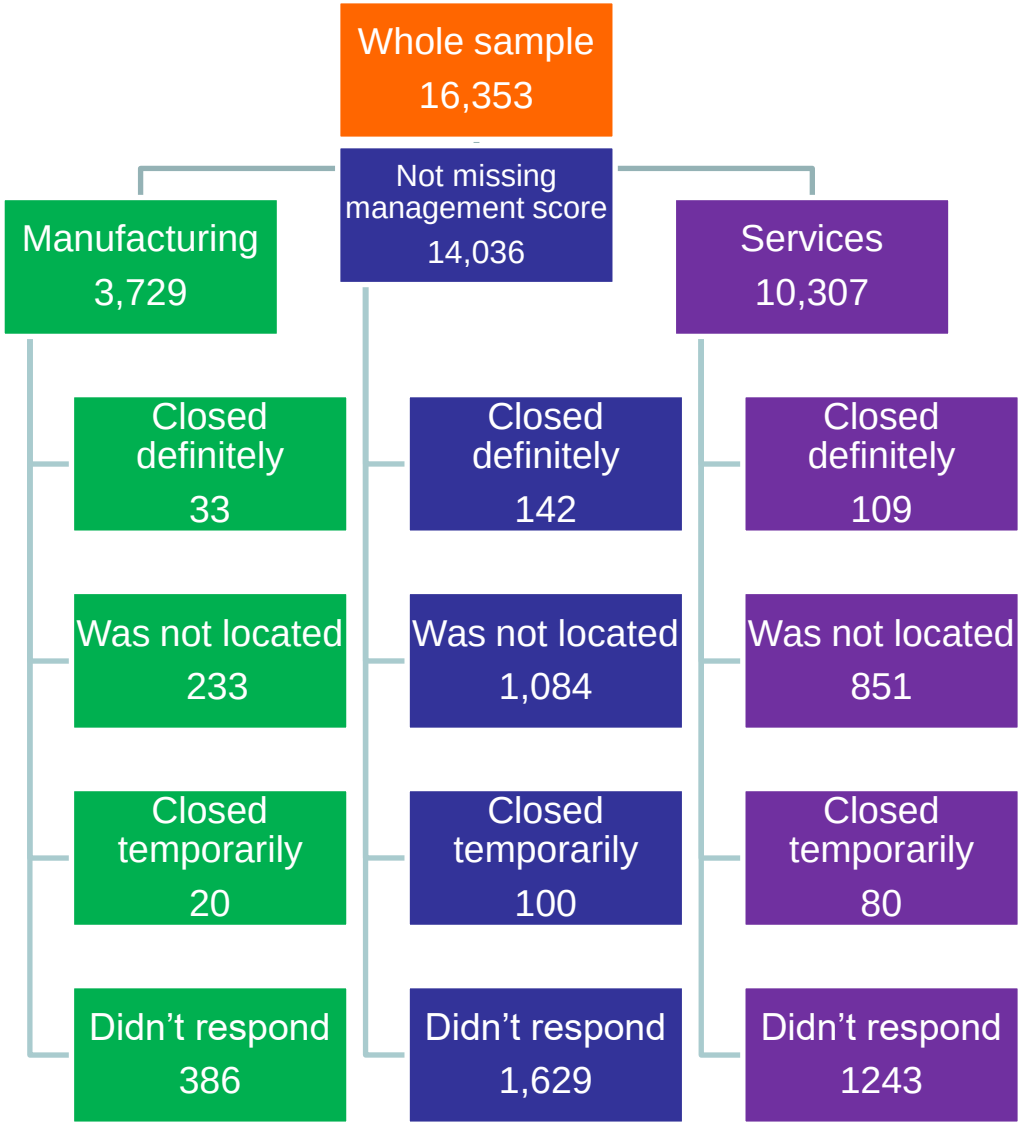
La unidad de observación
Empresa

Es la unidad económica que bajo una sola entidad propietaria o controladora combina acciones y recursos para realizar actividades de producción de bienes, compra-venta de mercancías o prestación de servicios, sea con fines mercantiles o no. Puede estar integrada por uno o más establecimientos.

Los datos asentados en este cuestionario deben corresponder solamente a esta empresa e incluir todas las actividades que realice.

