



Gender Gap in Entrepreneurship and Firm  
Performance in Developing Countries

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**2017 / 14**

## **Abstract**

This paper uses firm-level data from the World Bank Enterprise Surveys (WBES) to investigate productivity gaps between female and male-managed companies in developing countries. We depart from the previous literature by using the gender of the top manager as target variable, which is newly available in the 2016 version of the WBES. The main results indicate that it is crucial to distinguish between female management and female ownership and also the confluence between both. We find that when the firms are managed by females and there are not female owners, they show a higher average labour productivity and total factor productivity. However, if females are among the owners and a female is the top manager, then their productivity is lower than for other firms. These results are very heterogeneous among regions. In particular, results in South Saharan Africa, East Asia and South Asia seems to be driving the general results

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By Inmaculada Martinez-Zarzoso, University Jaume I and University of Goettingen

## Abstract

This paper uses firm-level data from the World Bank Enterprise Surveys (WBES) to investigate productivity gaps between female and male-managed companies in developing countries. We depart from the previous literature by using the gender of the top manager as target variable, which is newly available in the 2016 version of the WBES. The main results indicate that it is crucial to distinguish between female management and female ownership and also the confluence between both. We find that when the firms are managed by females and there are not female owners, they show a higher average labour productivity and total factor productivity. However, if females are among the owners and a female is the top manager, then their productivity is lower than for other firms. These results are very heterogeneous among regions. In particular, results in South Saharan Africa, East Asia and South Asia seems to be driving the general results.

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## 1. Introduction

Since the early 1990s, there has been a growing interest in the gender gap issue. Several international organizations, among them the World Bank (WB)<sup>1</sup>, the World Trade Organization (WTO) and the United Nations Development Program (UNDP) have introduced “gender” as a crucial cross-cutting issue that needs to be addressed in the fields of economics and social sciences. In particular, the World Bank has several programs targeted at boosting women’s empowerment, promoting women’s entrepreneurship and improving women’s health. Among the initiatives to support women in entrepreneurial activities, the WB has launched an initiative (Women Entrepreneurs Finance Initiative, WEFI) that will enable more than 1 billion USD in financing to provide technical assistance, access to credit and to invest in programs supporting women-led small and medium firms. The initiative was proposed in early 2017 by the United States and Germany and received strong support from other Development Assistance Committee (DAC) donors. In addition, the achievement of gender equality and empowerment of women is one of the commitments of the Sustainable

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<sup>1</sup> “The World Bank Group takes as its starting point that no country, community, or economy can achieve its potential or meet the challenges of the 21st century without the full and equal participation of women and men, girls and boys” <http://www.worldbank.org/en/topic/gender>.

Development Goals (SDG 5), to which the UN Member States committed in 2015, with a deadline in 2030 (WB, 2015). Only with males and females having equal opportunities and power, the effective use of talent by enterprises could be guaranteed. Given that talent is in general scarce in developing countries, discriminatory practices should be avoided because those will impede the best use of talent in detriment to economic development.

In developing countries, and especially in those in which women discrimination is prevalent, it is relevant to investigate the factors that drive gender gaps in firm performance, firm size and access to finance. We pay special attention to countries in the Middle East and North Africa region (MENA), in which the Islam is the dominant religion and women participation in economic activities is less prevalent than in other regions with more liberal cultural backgrounds. The main aim of this research is to shed some light on the factors that could contribute to overcome the barriers that deter females from participating in managerial activities. The output of this research could help to give some insights on the appropriate programs to support women-led firms and that should be finance by the WEFI.

Existing research on the performance gap between female and male firm' owners for other regions indicates that there are significant gender gaps in terms of firm size, but not always in terms of sales growth and productivity (Bardasi et al, 2011; Allison et al, 2015). While most previous papers determine firm's gender by whether or not there is a female owner (Bardasi et al, 2011; Allison et al, 2015; Davies and Mazhikeyev, 2017), in this paper we focus on the top manager being a female, since the manager is the decision maker and hence, the responsible for the performance of the firm (already pointed out by Bardasi et al, 2011 and Aterido et al, 2011).

Our main contribution to the literature is the use newly available gender variables (2016 version of the World Bank Enterprise Surveys, WBES) to analyze the relationship between

gender and firm performance in developing countries, and in particular in the MENA region. More specifically, we investigate whether there is a gender gap in performance when the top manager is a female, and compare the results with a gender gap when the ownership criterion is used to define the gender variable.

The main results indicate that it is crucial to distinguish between female management and female ownership and also the confluence between both. We find that when the firms are managed by females and there is not female owners, they show a higher average labour productivity and total factor productivity (TFP). However, if females are among the owners and a female is the top manager, then their productivity is in general lower than for other firms. These results are very heterogeneous among regions and among countries in the MENA region. In particular, results in South Saharan Africa, East Asia and South Asia seems to be driving the general results, whereas in Latin America and Eastern Europe and Central Asia, female participation in ownership seems to be negatively related to firm performance.

The rest of the paper is structured as follows, Section 2 revise the closely related literature. Section 3 describes the data, variables and presents the stylized facts. Section 4 presents the main results and finally, Section 5 concludes.

## **2. Literature review**

According to the literature on gender gaps in firm performance (Bardasi et al, 2011; Kappler and Parker, 2011), there are two main explanations of the fact that female-owned firms tend to have a worse performance than male owned firms. On the one hand, the constrained driven gaps view indicate that females face more constraints than males in the businesses environment of developing countries. For instance, it could be that access to credit is more restricted to women than to men, that legal treatment is gender biased or that corruption and

crime affect more females entrepreneurs that male ones. In general, these gender barriers are related to gender discrimination and gender-based social norms.

On the other hand, the preference-driven gap explanation states that females might show a preference for activities in services and trade and tend to operate at lower scale. In this case individual choices would be responsible for the lower rates of female participation and female success in entrepreneurship (Bardasi et al, 2011). Kappler and Parker (2011) name as potential explanations for the concentration of female entrepreneurs in low-capital intensive sectors with lower potential to grow, the existence of barriers to access to finance and the business regulatory environment. However, Aterido et al (2013), Hansen and Rand (2014a,b) and the Bruhn (2009) find no evidence that access to finance (or regulatory burdens) causes differences in performance between female and male-owned firms in Africa (the two first studies) and Latin America (Bruhn, 2009).

There are also studies that do not corroborate the hypothesis of relative female underperformance in entrepreneurship. Bardasi et al (2007), using WBES data, find that female-owned firms in Africa are at least as productive as male-owned firms and other studies find even that female-owned firms perform better (Allison et al, 2015). Allison et al (2015) investigates obstacles to firm growth and its links with female ownership in LA countries. They find that female owned firms face higher level obstacles in relation to crime and competition, but not concerning corruption and access to finance. Moreover, they find that in terms of labour productivity female owned enterprises are more productive than their male counterpart and that there are not significant gender differences in terms of sales growth. The authors remark that even facing more obstacles, female-owned firms perform better or not worse than male-owned ones.