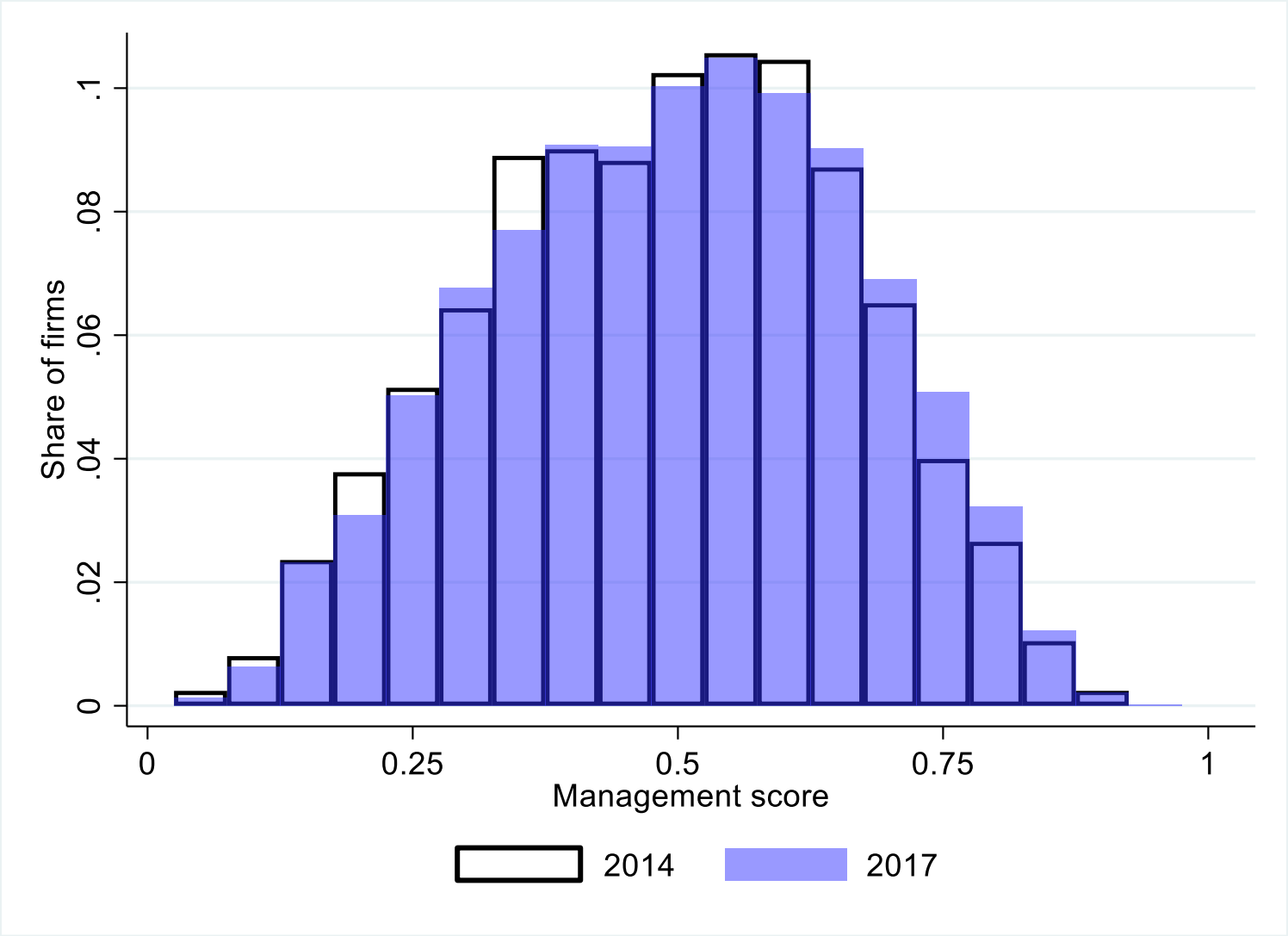
Los administradores, representantes o encargados de la unidad económica son solidariamente responsables de la información asentada en los documentos autorizados o suscritos por ellos.

Figure A2: Exit analysis 2014-2017



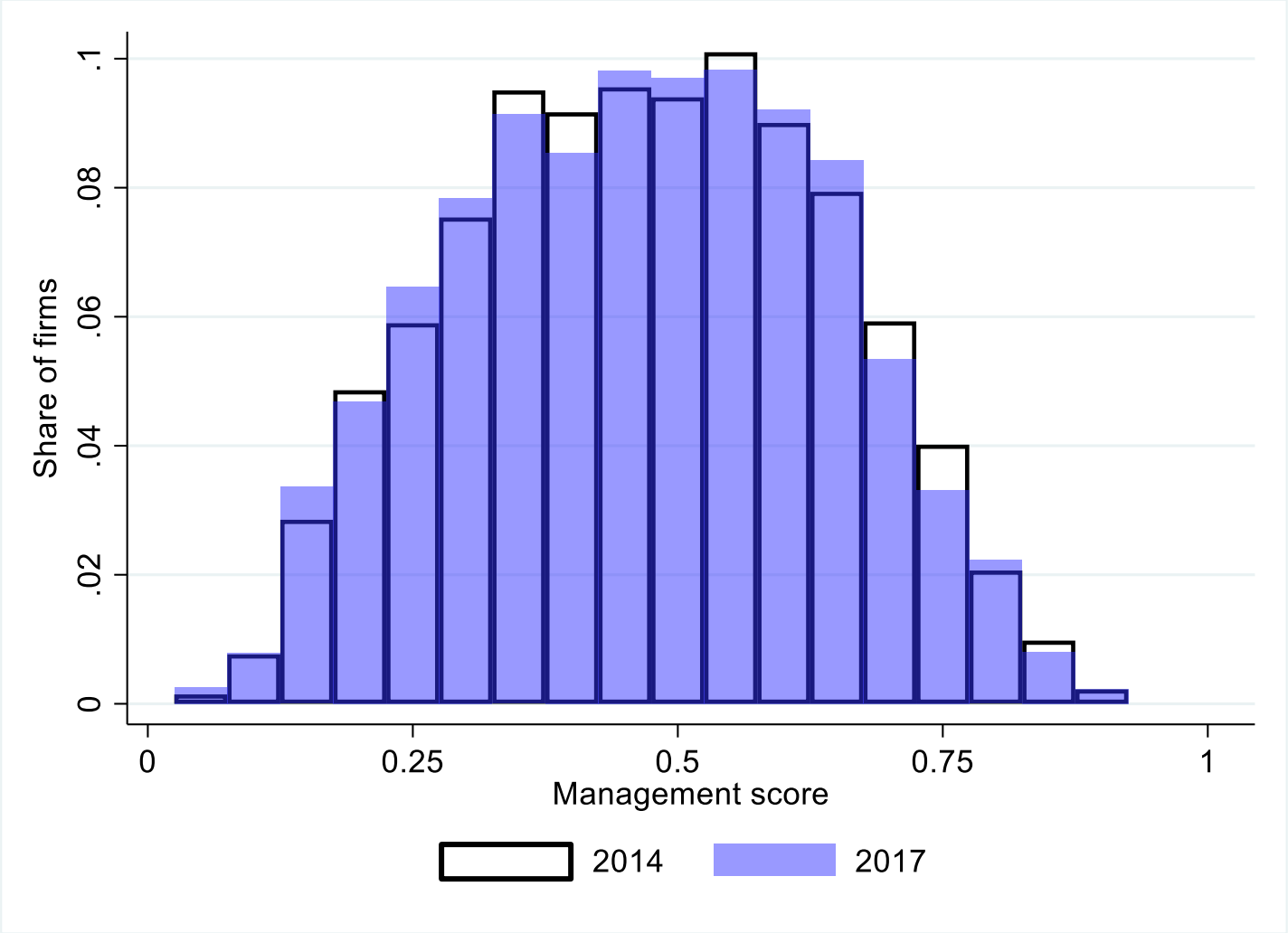
Notes: Based on information from the 2015 and 2018 waves of ENAPROCE.