Aterido et al (2011) finds that the definition of female enterprise matters for the results. Most of the existent studies use a measure of female participation in ownership, however many of these women owners have little or no involvement in the management of the firm. Aterido et al (2011) find that whereas using the ‘participation in ownership’ does not lead to differences in firms’ performance by gender in Africa, restricting firms to those in which the women owner is the chief decision maker, does lead to a significant productivity gap of 15 per cent. Other authors that also experimented with this alternative definition are Davies and Mazhikeyev (2015) and Bardasi et al (2011). However, the data available for women in top management positions was very limited in these studies. In this paper we explore the new WBES 2016 dataset, in which the number of data-points identifying female-managers has increase considerably with respect to previous editions.

### **3. Data and variables**

We use the newest multi-country version of the WBES dataset released in October 2016. The questionnaires are based on similar sampling techniques and hence provide fairly comparable firm-level data. It includes countries in six developing regions, namely South Saharan African (SSA), East Asia and Pacific (EAP), Eastern Europe and Central Asia (ECA), Latin America and Caribbean (LAC) and Middle East and North Africa (MENA). In addition the data includes two regions comprising high income (HI) countries; one for OECD and the second for non-OECD countries. The list of countries and years of the surveys can be found in Table A.1 and the number of firms by region and year in Table A.2. Summary statistics are shown in Table A.3 and pairwise correlation coefficients in Table A.4. The variables used are described in Table A.5, indicating the corresponding question and the definition of the created dummy variables.

The surveys are based on random samples constructed using stratified random sampling. Only formal (registered) companies with 5 or more employees are targeted for interviews and firms with 100 percent government/state ownership are not eligible to participate in the survey. In general, business owners and top managers are interviewed, but sometimes the survey respondent calls company accountants and human resource managers into the interview to answer questions concerning the sales and labour sections of the survey. The questionnaire covers a broad range of business environment topics including access to finance, corruption, infrastructure, crime, competition, and performance measures. Typically, 1200-1800 interviews are conducted in larger economies, 360 interviews in medium-sized economies, and only 150 interviews in small economies<sup>2</sup>.

Our target variables are related to female ownership and female top managers. The question: are any of the owners female? (code b4 in the dataset) allows us to identify whether there is a women among the owners. A second question classifies firms into 5 categories (code b4a\_cat) according to sex dominance in the ownership of the firm. We construct a dummy that takes the value of one if ownership is equally divided among males and females, if females are a majority or if all owners are females, zero otherwise. This variable is used as a proxy for female presence (gender diversity) in ownership. A third question asks whether the top manager is a female (code b7a). For this variable there are fewer answers available and hence the sample is restricted. The correlation between female presence in ownership and female executive is 0.42 percent and hence, in some cases (12 percent) the manager of firms owned by at least a female is also a female.

The data enable us to identify also a number of firm performance variables, as well as variables capturing the main obstacles that may affect the relative performance of female versus male owned/managed enterprises. The main performance variables we use are labour

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<sup>2</sup> See [www.enterprisesurveys.org](http://www.enterprisesurveys.org) for more details.



productivity, value added per employee<sup>3</sup> and TFP. Descriptive statistics corresponding to the three dummy variables of interest are shown in Table 1.

Female entrepreneurs are a minority in all regions examined, but with marked differences. The first part of Table 1 shows the average share of females involved in entrepreneurship by region and the second part show similar numbers for each of the MENA countries surveyed. Three definitions of gender are considered,  $Fem=1$  if there is at least a female owner,  $Tfem=1$  if the top manager is a female, and  $Femmore=1$  if at least 50 percent of the owners are females.

The first column shows that the presence of females among the owners (definition of gender most frequently used in previous research) is around 36 percent in ECA, a number similar to the average in high income OECD and non-OECD countries, slightly lower in SSA (28 percent) and much lower in SAR and MENA. In contrast, EAP countries show an average share of female owners close to 50 percent. Within the MENA region, Tunisia shows a number similar to the ECA average (36 percent), whereas Yemen and Jordan show the lowest shares (3.4 percent and 2.9 percent, respectively). The second column shows the average share of female top managers ( $Tfem$ ), the shares are much lower in general and follow a similar pattern across regions and countries, with EAP countries also showing the highest average share (27 percent) and MENA the lowest (4 percent). Among the MENA countries (column 5), Iraq and Yemen show the lowest share of female top managers, only 1 percent, whereas Djibouti and Tunisia show the higher (14 percent and 8 percent, respectively). Finally, the third gender variable, gender diversity in ownership, is shown in columns 3 and 6 for regions and MENA countries. At least half of the owners are females in 24 percent of the firms in EAP, region that shows the highest percentage among the developing regions,

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<sup>3</sup> Other authors use sales and employment growth as well. However, we argue that sales and number of workers 3 years ago is misreported and errors in the data are an important issue. Both, sales and employment growth have huge standard deviations and many missing data.

whereas the lowest share (5 percent) is shown for MENA countries. Within MENA, we find a similar pattern as for female top managers. Since the variable gender diversity is missing for half of the firms in the sample, we base the empirical analysis in the other two gender variables, namely female participation in ownership and female top manager.

**Table 1. Share of female entrepreneurs by region and MENA countries**

	<u>Region</u>	<u>Fem</u>	<u>Tfem</u>	<u>Femmore</u>	<u>Country</u>	<u>Fem</u>	<u>Tfem</u>	<u>Femmore</u>
<i>mean</i>	<b>AFR</b>	<b>0.29</b>	<b>0.14</b>	<b>0.16</b>	<b>Djibouti2013</b>	<b>0.06</b>	<b>0.14</b>	<b>0.10</b>
<i>se</i>		0.45	0.34	0.37		0.24	0.35	0.30
<i>Nobs</i>		23006	17726	17360		219	266	261
<i>mean</i>	<b>EAP</b>	<b>0.50</b>	<b>0.27</b>	<b>0.24</b>	<b>Egypt2013</b>	<b>0.08</b>	<b>0.05</b>	<b>0.05</b>
<i>se</i>		0.50	0.44	0.43		0.28	0.23	0.22
<i>Nobs</i>		15755	14759	7191		2441	2896	2743
<i>mean</i>	<b>ECA</b>	<b>0.36</b>	<b>0.17</b>	<b>0.17</b>	<b>Iraq2011</b>	<b>0.07</b>	<b>0.01</b>	-
<i>se</i>		0.48	0.38	0.37		0.25	0.10	-
<i>Nobs</i>		17682	16573	8459		754	755	0
<i>mean</i>	<b>LAC</b>	<b>0.37</b>	<b>0.16</b>	<b>0.24</b>	<b>Jordan2013</b>	<b>0.03</b>	<b>0.02</b>	<b>0.03</b>
<i>se</i>		0.48	0.37	0.43		0.17	0.13	0.18
<i>Nobs</i>		20576	12732	699		474	571	536
<i>mean</i>	<b>MENA</b>	<b>0.10</b>	<b>0.04</b>	<b>0.05</b>	<b>Lebanon2013</b>	<b>0.17</b>	<b>0.05</b>	<b>0.07</b>
<i>se</i>		0.30	0.21	0.22		0.38	0.21	0.25
<i>Nobs</i>		6232	7311	5807		420	561	552
<i>mean</i>	<b>SAR</b>	<b>0.16</b>	<b>0.08</b>	<b>0.06</b>	<b>Morocco2013</b>	<b>0.13</b>	<b>0.05</b>	<b>0.05</b>
<i>se</i>		0.37	0.27	0.23		0.33	0.22	0.22
<i>Nobs</i>		17219	14596	12880		296	407	376
<i>mean</i>	<b>HI: OECD</b>	<b>0.36</b>	<b>0.17</b>	<b>0.20</b>	<b>Tunisia2013</b>	<b>0.37</b>	<b>0.08</b>	<b>0.07</b>
<i>se</i>		0.48	0.37	0.40		0.48	0.27	0.25
<i>Nobs</i>		5996	5212	2394		438	592	577
<i>mean</i>	<b>HI: NOCDE</b>	<b>0.36</b>	<b>0.21</b>	<b>0.26</b>	<b>Yemen2013</b>	<b>0.03</b>	<b>0.01</b>	<b>0.01</b>
<i>se</i>		0.48	0.41	0.44		0.18	0.09	0.11
<i>Nobs</i>		9314	8285	918		323	353	338
<i>mean</i>	<b>Total</b>	<b>0.32</b>	<b>0.16</b>	<b>0.14</b>	<b>Total</b>	<b>0.10</b>	<b>0.04</b>	<b>0.05</b>
<i>se</i>		0.47	0.36	0.35		0.30	0.21	0.22
<i>Nobs</i>		115780	97194	55708		6232	7311	5807

**Note:** Fem=1 if at least a female among the owners, zero otherwise, Tfem=1 if the top manager is a female, zero otherwise, Femmore=1 if at least 50 percent of the owners are females. Source: World Bank Group (2016).

The second stylized fact that has been found in previous studies is that female owned firms tend to be smaller in size and show a worse performance in terms of firm size (total revenue), and efficiency (labour productivity and value added per worker).

In Table 2 we show the results for t-test mean-differences in the performance variables and obstacles between male and female owned/managed firms for the sample of developing countries. We find that firms with female participation in ownership are on average higher in size (total sales) and more productive than others, whereas gender diversity is associated to lower average sales, but to higher labour productivity and value added per employee. In addition, no significant differences in size are found for firms with female top managers, whereas their average performance is better than for male managed firms. Since it is expected to find heterogeneity by region, Table 3 presents similar results for each of the six regions in the developing world. For the regional analysis we focus specifically on the gender of the top manager.

**Table 2. Differences in performance between male and female owned firms. Univariate tests**

Female	Female presence in ownership			Top manager is female			More than 50 percent female owned		
	0	1	t-Stat	0	1	t-Stat	0	1	t-Stat
Ln sales	16.69	16.95	-11.06*	16.98	16.96	0.68	16.98	16.70	6.26*
Ln va pw	12.97	13.02	-1.78	13.06	13.24	-3.85*	13.22	13.31	-1.60
Ln lab pro	13.41	13.51	-4.77*	13.54	13.79	-8.06*	13.67	13.83	-3.88*
Crime	1.18	1.15	3.24*	1.15	1.13	1.74	1.03	1.04	-0.91
Informal	1.48	1.52	-4.80*	1.48	1.46	1.33	1.39	1.46	-3.98*
Corruption	1.81	1.63	17.32*	1.79	1.55	16.82*	1.80	1.57	12.00*
Access to finance	1.50	1.45	5.72*	1.49	1.42	5.04*	1.47	1.47	-0.24
Ln age	2.57	2.66	-13.84*	2.61	2.54	8.29*	2.57	2.47	9.44*
Owncon	0.83	0.73	56.91*	0.79	0.80	-2.75*	0.81	0.83	-6.62*
Experience	16.23	17.42	-16.27*	17.13	15.43	16.39*	16.06	15.62	3.39*
Exporter	0.20	0.25	-18.13*	0.22	0.21	2.34	0.20	0.18	4.51*
Foreign Owned	0.08	0.06	8.23*	0.08	0.06	6.34*	0.07	0.06	5.40*

**Note:** \* denotes significant at the 1 percent level.

Tables 2 and 3 also include gender differences in factors that are known to affect firm performance, such as experience of the manager, exporter status or foreign ownership and factors that are perceived as investment climate constrains. It could be argued that for female

managers access to finance or crime could be a higher constraint than for male managers, but we do not find this pattern on average, but this could be the case for some regions.

According to the results in Table 3, in terms of total sales, firms managed by males have higher sales on average in most regions, with the only exception of SAR. In terms of value added (labour productivity) per worker no significant differences are found for the EAC (AFR and EAP) regions, whereas for AFR, EAP, LAC and MENA (LAC and MENA) the performance is better on average for male managed firms and for female managed firms in SAR (ECA and SAR). Crime is in AFR, EAP, ECA and LAC a higher constraint for female managers, whereas access to finance is only a higher constraint for female managers in AFR. There are not significant differences concerning informality and concerning corruption only in AFR and SAR.

**Table 3. Differences in performance between male and female managed firms by region**

<b>Top manager:</b>	<b>Male</b>	<b>Female</b>	<b>t-Stat</b>	<b>Male</b>	<b>Female</b>	<b>t-Stat</b>	<b>Male</b>	<b>Female</b>	<b>t-Stat</b>
<b>Region</b>	<b>AFR</b>			<b>EAP</b>			<b>ECA</b>		
Ln sales	16.77	16.30	5.86*	19.06	18.53	7.54*	15.96	15.76	2.72*
Ln VA per worker	13.52	13.11	3.02*	14.84	14.51	3.78*	11.68	11.70	-0.16
Ln labor product.	13.75	13.68	0.96	15.26	15.15	1.72	12.59	12.78	-2.90*
Crime	1.27	1.36	-3.04*	0.65	0.72	-3.61*	0.94	1.03	-2.96*
Informal	1.79	1.85	-1.84	1.10	1.09	0.33	1.39	1.43	-1.35
Corruption	1.87	1.75	3.85*	0.84	0.87	-1.15	1.48	1.46	0.61
Acces to finance	1.92	2.03	-3.68*	1.02	0.99	1.37	1.28	1.30	-0.86
Ln age	2.45	2.34	5.89*	2.62	2.59	1.87	2.46	2.40	4.39*
Own con	0.85	0.87	-2.96*	0.81	0.80	2.75*	0.80	0.83	-5.45*
Experience	14.99	12.81	10.19*	16.23	15.67	3.10*	17.12	15.70	6.53*
Exporter	0.18	0.16	1.76	0.24	0.24	0.18	0.25	0.19	6.21*
Foreign Owned	0.13	0.09	5.77*	0.10	0.06	6.91*	0.06	0.05	2.27
<b>Region</b>	<b>LAC</b>			<b>MENA</b>			<b>SAR</b>		
Ln sales	16.48	15.53	10.94*	16.14	15.50	3.47*	17.19	17.89	-10.30*
Ln VA per worker	12.19	11.83	3.41*	12.20	11.08	4.41*	13.04	13.26	-4.45*
Ln labor product.	12.77	12.45	4.31*	12.94	12.34	3.42*	13.65	13.85	-4.53*
Crime	1.86	1.95	-2.82*	1.56	1.49	0.80	0.87	0.81	1.62
Informal	1.92	1.92	-0.01	1.62	1.51	1.28	1.11	1.18	-1.89
Corruption	2.23	2.17	1.78	2.39	2.34	0.55	2.08	2.21	-2.99*
Access finance	1.70	1.71	-0.40	1.66	1.63	0.46	1.33	1.37	-1.05