Figure A3: Management distribution - Manufacturing



Notes: Plots of sample of 3,707 Mexican manufacturing firms in 2014, and 2,936 in 2017

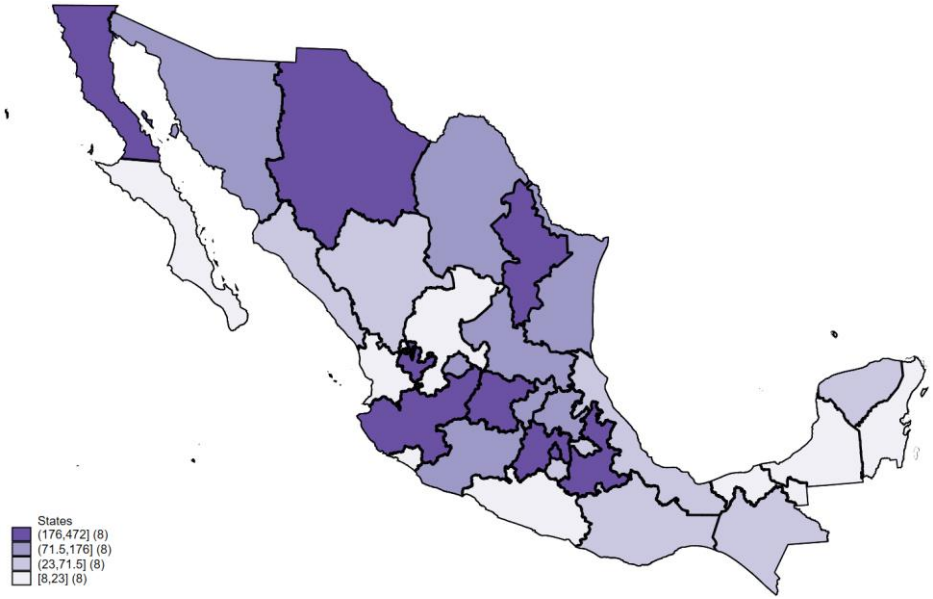
Figure A4: Management distribution - Services



Notes: 6,643 observations on Mexican manufacturing; 17,684 observations on Mexican services

Figure A5: States included in the sample

(a) Number of firms in the sample by state: Manufacturing



(b) Number of firms in the sample by municipality: Services

Source: Authors' calculations with data from ENAPROCE 2015 and 2018, INEGI.