Ln age	2.96	2.84	5.90*	2.64	2.61	0.71	2.65	2.65	0.06
Owncon	0.72	0.74	-3.47*	0.75	0.74	0.54	0.79	0.73	6.99*
Experience	22.17	18.24	13.70*	20.31	17.41	4.37*	14.56	13.88	2.27
Exporter	0.29	0.19	9.79*	0.23	0.22	0.58	0.15	0.28	-11.63*
Foreign	0.11	0.07	5.57*	0.05	0.07	-0.97	0.01	0.02	-3.42*

**Note:** Source: World Bank Group (2016). \* denotes significant at the 1 percent level.

In Table 4 we show the participation of women in entrepreneurship classified by employment size. It can be observed that woman presence in ownership is more common in small and medium firms in both develop and developing countries, whereas in the MENA region the reverse is the case. As regards female top managers, as shown in the top and middle part of Table 4, the percent of firms is also higher for small and medium size firms, whereas it is very similar in MENA countries. Only in terms of gender diversity, small firms in MENA countries seems to show a higher percentage of firms with gender-diversity in ownership. The average number of female employees is shown in the last column of Table 5 and indicates that the average number of women in the labour force is much lower in MENA countries than in other developing countries.

**Table 4. Female participation by region and firm size**

Size Category	Female Top Manager	Female Presence	Gender Diversity	Female Employment
<b>Developing countries</b>				<b>Average Number</b>
<b>Small(&lt;20)</b>	17.84%	29.83%	17.08%	3
<b>Medium(20-99)</b>	13.26%	32.09%	11.70%	12
<b>Large(&gt;100)</b>	12.76%	35.74%	8.47%	137
<b>Overall mean</b>	15.21%	31.71%	13.79%	23
<b>Developed countries</b>				
<b>Small(&lt;20)</b>	24.81%	38.60%	27.37%	4
<b>Medium(20-99)</b>	16.46%	33.65%	17.14%	17
<b>Large(&gt;100)</b>	11.09%	34.77%	10.08%	217
<b>Overall mean</b>	19.23%	36.11%	21.98%	38
<b>MENA countries</b>				
<b>Small(&lt;20)</b>	4.46%	6.29%	6.15%	1
<b>Medium(20-99)</b>	4.64%	11.74%	4.45%	6
<b>Large(&gt;100)</b>	4.02%	20.04%	4.20%	74
<b>Overall mean</b>	4.45%	10.13%	5.22%	10

**Note:** The % denote the average percent of firms in each case.

The descriptive statistics are informative of the general picture concerning gender participation in entrepreneurship, however a statistical analysis is required to investigate gender gaps with more precision and accuracy.

#### 4. Model specification and main results

The baseline model investigates gender gaps in performance by estimating a regression where the dependent variables are sales per worker, value added per worker and TFP.

The first measure is labour productivity and the empirical model is give by,

$$\ln\left(\frac{sales}{nworkers}\right)_{ic} = \beta_0 + \beta_{fp} fem_{ic} + \beta_{ft} tfem_{ic} + \beta_{int}(fem_{ic} * tfem_{ic}) + \beta_l \ln labour_{ic} + \sum_k \beta_{ck} constrains_{kic} + \sum_j \beta_x X_{jic} + \omega_s + \mu_c + \varphi_y + \eta_{ic} \quad (1)$$

where *fem* denotes female presence in ownership, it is a dummy variable that takes the value of one if among the owners there are females; *tfem* is a dummy that takes the value of one if a woman is the top manager; *labour* denotes the number of full time workers, *constrains* contains a number of institutional factors that may constraint the performance of the firm. The variables considered are corruption, crime, competition from the informal market and access to finance. All are measured in an scale from 1 to 4, a higher number indicates that the corresponding variable is a more important constraint. A number of controls,  $X_{jic}$  have been added to the model, including whether the firm is an exporter or is part of a multinational (*foreign*), the number of years of experience (*experience*) of the top manager and the number of years in operation in the country (*age*) and a variable of ownership concentration (*owncon*). The dependent variable, labour productivity, is measured as total sales, *sales*, divided by the number of permanent workers, *nworkers*.

As a second dependent variable we consider value added per worker. Value added is computed as total sales minus the value of materials and intermediate inputs used in production.

As third main measure of efficiency we use TFP of the firm. To calculate TFP we obtain estimates of a traditional Cobb-Douglas production function. The Cobb-Douglas production function is given by:

$$\begin{aligned} \ln sales_{it} = & \\ & \beta_0 + \beta_{fp} fem_{it} + \beta_{ft} tfem_{it} + \beta_{int}(fem_{it} * tfem_{it}) + \beta_l \ln labour_{it} + \\ & \beta_k \ln capital_{it} + \beta_m \ln materials_{it} + \sum_k \beta_{ck} constrains_{kit} + \sum_j \beta_x X_{jit} + \omega_s + \\ & \mu_c + \varphi_y + \eta_{it} \quad (2) \end{aligned}$$

where  $\ln$  denotes natural logarithms,  $sales_{it}$  is total sales of firm  $i$  in year  $t$ , in thousands of Egyptian pounds. As independent variables we include  $labour_{it}$  defined as the average number of permanent workers,  $materials_{it}$  denotes the total purchases of raw materials and intermediate goods,  $capital_{it}$  denotes the total fixed tangible assets of the firm and the error term is decomposed into two terms:  $\omega_{sc}$ , which indicates productivity shocks and an i.i.d. component given by  $\eta_{it}$ . We deflate firm-level sales and input expenditures using the industry level production price index for manufactures for the corresponding year, the data comes from the International Financial Statistics (IFS and UN) for manufacturing.

The interpretation of the dummy variables is as follows. If one female is among the owners and the top manager is a male, the female owner effect is  $\beta_{fp}$ , and when there is a female executive and the owners are all males the effect of female-management is  $\beta_{ft}$ . Finally if  $fem=1$  and  $tfem=1$ , the effects of female presence becomes  $\beta_{fp} + \beta_{ft} + \beta_{int}$ .

The results in Table 5 show that female presence is associated with 6 percent lower labour productivity (column 1). When adding the female executive dummy in column (2), its coefficient is not statistically significant, however, column (3) indicates that firms with female top managers in which there are no female owners are on average 22 percent more productive than male managed firms, whereas if females are among the owners and the top manager is a female, the average labour productivity is around 16 percent lower (0.223-0.381=-0.159). Finally, in columns (4) value added per employee is used as dependent variable and a different specification (Equation 2, above) with sales as dependent variable that includes capital and materials as explanatory variables is estimated in column (5). The results are similar in terms of sign and significance as in column (3), but smaller in magnitude. In the later case firms with a female top manager show a 12 percent higher labour productivity than those without, when no females are among the owners.

Concerning the business constrains, informal competition and access to finance are statistically significant and indicate that when firms perceive the given obstacle as a higher constrain this is associated with a lower performance. Firms perform better when they are exporters and foreign participated, as has been also confirmed in the related literature.

**Table 5. Gender bias and firm performance. Baseline results**

Dep. Var.:	(1) Lab Pro	(2) Lab Pro	(3) Lab Pro	(4) VA	(5) TFP
<b>Ind. VARIABLES</b>					
Female Presence	-0.060*** (0.016)	-0.054*** (0.017)	0.010 (0.018)	-0.015 (0.023)	0.015 (0.021)
Female Top Manager		-0.032 (0.021)	0.223*** (0.038)	0.197*** (0.059)	0.120*** (0.044)
Female Presence*Top Manager			-0.381*** (0.045)	-0.362*** (0.066)	-0.176*** (0.052)
Ln number of workers	0.051*** (0.009)	0.051*** (0.009)	0.047*** (0.009)	0.061*** (0.011)	0.455*** (0.015)
Ln Capital					0.085*** (0.007)
Ln Materials					0.518*** (0.011)



Crime	-0.007 (0.007)	-0.008 (0.007)	-0.007 (0.007)	0.004 (0.009)	0.002 (0.007)
Informal competition	-0.019*** (0.006)	-0.019*** (0.006)	-0.019*** (0.006)	-0.013* (0.008)	-0.010* (0.006)
Corruption	0.023*** (0.006)	0.023*** (0.006)	0.023*** (0.006)	0.014** (0.007)	0.008 (0.005)
Access to finance	-0.063*** (0.006)	-0.063*** (0.007)	-0.063*** (0.007)	-0.067*** (0.008)	-0.041*** (0.007)
Ln age	0.065*** (0.011)	0.066*** (0.011)	0.065*** (0.011)	0.076*** (0.014)	0.025*** (0.009)
Ownership concentration	-0.413*** (0.029)	-0.402*** (0.030)	-0.388*** (0.029)	-0.309*** (0.036)	-0.127*** (0.027)
Experience of the manager	0.002** (0.001)	0.001** (0.001)	0.002** (0.001)	-0.001 (0.001)	-0.001 (0.001)
Exporter	0.242*** (0.022)	0.243*** (0.022)	0.241*** (0.022)	0.308*** (0.027)	0.134*** (0.018)
Foreign owned	0.483*** (0.036)	0.479*** (0.036)	0.476*** (0.036)	0.414*** (0.046)	0.205*** (0.033)
Constant	12.657*** (0.062)	12.650*** (0.062)	12.658*** (0.062)	12.259*** (0.079)	5.512*** (0.119)
Observations	53,826	52,804	52,804	30,180	19,947
Adjusted R-squared	0.766	0.765	0.765	0.776	0.932

Robust standard errors in parentheses cluster by survey weights. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Country, sector and year dummies are added in all models, not reported to save space.

Next, in Table 6 we show similar estimations for each region using labour productivity as dependent variable (Equation 1, above)<sup>4</sup>. The gender variables show very heterogeneous estimated coefficients, indicating the particularities of each geographical location of the corresponding countries. The first interesting outcome is that female presence in ownership when the top manager is a male shows a positive and significant effect on labour productivity in AFR, MENA and SAR regions and a negative effect on ECA. Secondly, when a female is the top manager and the owners are all males firms seems to show a higher performance in AFR, EAP and SAR, however, if the manager is a female and there is at least a female among the owners, this is associated to a lower performance in AFR, EAP and LAC and in SAR.

**Table 6. Gender bias in labour productivity by region**

<sup>4</sup> The number of observations is considerably restricted for materials and inputs and also for capital, therefore, for the regional and country analysis we focus on labour productivity (total sales per employee) as dependent variable.

Dep. Var: Labour Prod. Ind. VARIABLES	(1) AFR	(2) EAP	(3) ECA	(4) LAC	(5) MENA	(6) SAR
Female Presence	0.099* (0.053)	-0.092* (0.050)	-0.082** (0.035)	0.020 (0.027)	0.226*** (0.077)	0.088** (0.043)
Female Top Manager	0.252** (0.105)	0.345*** (0.097)	-0.023 (0.081)	0.092 (0.068)	-0.048 (0.177)	0.364*** (0.067)
Female Presence*Top Manager	-0.524*** (0.126)	-0.385*** (0.114)	-0.125 (0.091)	-0.341*** (0.078)	0.027 (0.277)	-0.485*** (0.094)
Ln number of workers	0.014 (0.024)	0.028 (0.029)	0.008 (0.013)	0.126*** (0.012)	0.001 (0.025)	0.029 (0.019)
Crime	-0.052*** (0.019)	0.013 (0.021)	-0.003 (0.012)	0.015 (0.010)	0.014 (0.019)	-0.013 (0.026)
Informal competition	-0.053*** (0.017)	0.006 (0.016)	-0.006 (0.010)	-0.051*** (0.009)	0.029* (0.017)	-0.013 (0.014)
Corruption	0.014 (0.017)	0.038** (0.016)	0.022** (0.011)	0.012 (0.010)	-0.013 (0.018)	0.023* (0.013)
Access to finance	-0.039** (0.019)	-0.104*** (0.017)	-0.018* (0.010)	-0.065*** (0.011)	-0.108*** (0.020)	-0.065*** (0.017)
Ln age	0.184*** (0.036)	0.187*** (0.031)	-0.029 (0.022)	0.077*** (0.019)	0.001 (0.030)	0.014 (0.022)
Ownership concentration	-0.492*** (0.114)	-0.518*** (0.083)	-0.132** (0.055)	-0.110** (0.045)	-0.435*** (0.088)	-0.584*** (0.069)
Experience of the manager	0.006* (0.003)	-0.001 (0.002)	-0.001 (0.001)	-0.001 (0.001)	0.003 (0.002)	0.003* (0.002)
Exporter	0.026 (0.062)	0.306*** (0.067)	0.274*** (0.040)	0.258*** (0.034)	0.231*** (0.067)	0.314*** (0.053)
Foreign owned	0.721*** (0.084)	0.306*** (0.086)	0.421*** (0.080)	0.462*** (0.059)	0.175 (0.112)	0.274 (0.197)
Observations	8,580	8,574	10,765	8,506	4,154	12,225
Adjusted R-squared	0.643	0.799	0.773	0.850	0.805	0.136

Note: Robust standard errors in parentheses cluster by survey weights. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Country, sector and year dummies are added in all models, not reported to save space.

Focusing on the MENA region the result indicate that whereas in Tunisia firms with female executives have a better performance than firms without, independently of the gender-division in ownership, in Morocco female presence in ownership is associated with better performance and female management does not show a significant coefficient, whereas in Jordan and Yemen there are no firms in the survey with a female top manager and female presence in ownership and hence the interaction coefficient cannot be estimated. In Jordan, as in Morocco, female presence in management is associated with better performance, but firms with female top manager owned by males perform worse than the rest. This second effect is

also found for firms in Lebanon. In the case of Egypt there is no clear relationship between performance and females entrepreneurs, same outcome in Yemen, and in Djibouti the sum of the three coefficients (two dummies and interaction term) is positive, indicating that firms with female top managers that are involved in ownership have better performance than the rest. However, the sample size is very low (less than 200 observations) for Yemen and Djibouti and so the results must be interpreted with caution. As regards the investment constraints, only access to finance is significantly related to performance for Egypt and Tunisia, whereas in Morocco, when firms perceive access to finance as a constraint, they indeed perform better. The other constraints are not statistically significant.