Figure A6: Age and log(value added per employee): mean

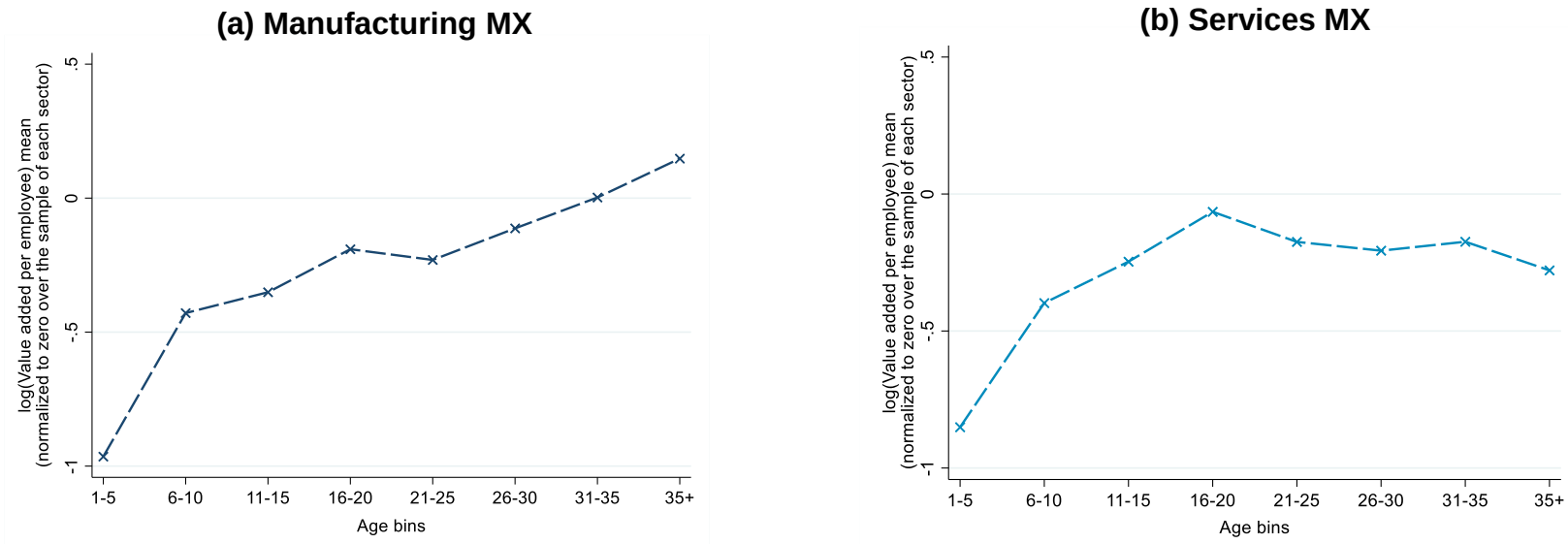
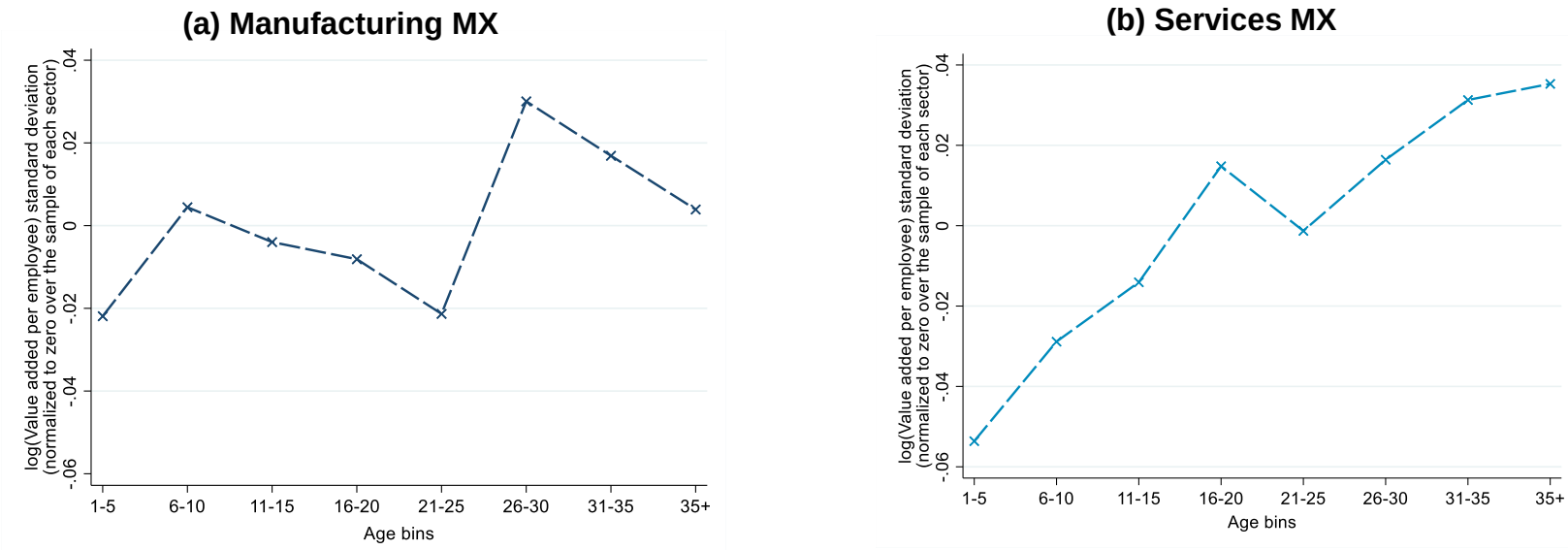


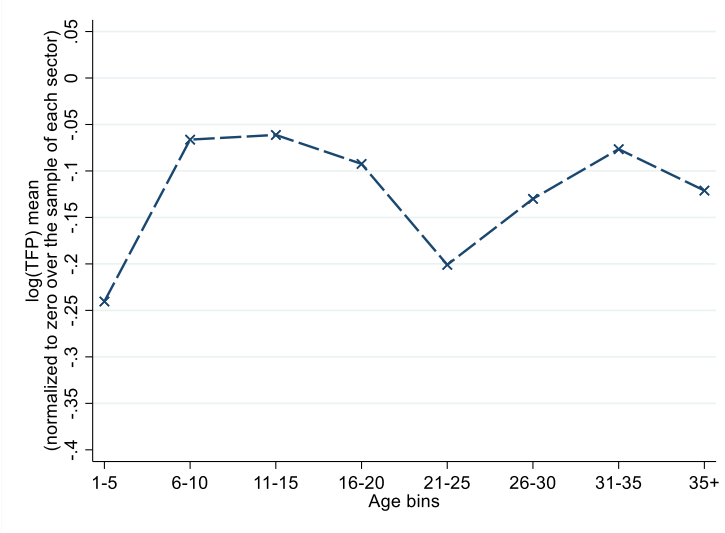
Figure A7: Age and log(value added per employee): spread



Notes: 6,643 observations on Mexican manufacturing; 17,684 observations on Mexican services