**Table 7. Gender bias and labour productivity in MENA countries**

Dep. Var: Labour Prod. Ind. VARIABLES	(1) Tunisia	(2) Egypt	(3) Jordan	(4) Morocco	(5) Lebanon	(6) Yemen	(7) Djibouti
Female Presence	0.181 (0.114)	0.190 (0.144)	0.485** (0.213)	0.880*** (0.293)	0.476 (0.293)	0.508 (1.088)	-1.895** (0.773)
Female Top Manager	0.837*** (0.246)	-0.044 (0.210)	-2.461*** (0.358)	0.760 (0.915)	-0.854** (0.348)	-0.008 (0.433)	-1.751*** (0.464)
Female Presence*Top Manager	-0.348 (0.365)	0.633* (0.364)			0.755* (0.443)		4.201** (1.236)
Ln number of workers	0.003 (0.052)	0.056 (0.052)	0.024 (0.070)	-0.130 (0.091)	0.031 (0.061)	0.240* (0.127)	-0.698*** (0.052)
Crime	-0.073 (0.059)	0.026 (0.032)	-0.085 (0.077)	-0.132 (0.105)	0.028 (0.060)	0.119 (0.099)	-0.063 (0.037)
Informal competition	-0.020 (0.045)	-0.020 (0.030)	-0.003 (0.065)	-0.017 (0.086)	0.042 (0.055)	-0.005 (0.095)	0.118 (0.069)
Corruption	0.056 (0.049)	-0.022 (0.031)	0.010 (0.051)	-0.171 (0.117)	0.011 (0.056)	-0.191 (0.168)	-0.126 (0.097)
Access to finance	-0.127*** (0.037)	-0.112*** (0.031)	-0.057 (0.041)	0.219** (0.093)	-0.026 (0.061)	0.090 (0.098)	0.115 (0.086)
Ln age	0.038 (0.100)	-0.145*** (0.047)	0.161** (0.078)	0.121 (0.164)	0.012 (0.077)	-0.200 (0.179)	0.132 (0.108)
Ownership concentration	0.024 (0.185)	-0.318** (0.127)	-0.477** (0.219)	0.413 (0.507)	-0.489* (0.283)	-2.032*** (0.702)	-1.509*** (0.189)
Experience of the manager	0.005 (0.006)	0.001 (0.004)	-0.012* (0.007)	0.001 (0.013)	-0.001 (0.006)	0.009 (0.020)	0.008 (0.015)
Exporter	0.034 (0.137)	0.387*** (0.109)	0.299** (0.132)	0.332 (0.308)	0.186 (0.141)	0.133 (0.428)	-0.095 (0.377)
Foreign owned	-0.143 (0.228)	0.160 (0.188)	-0.050 (0.261)	0.578* (0.295)	-0.314 (0.659)	0.667 (0.756)	-0.364 (0.556)

Observations	396	1,385	346	203	278	187	155
Adjusted R-squared	0.321	0.085	0.096	0.102	0.097	0.169	0.341

Note: Robust standard errors in parentheses clustered by survey weights. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Sector and year dummies are added in all models, not reported to save space.

## 5. Robustness

A very efficient and commonly used method to control for endogeneity problems in non-experimental and experimental causal studies is propensity matching score (PSM). This technique estimates the likelihood to receive a treatment of all observations and matches each treated observation (we take female top manager, *tfem*, as treatment variable) with one or several untreated observations (the control group: male managed firms) according to their propensity scores. The propensity score should include only the variables that influence both the participation decision and the outcome variables (we take labour productivity/value added per employee/TFP).

The following logit model is estimated:

$$\begin{aligned}
TFEM_{ic} = & \beta_0 + \beta_l \ln labour_{ic} + \beta_k \ln capital_{ic} + \beta_m \ln materials_{ic} \\
& + \sum_k \beta_{ck} \text{constrains}_{kic} + \sum_j \beta_x X_{jic} + \eta_{ic}
\end{aligned}
\tag{3}$$

The PSM results are presented in Table 8. Using PSM to see differences in performance we obtain that on average firms with top female managers have a labour productivity (value added per employee) which is around 9 percent (8 percent) higher than firms with top male managers. When we take total factor productivity, the ATE is 0.18, and hence the positive difference in performance is twice as large as before, but the sample has less than half of the observations of the original sample, and hence, the results have to be interpreted with caution.

**Table 8. Treatment-effects estimation. Estimator: IPW regression adjustment**

<b>Treatment:</b>		<b>Robust</b>					
<b>Female top manager</b>	<b>Coef.</b>	<b>Std. Err.</b>	<b>z</b>	<b>P&gt;z</b>	<b>[95% Interval]</b>	<b>Nobs</b>	
<b>Outcome variables:</b>							
<b>Ln lab pro</b>							
ATE (1 vs 0)	<b>0.090</b>	0.032	2.77	0.01	0.026	0.153	66,048
PO mean	13.637	0.012	1142	0	13.614	13.661	
<b>Ln VA per worker</b>							
ATE (1 vs 0)	<b>0.080</b>	0.045	1.75	0.08	-0.009	0.168	36,021
PO mean	13.179	0.016	828	0	13.147	13.210	
<b>TFP</b>							
ATE (1 vs 0)	<b>0.186</b>	0.026	7.26	0	0.136	0.23674	23,156
PO mean	17.636	0.022	806	0	17.59	17.679	

Note: Treatment effect estimation, inverse-probability weights, treatment model=probit.

The results using PSM to see differences in performance by region are less reliable due to the lack of enough comparable firms. We obtain that female-managed firms are more productive than comparable male-managed firms in ECA and female presence in ownership is associated with better performance in MENA and LAC, however better quality data and further research are needed to be able to confirm these outcomes. Finally, for the MENA countries we find that for Tunisia firms with top female managers or with female presence in ownership perform better than others, the same is the case for Egypt, when considering firms with female top managers, for Morocco results are not statistically significant and there is not enough observations for the other three MENA countries to implement this method.

## 6. Conclusions

This paper investigates whether female participation in entrepreneurship, as owners or as managers is related to firm performance. Gender differences in firm's performance have been investigated for different regions in the world economy using a number of proxies to measure the gender variables. We depart from the existent literature by using a more comprehensive dataset, available for countries in six regions in the world economy that

include developing countries. The second departure is the use of the variable top female manager as main proxy to measure female participation in ownership and to compare the results with those obtained for the most commonly used proxy, namely, female presence in ownership.

The main results indicate that it is crucial to distinguish between female management and female ownership and the confluence between both. We find that when the firms are managed by females and there is not female owners, they show a higher average labour productivity and TFP. However, if females are among the owners and a female is the top manager, then their productivity is lower than for other firms. These results are very heterogeneous among regions and among countries in the MENA region. In particular, results in South Saharan Africa, East Asia and South Asia seems to be driving the general results, whereas in Latin America and Eastern Europe and Central Asia, female participation in ownership seems to be negatively related to firm performance.