Figure A8: Age and log(TFP): mean

(a) Manufacturing MX



(b) Services MX

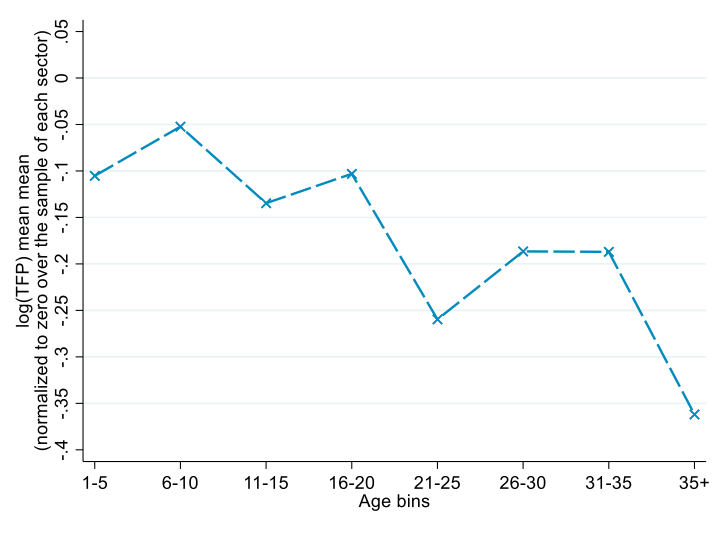
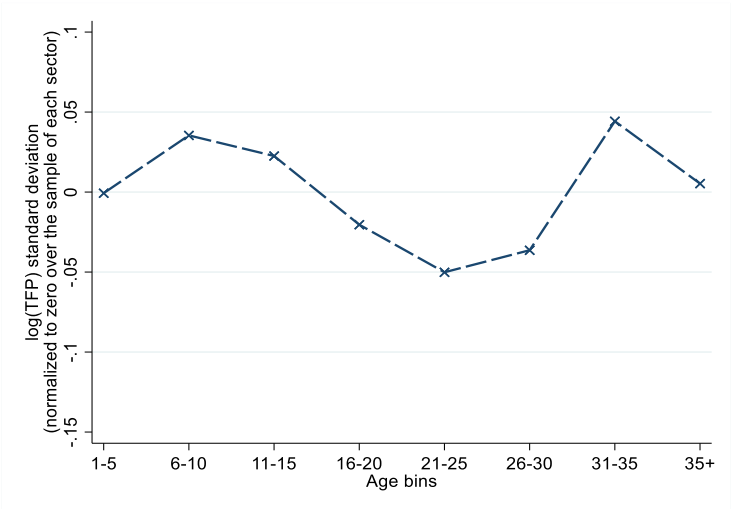
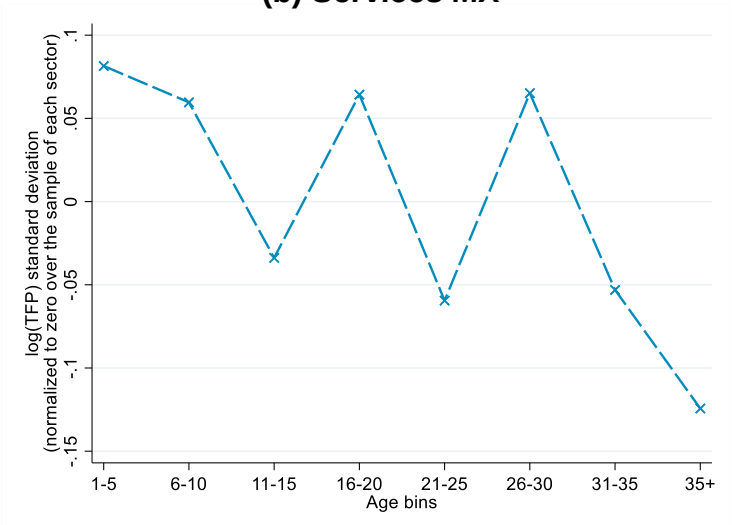


Figure A9: Age and log(TFP): spread

(a) Manufacturing MX



(b) Services MX



Notes: 6,643 observations on Mexican manufacturing; 17,684 observations on Mexican services.

Figure A10: CDFs Management score according to drive time (unweighted)

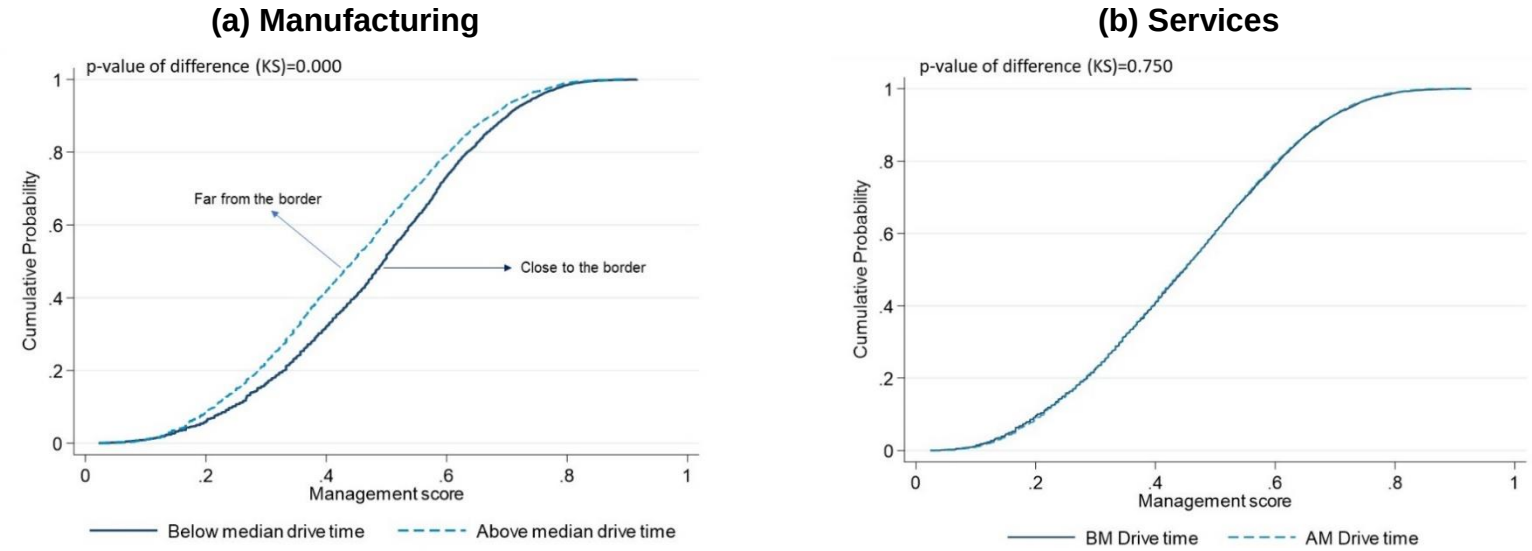
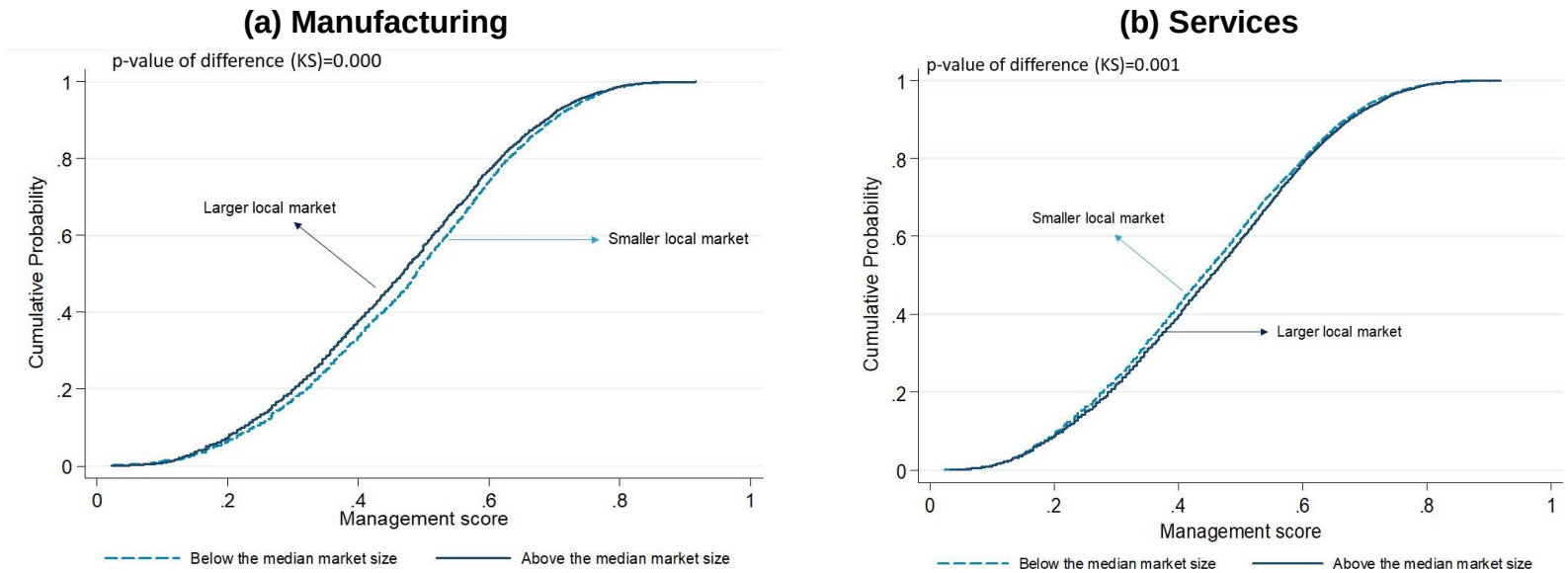
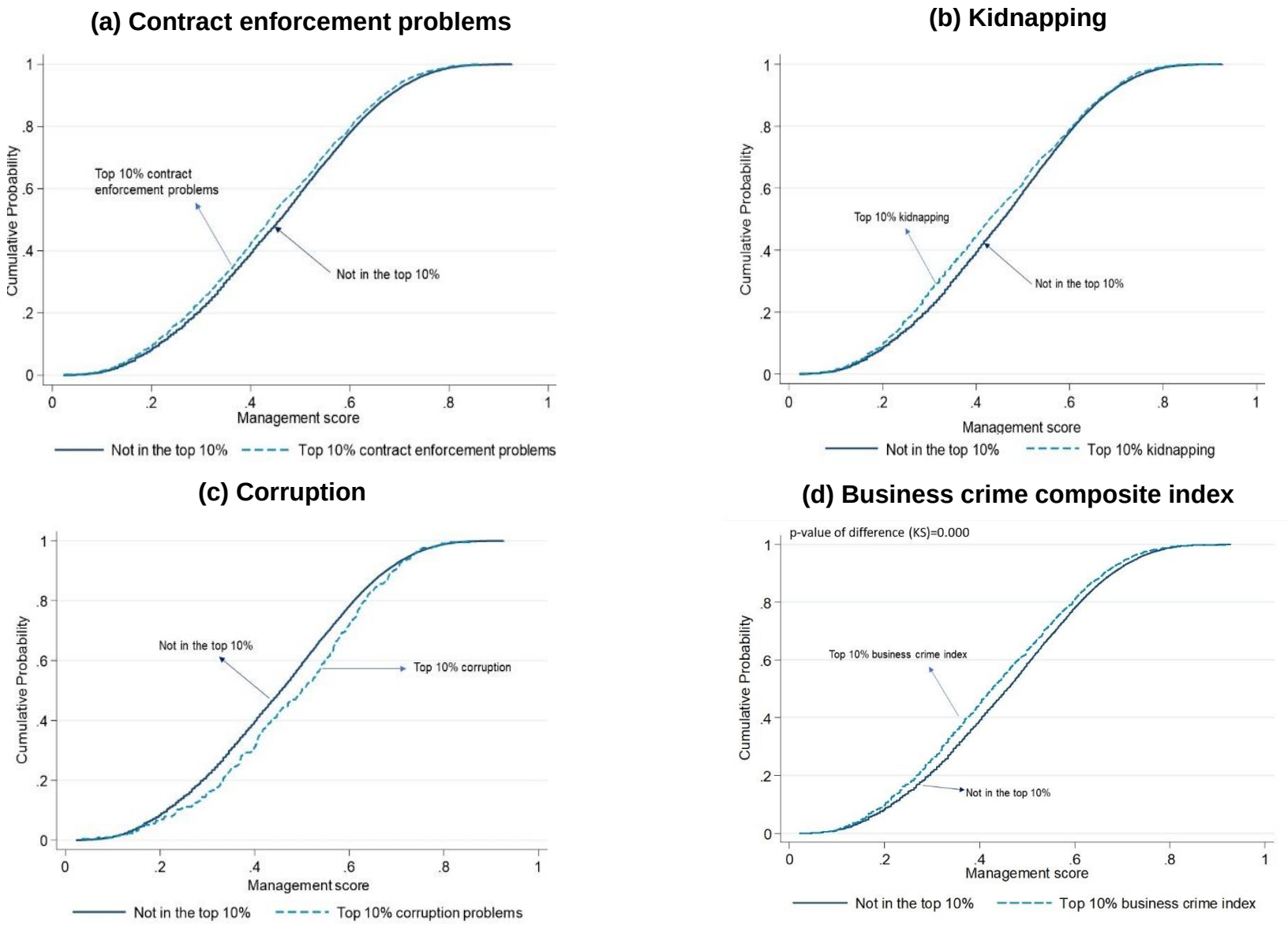