Within the MENA region, results for Tunisia are encouraging, since we find that female participation in entrepreneurship is clearly associated to higher average labour productivity, result partially confirmed also for Morocco. Hence, we conclude that to overcome the highly persistent gender bias in entrepreneurship in MENA countries it should be extremely desirable to dedicate more resources to educate younger generations so that gender inequality does not persist and that gender discrimination is turned around. It was been shown in this paper that female management is not necessarily associated to worse firm performance, on the contrary, it is in specific cases the other way around.

More research is needed for specific countries using richer datasets to relate our results to the specific business environments and cultural and social norms that are present in each country. For further research we plan to investigate whether firms managed by females face higher

business environment obstacles (similar to Allison et al, 2015; but with a different definition of gender).

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## Appendix

**Table A.1 List of countries and years surveyed by region**

<b>Region = AFR</b>	<b>Obs</b>	<b>Region = AFR</b>	<b>Obs</b>
Angola2006	425	Rwanda2011	241
Angola2010	360	Senegal2007	506
Benin2009	150	Senegal2014	601
Benin2016	150	Sierra Leone2009	150
Botswana2006	342	SouthAfrica2007	937
Botswana2010	268	Southsudan2014	738
BurkinaFaso2009	394	Sudan2014	662
Burundi2006	270	Swaziland2006	307
Burundi2014	157	Tanzania2006	419
Cameroon2009	363	Tanzania2013	813
CapeVerde2009	156	Togo2009	155
Centralafricanrepublic2011	150	Uganda2006	563
Chad2009	150	Uganda2013	762
Congo2009	151	Zambia2007	484
Côte d'Ivoire2009	526	Zambia2013	720
DRC2006	340	Zimbabwe2011	599
DRC2010	359	Total	29,008
DRC2013	529	<b>region = EAP</b>	
Eritrea2009	179	Cambodia2013	472
Ethiopia2011	644	Cambodia2016	373
Ethiopia2015	848	China2012	2,700
Gabon2009	179	Fiji2009	164
Gambia2006	174	Indonesia2009	1,444
Ghana2007	494	Indonesia2015	1,320
Ghana2013	720	LaoPDR2009	360
Guinea2006	223	LaoPDR2012	270
GuineaBissau2006	159	LaoPDR2016	368
Kenya2007	657	Malaysia2015	1,000
Kenya2013	781	Micronesia2009	68
Lesotho2009	151	Mongolia2009	362
Lesotho2016	150	Mongolia2013	360
Liberia2009	150	Myanmar2014	632
Madagascar2009	445	PapuaNewGuinea2015	65
Madagascar2013	532	Philippines2009	1,326
Malawi2009	150	Philippines2015	1,335
Malawi2014	523	Samoa2009	109
Mali2007	490	Solomon Islands2015	151
Mali2010	360	Thailand2016	1,000
Mauritania2006	237	Timor Leste2009	150
Mauritania2014	150	Timor-Leste2015	126
Mauritius2009	398	Tonga2009	150
Mozambique2007	479	Vanuatu2009	128

Namibia2006	329	Vietnam2009	1,053
Namibia2014	580	Vietnam2015	996
Niger2009	150	Total	16,482
Nigeria2007	1,891		
Nigeria2014	2,676		
Rwanda2006	212		

<b>Region = SAR</b>	<b>Obs</b>	<b>Region = ECA</b>	<b>Obs</b>	<b>Region = LAC</b>	<b>Obs</b>
Afghanistan2008	535	Serbia2009	388	StLucia2010	150
Afghanistan2014	410	Serbia2013	360	StVincentandGrenadines2010	154
Bangladesh2007	1,504	Tajikistan2008	360	Suriname2010	152
Bangladesh2013	1,442	Tajikistan2013	359	Venezuela2006	500
Bhutan2009	250	Turkey2008	1,152	Venezuela2010	320
Bhutan2015	253	Turkey2013	1,344	Total	22,057
India2014	9,281	Ukraine2008	851	<b>region = MENA</b>	
Nepal2009	368	Ukraine2013	1,002	Djibouti2013	266
Nepal2013	482	Uzbekistan2008	366	Egypt2013	2,897
Pakistan2007	935	Uzbekistan2013	390	Iraq2011	756
Pakistan2013	1,247	Total	17,941	Jordan2013	573
SriLanka2011	610	<b>region = LAC</b>		Lebanon2013	561
Total	17,317	Argentina2006	1,063	Morocco2013	407
<b>-&gt; region = ECA</b>		Argentina2010	1,054	Tunisia2013	592
Albania2007	304	Belize2010	150	West Bank And Gaza2013	434
Albania2013	360	Bolivia2006	613	Yemen2010	477
Armenia2009	374	Bolivia2010	362	Yemen2013	353
Armenia2013	360	Brazil2009	1,802	Total	7,316
Azerbaijan2009	380	Colombia2006	1,000		
Azerbaijan2013	390	Colombia2010	942		
Belarus2008	273	Costarica2010	538		
Belarus2013	360	Dominica2010	150		
Bosnia and Herzegovina2009	361	Dom.Rep.2010	360		
Bosnia and Herzegovina2013	360	Ecuador2006	658		
Bulgaria2007	1,015	Ecuador2010	366		
Bulgaria2009	288	ElSalvador2006	693		
Bulgaria2013	293	ElSalvador2016	719		
Fyr Macedonia2009	366	ElSalvador2010	360		
Fyr Macedonia2013	360	Grenada2010	153		
Georgia2008	373	Guatemala2006	522		
Georgia2013	360	Guatemala2010	590		
Hungary2009	291	Guyana2010	165		
Hungary2013	310	Honduras2006	436		
Kazakhstan2009	544	Honduras2010	360		
Kazakhstan2013	600	Jamaica2010	376		
Kosovo2009	270	Mexico2006	1,480		
Kosovo2013	202	Mexico2010	1,480		
Kyrgyz Republic2009	235	Nicaragua2006	478		
Kyrgyz Republic2013	270	Nicaragua2010	336		

Moldova2009	363	Panama2006	604
Moldova2013	360	Panama2010	365
Montenegro2009	116	Paraguay2006	613
Montenegro2013	150	Paraguay2010	361
Romania2009	541	Peru2006	632
Romania2013	540	Peru2010	1,000

**Source:** World Bank Enterprise Surveys, 2016. South Saharan African (SSA), East Asia and Pacific (EAP), Eastern Europe and Central Asia (ECA), Latin America and Caribbean (LAC) and Middle East and North Africa (MENA). In addition the data includes two regions comprising high income (HI) countries; one for Organization of Economic Cooperation and Development (OECD) and the second for non-OECD countries.