Figure A11: CDFs Management score according to market size (unweighted)



Notes: 6,643 observations on Mexican manufacturing; 17,684 observations on Mexican services

Figure A12: CDFs Management score according to institutional strengths (unweighted)



Notes: 6,643 observations on Mexican manufacturing; 17,684 observations on Mexican services

Online Appendix Tables

Table A1. Descriptive Statistics by sector

	Mean	S.D.	p10	p25	p50	p75	p90	N
Manufacturing								
2014								
A. Management								
Management score	0.462	0.171	0.226	0.339	0.472	0.589	0.685	3,707
Data driven performance monitoring	0.515	0.197	0.222	0.389	0.528	0.667	0.750	3,707
Incentives and targets	0.421	0.218	0.135	0.248	0.417	0.588	0.713	3,707
B. Firm characteristics								
Size (number of employees)	117	185	13	21	50	125	260	3,707
Firm age	19.637	15.038	4.000	8.000	16.000	27.000	40.000	3,707
Exporter	0.345	0.476	0.000	0.000	0.000	1.000	1.000	3,707
Share of exports	0.130	0.276	0.000	0.000	0.000	0.058	0.595	3,707
FDI1*	0.159	0.366	0.000	0.000	0.000	0.000	1.000	3,707
FDI2*	0.145	0.353	0.000	0.000	0.000	0.000	1.000	3,707
Share of FDI	14.142	34.004	0.000	0.000	0.000	0.000	100.000	3,707
Share college degree	0.160	0.144	0.017	0.065	0.125	0.216	0.340	3,707
Share white collar	0.166	0.103	0.050	0.089	0.149	0.222	0.313	3,707
C. Other control variables								
Drive time to border (hrs)	10.0	5.8	2.5	4.4	10.8	12.8	14.3	3,707
Population density (inhabitans/km^2)	926.9	832.5	95.2	373.0	603.7	1,133.1	2,548.3	3,707
MA average household monthly per capita income (pesos)	2,912.6	874.3	2,141.8	2,367.4	2,847.0	3,347.0	3,558.8	3,707
Share of exports (NAICS 6-digits exports/sales)	0.183	0.160	0.007	0.066	0.144	0.256	0.415	3,707
2017								
A. Management								
Management score	0.474	0.173	0.238	0.345	0.483	0.607	0.700	2,936
Data driven performance monitoring	0.515	0.187	0.250	0.389	0.528	0.667	0.750	2,936
Incentives and targets	0.441	0.223	0.135	0.260	0.445	0.608	0.742	2,936
B. Firm characteristics								
Size (number of employees)	133	204	15	25	58	145	310	2,936
Firm age	22.269	14.523	7.000	11.000	19.000	30.000	42.000	2,936
Exporter	0.370	0.483	0.000	0.000	0.000	1.000	1.000	2,936
Share of exports	0.135	0.279	0.000	0.000	0.000	0.078	0.623	2,936
FDI1*	0.168	0.374	0.000	0.000	0.000	0.000	1.000	2,936
FDI2*	0.154	0.361	0.000	0.000	0.000	0.000	1.000	2,936
Share of FDI	15.214	35.172	0.000	0.000	0.000	0.000	100.000	2,936
Share college degree	0.165	0.153	0.023	0.067	0.128	0.214	0.342	2,936
Share white collar	0.167	0.126	0.043	0.080	0.140	0.219	0.326	2,936
C. Other control variables								
Drive time to border (hrs)	9.9	5.8	2.5	4.4	10.7	12.8	14.3	2,936
Population density (inhabitans/km^2)	918.7	821.8	95.2	373.0	603.7	1,133.1	2,548.3	2,936
MA average household monthly per capita income (pesos)	2,918.6	883.7	2,141.8	2,367.4	2,847.0	3,347.0	3,558.8	2,936
Share of exports (NAICS 6-digits exports/sales)	0.186	0.163	0.007	0.058	0.149	0.264	0.417	2,936
Services								
2014								
A. Management								
Management score	0.446	0.172	0.214	0.317	0.447	0.577	0.674	10,175
Data driven performance monitoring	0.465	0.195	0.167	0.333	0.500	0.611	0.708	10,175
Incentives and targets	0.428	0.222	0.135	0.250	0.427	0.600	0.730	10,175
B. Firm characteristics								
Size (number of employees)	68	147	12	15	25	53	120	10,175
Firm age	16.235	13.629	3.000	6.000	13.000	22.000	33.000	10,175
Exporter	0.061	0.240	0.000	0.000	0.000	0.000	0.000	10,175
Share of exports	0.015	0.094	0.000	0.000	0.000	0.000	0.000	10,175
FDI1*	0.041	0.198	0.000	0.000	0.000	0.000	0.000	10,175
FDI2*	0.034	0.180	0.000	0.000	0.000	0.000	0.000	10,175
Share of FDI	3.277	17.041	0.000	0.000	0.000	0.000	0.000	10,175
Share college degree	0.271	0.273	0.000	0.077	0.176	0.368	0.762	10,175
Share white collar	0.159	0.102	0.043	0.082	0.143	0.217	0.300	10,175
C. Other control variables								
Drive time to border (hrs)	12.4	7.1	2.6	8.4	12.6	14.3	22.3	10,175
Population density (inhabitans/km^2)	812.9	832.8	62.9	173.0	532.3	993.3	2,548.3	10,175
MA average household monthly per capita income (pesos)	3,174.8	1,226.5	2,229.5	2,525.4	2,921.7	3,357.7	4,314.1	10,175
Share of exports (NAICS 6-digits exports/sales)	0.014	0.026	0.000	0.000	0.002	0.020	0.041	10,175