## A.2 Number of firms surveyed by year and region

Year	Region								Total
	AFR	EAP	ECA	LAC	MENA	SAR	HI OECD	HI NOECD	
2008	2,010	215	7,490	0	0	535	957	1,071	12,278
2009	1,987	4,917	402	0	0	617	572	480	8,975
2010	1,347	180	0	5,921	477	0	941	602	9,468
2011	1,374	0	0	4,323	756	610	92	3,868	11,023
2012	328	778	464	0	0	0	0	1,326	2,896
2013	3,501	323	7,568	0	2,776	5,784	1,808	966	22,726
2014	6,461	894	698	0	3,307	6,737	882	0	18,979
2015	1,647	3,707	0	0	0	594	0	0	5,948
2016	361	2,765	0	719	0	0	0	0	3,845
Total	19,016	13,779	16,622	10,963	7,316	14,877	5,252	8,313	96,138

**Source:** World Bank Enterprise Surveys, 2016. See Table A.1 for the definition of regions.

**Table A.3 Summary statistics**

<b>Variable</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Fem</b>	100,470	0.317	0.465	0	1
<b>Tfem</b>	83,697	0.152	0.359	0	1
<b>Femmore</b>	52,396	0.138	0.345	0	1
<b>Femempl</b>	39,510	23.350	243.609	0	38400
<b>Lab prod</b>	110,102	96.935	469.108	0	64000
<b>Ln sales</b>	97,067	16.819	3.243	0	34.105
<b>Ln labor</b>	95,394	14.745	3.092	0	30.575
<b>Ln capital</b>	39,790	15.208	3.369	0	32.929
<b>Ln materials</b>	52,266	15.748	3.456	0	32.013
<b>Ln VA pw</b>	50,034	13.008	2.785	1.355	27.572
<b>Ln lab pro</b>	96,657	13.499	2.898	-3.571	28.931
<b>Age</b>	81,058	17.878	14.827	0.5	203
<b>Experience</b>	106,510	16.607	10.659	1	59
<b>Crime</b>	108,368	1.220	1.314	0	4
<b>Informal</b>	105,714	1.519	1.378	0	4
<b>Corruption</b>	106,222	1.788	1.489	0	4
<b>Accesfinance</b>	105,954	1.518	1.336	0	4
<b>Owncon</b>	104,260	0.801	0.261	0.002	1
<b>Exporter</b>	110,121	0.213	0.409	0	1
<b>Foreign</b>	107,966	0.081	0.254	0	1

**Note:** See Table A.5 for variables' definition.

**Table A.4. Pairwise correlations**

	<b>Fem</b>	<b>Tfem</b>	<b>Lnsales</b>	<b>Lnvapw</b>	<b>Lnlabpro</b>	<b>Age</b>	<b>Exper</b>	<b>Crime</b>	<b>Informal</b>	<b>Corrup.</b>	<b>Accesf</b>	<b>owncon1</b>	<b>exporter</b>	<b>foreign1</b>
<b>Fem</b>	1													
<b>Tfem</b>	0.4148*	1												
<b>Ln sales Ln VA per worker</b>	0.0371*	-0.0025	1											
<b>Ln lab pro</b>	0.0160*	0.0301*	0.8752*	1										
<b>Age</b>	0.0529*	-0.0361*	0.1119*	-0.0199*	0.0026	1								
<b>Experience</b>	0.0518*	-0.0573*	0.0241*	-0.0634*	-0.0441*	0.3879*	1							
<b>Crime</b>	-0.0103	-0.0061	-0.0593*	-0.0709*	-0.0520*	0.0190*	0.0378*	1						
<b>Informal</b>	0.0154*	-0.0047	-0.0555*	-0.0296*	-0.0179*	0.0308*	0.0557*	0.3094*	1					
<b>Corruption</b>	-0.0555*	-0.0593*	-0.0697*	-0.1021*	-0.0835*	0.0343*	0.0636*	0.3951*	0.2763*	1				
<b>Access finance</b>	-0.0184*	-0.0176*	-0.0912*	-0.0464*	-0.0406*	-0.0348*	-0.0247*	0.2816*	0.2791*	0.2539*	1			
<b>Owncon</b>	-0.1802*	0.0098	-0.1233*	0.0177*	-0.0038	-0.1564*	-0.1339*	-0.0156*	0.005	-0.0528*	0.0345*	1		
<b>Exporter</b>	0.0571*	-0.0081	0.1634*	0.0147*	0.0077	0.1260*	0.1114*	-0.0163*	-0.0403*	0.0270*	-0.0402*	-0.1558*	1	
<b>Foreign</b>	-0.0261*	-0.0221*	0.1329*	0.0926*	0.0594*	-0.0083	-0.0233*	0.0292*	-0.0279*	-0.0067	-0.0477*	-0.0462*	0.1713*	1

**Note:** \* denotes significance at the 5% level. See Table A.5 for variables' definition.

**Table A.5 Variables' definition**

<b>Cat</b>	<b>Acronym</b>	<b>Definition</b>	<b>Question</b>	<b>Question num</b>
<b>Gender</b>	<b>Fem</b>	Dummy variable that takes the value of 1 if owner is a female, zero otherwise	Amongst the owners of the firm, are there any females?	b4
	<b>Tfem</b>	Dummy variable that takes the value of 1 if the top manager is a female, zero otherwise	Is the top manager female?	b7a
	<b>Femmore</b>	Dummy variable that takes the value if 1 if fem_cat>2 (at least 50 percent are female owners)	Are the owner of the firm: 1:all men, 2:majority men,3:majority women,4:all women,5:equally divided	b4a_cat and own elaboration
<b>Total Factor Productivity (TPF)</b>	<b>Capital</b>	Net book value of machinery vehicles, and equipment in last fiscal year	Net book value of machinery vehicles, and equipment in last fiscal year	na6 and authors elaboration
	<b>Materials</b>	Total purchases of raw material and intermediate goods (deflated by the production price index (PPI) for manufactures)	Cost of raw materials and intermediate goods used in prod. in last fiscal year	n6a and authors elaboration
	<b>Wages</b>	total labor cost (incl. wages, salaries, bonuses, etc) in last fiscal year (deflated by the production price index (PPI) for manufactures)	Total cost of labor, including wages, salaries and bonuses	n2a authors elaboration
<b>Firm Performance</b>	<b>Labour Productivity</b>	Last complete fiscal year's total sales divided by total number of permanent workers	Sales: In fiscal year (please insert last completed fiscal year) what were this establishment's total annual sales for all products and services?	d2, l1 and author' elaboration
	<b>VA per worker</b>	(Total annual sales -materials)/total number of permanent workers	See questions for sales, materials and Nworkers	Author' elaboration
	<b>Nworkers</b>	Total number of permanent workers end of last fiscal year	How many permanent, full-time individuals worked in this establishment?	l1
<b>Ownership</b>	<b>Foreign</b>	Dummy variable that takes the value of 1 if the firm is partly owned by a foreigner	Percentage of the firm owned by a foreign owner	b2b and author' elaboration
	<b>Ownconc</b>	Percentage of the firm owned by the main owner	what percentage of this firm does the largest owner(s) own?	b3
<b>International Trade</b>	<b>Exporter</b>	Dummy variable that takes value 1 if firm export in year t	What percent of your establishment's sales were exported directly in current year	Author' elaboration from variables d3b and d3c (direct and indirect export shares)
<b>Constraints</b>	<b>Corruption</b>	Corruption	Please tell us to what degree each factor is an obstacle to the current operations of the establishment, judge its severity as an obstacle on a four-point scale: No obstacle, minor, moderate, major, very severe	j30f
	<b>Crime</b>	theft, disorder and crimes		i30
	<b>Access finance</b>	Access/cost of finance		k30
	<b>Informal</b>	Illegal competition from the informal sector/smuggling and dumping		e30

**Source:** World Bank Enterprise Surveys, 2016.