	2017							
A. Management								
Management score	0.443	0.173	0.208	0.314	0.446	0.577	0.669	7,509
Data driven performance monitoring	0.455	0.190	0.167	0.333	0.472	0.597	0.694	7,509
Incentives and targets	0.429	0.226	0.135	0.250	0.438	0.604	0.730	7,509
B. Firm characteristics								
Size (number of employees)	68	136	12	16	28	60	131	7,509
Firm age	18.447	12.686	6.000	9.000	16.000	24.000	34.000	7,509
Exporter	0.064	0.244	0.000	0.000	0.000	0.000	0.000	7,509
Share of exports	0.013	0.086	0.000	0.000	0.000	0.000	0.000	7,509
FDI1*	0.039	0.193	0.000	0.000	0.000	0.000	0.000	7,509
FDI2*	0.032	0.177	0.000	0.000	0.000	0.000	0.000	7,509
Share of FDI	3.172	16.874	0.000	0.000	0.000	0.000	0.000	7,509
Share college degree	0.269	0.284	0.000	0.071	0.167	0.353	0.814	7,509
Share white collar	0.166	0.131	0.041	0.078	0.138	0.214	0.320	7,509
C. Other control variables								
Drive time to border (hrs)	12.6	7.2	2.6	8.5	12.6	14.3	23.6	7,509
Population density (inhabitans/km^2)	795.6	814.0	62.7	173.0	532.3	993.3	2,548.3	7,509
MA average household monthly per capita income (pesos)	3,132.0	1,160.5	2,229.5	2,525.4	2,910.1	3,352.3	4,130.4	7,509
Share of exports (NAICS 6-digits exports/sales)	0.014	0.027	0.000	0.000	0.002	0.020	0.041	7,509

Notes: *FDI1 is defined as a firm with any participation of FDI and FDI2 indicates 50% or more FDI.

Table A2. Firm performance and management scores using data from 2014 Economic Census

	Manufacturing			Services		
	(1)	(2)	(3)	(5)	(6)	(7)
	log(Value Added per Employee)		log(TFP)[1]	log(Value Added per Employee)		log(TFP)[1]
Management score	0.905***	0.322***	0.0910**	0.433***	0.280***	0.0535
	(0.0940)	(0.100)	(0.0457)	(0.0715)	(0.0692)	(0.0407)
log(capital/employee)		0.0851***			0.0451***	
		(0.0103)			(0.00545)	
log(employees)		0.104***			0.0913***	
		(0.0177)			(0.0155)	
Share of workers with a college degree		0.400***			0.0330	
		(0.149)			(0.0642)	
6-digits NAICS	No	Yes	Yes	No	Yes	Yes
Observations	3,808	3,808	3,808	7,286	7,286	7,286

Notes: Robust standard errors in parentheses; * Significant at the 10% level, ** 5% level, *** 1% level. TFP is constructed using a Törnqvist index approach (see Data Appendix, section B.3.1).

Table A3. Management Practices and Firm Performance in Microenterprises

	Microenterprises (manufacturing and services)	
	(1)	(2)
	log(Value Added per Employee)	
Management score	1.016***	0.315***
	(0.0474)	(0.0461)
log(capital/employee)		0.124***
		(0.00454)
log(employees)		0.139***
		(0.0256)
Share white-collar workers		-0.334***
		(0.0492)
Share of workers with a college degree		0.232***
		(0.0429)
% rise from 10th to 90th management percentile	88.7	21.8
6-digits NAICS	No	Yes
Time	Yes	Yes
Observations	11,655	11,655

Notes: Robust standard errors in parentheses clustered at the firm level; * Significant at the 10% level, ** 5% level, *** 1% level.

Table A4. Management Practices, Exit, and Employment growth

Dependent variable:	**Employment growth (annualized)**			**Exit (annualized)**		
	(1) Manufacturing	(2) Services	p-value difference	(3) Manufacturing	(4) Services	p-value difference
			Panel (a)			
Management	0.164***	0.092***	0.008	-0.047***	-0.025***	0.028
	(0.0226)	(0.0156)		(0.0084)	(0.0054)	
R^2	0.016	0.004		0.009	0.002	
Observations	3307	8900		3,707	10,175	
			Panel (b)			
ln(VA/employee)*	0.038***	0.030***	0.142	-0.009***	-0.005***	0.026
	(0.0039)	(0.0036)		(0.0015)	(0.0013)	
R^2	0.032	0.015		0.014	0.003	
Observations	3307	5137		3,707	5,878	

Notes: Robust standard errors in parentheses. * Significant at the 10% level, ** 5% level, *** 1% level.
*Annual exit rates are 2.38% for manufacturing and 3.87% for services.
*Results are divided by three to calculate annual rates.

*Exit is defined as those firms that closed pemanently as well as those that were not found. 1,226 firms (266 manufacturing and 960 services firms) exited the market during this period. In growth regressions, firms that did not respond are set to be missing.
*Employment growth is defined as $2 * (L_{N+1} - L_N)/(L_{N+1} + L_N)$ following Davis & Haltiwanger (1992)

*Commerce is excluded in Value-Added regressions as merchandise for resales was not accounted for in the first wave of the survey.
*Results for Value-Added exclude those observations that have missing values for the management score.