Informal firms in Mozambique: status and potential

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Abstract

In most countries in Africa, the informal sector is large and exhibits low levels of productivity compared to the formal economy: informal firms are typically small, inefficient, and run by entrepreneurs with low levels of education. This paper presents novel representative firm-level data collected on informal firms in the three largest cities of Mozambique, as well as data of formal enterprises. Compared to formal microenterprises, informal firms sell about 14 times less, make 17 times lower profits and are 2-3 times less productive. Almost two-thirds (61%) of these performance gaps can be explained by differences in firm characteristics: informal firms are smaller, use fewer business practices and use less capital and production inputs, while the rest of the gap is explained by differential returns. Despite this "duality" between formality and informality, there is nevertheless a small but significant group of informal enterprises (7.6% of informal firms, representing 10.6% of employment in the informal sector) that in their characteristics and productivity levels are similar to formal microenterprises. Policies should take this heterogeneity into account.

Keywords: Informality; business registration; tax; government; financial access, small enterprises.

JEL codes: O17, O12, C93, D22, H41, L26

1 Introduction

In line with many other low-income countries, informality remains very much prevalent in Mozambique: about 80% of the Mozambican labor force works in the informal sector, mostly in agriculture and informal self-employment (World Bank 2018). Very few workers are employed formally: social security only covers a mere 6% of the labor force. Despite the establishment of "one-stop shops" by the Mozambique government to encourage registration, Mozambique still only ranks 174 out of 190 on the formal Ease of Starting a Business and firms report that registration remains an even lengthier and tedious process than what the law requires of them.[1]

Berkel (2018) followed a shoemaker from Maputo on his journey of formalizing his firm. Even though the law stipulates a business license with indefinite validity could be obtained with only minimal documentation, the entrepreneur was sent back several times to collect additional documents that were not required by law, had to pay more (5,700 MZN / US$100 instead of 1,639 MZN / US$27) and in the end only got a license that had to be renewed annually for a fee of 3,000 MZN. The entire procedure took 32 days, instead of the 17 days formally required that are documented by the World Bank's Doing Business report.

The informal sector in Mozambique is estimated to account for 31% of GDP (Medina and Schneider 2018). Despite its importance, our understanding of the informal private sector in Mozambique is limited. Existing administrative data (e.g., the Censo de Empresas, CEMPRE, as used by Lachler & Walker 2018) only covers the formal manufacturing sector (which corresponds to only 7% of all firms in the country).

This paper covers this gap by analyzing novel non-farm firm data collected by the 2018 World Bank Enterprise Survey, which – for the first time in Mozambique – also covers informal enterprises. As the data shows, and in line with the earlier literature, informal firms are less productive than formal enterprises, confirming findings from other countries. Compared to formal microenterprises, informal firms sell about 14 times less, make 17 times lower profits and are 2-3 times less productive. Informal firms significantly differ in underlying characteristics from formal microenterprises. Informal firms employ fewer employees, use less capital and raw material, are

[1] In the Enterprise Survey of informal firms, 40.8% of informal enterprises report that the time, fees, and paperwork required to register is the primary or secondary reason why they have not registered.

less likely to have access to finance and banking, adopt fewer good business practices and have fewer skills at their disposal.

But not all informal firms are the same. Earlier studies in other countries have shown that there is a group of informal firms that is very similar in their characteristics to formal enterprises (De Mel et al. 2010, Bruhn 2011, Benhassine et al. 2018) and who produce at similar levels as formal enterprises (e.g. in Tanzania, Diao, Kweka & McMillan 2017). Benhassine et al. (2018) showed for Benin that this group of firms was more likely to benefit more from formalization incentives than other firms. Using a discriminant analysis (also known as species classification) we identify for Mozambique a group of "high-resemblance-high-performance" informal firms that in their characteristics resemble formal businesses and produce on par with them. This group corresponds to 7.6% of informal firms, representing 10.6% of employment in the informal sector in the three cities we study.

This paper is organized as follows. Section 2 presents a review of the literature on informal firms. Section 3 presents the data, sampling and empirical strategy. Section 4 describes the informal sector in Mozambique. Section 5 compares the performance of informal and formal firms, identifying possible explanatory factors for the differences. Section 6 identifies informal firms in Mozambique with high productivity and a high resemblance to formal firms. Section 7 discusses the implications of the findings for policy.

2 Background

Cross-country comparisons show a strong relationship between informality and economic output: informality is especially prevalent in low income countries, and informality declines as countries become wealthier (La Porta & Schleifer 2014). Despite the strong correlation, the direction of causality is not necessarily obvious.

One view expressed by De Soto (1989) suggests that burdensome regulation is keeping firms both informal and unproductive. A removal of these barriers will allow firms to increase access to

finance and markets, provide more legal certainty and subsequently encourage firm growth. Some of the benefits might accrue to other firms that are already formal or to potential new entrant firms.[2]

An opposing view expressed by La Porta & Schleifer (2014) emphasizes that informal firms are in their characteristics (e.g. education, skills, experience, and attitudes of the manager) very different from formal firms and that these differences in fundamental characteristics are key to understanding observed differences in firm performance. Under this view, policy should focus on other areas of enterprise development, and that informality would reduce over time as the country develops.

Countries around the world have tried different approaches to entice firms to formalize:

a. Many countries have approached the challenge of formalization by simplifying legal procedures. Experiences from countries like Mexico and Colombia show that simplified start-up processes do lead to increases in the number of business registrations (e.g., in Mexico and Colombia the number of registrations increased by approximately 5%; see Bruhn 2011, Kaplan, Piedra & Seria 2011, Bruhn & McKenzie 2013). In Peru, simplification led to a 43% increase in firm registrations, but many firms only applied for temporary one-year licenses and did not renew these in the following year (Mullainathan & Schnabl 2010; Bruhn & McKenzie 2013).[3]
b. Other countries focused on creating more transparency around the process have had decent results. In Malawi, providing firms with information and support to register was successful. Campos, Goldstein & McKenzie (2018) conducted a field experiment where firms were given hands-on assistance in registering their business. More than 70% of the targeted firms registered their business, even though fewer than 10% registered for taxes. However, business registration on its own did not impact firm profits. Only when information on business registration was combined with information on opening a business bank account profits increased. In another field experiment in Belo Horizonte, Brazil, De Andrade,

[2] Informal firms can harm and in certain cases crowd out existing formal firms or potential entrants, by competing unfairly through the avoidance of tax and labor regulations (Levy 2008). In the 2018 Mozambique Enterprise Survey, unfair competition from the informal sector was indeed identified as among the top three constraints on operations and productivity for formal firms in Mozambique.

[3] In the case of Peru (Mullainathan & Schnabl 2010) were offered the choice between a more expensive permanent license and a cheaper provisional license, only valid for one year. A proportion of 63% of businesses opted for the provisional one-year license.

Bruhn & McKenzie (2014) find that just providing information on business registration does not lead to more business registrations. However, increasing enforcement does help to achieve formalization: firms that were visited by an inspector were 27% more likely to be registered.

c. And some countries have tried financial incentives to entice firms to formalize. In Sri Lanka, De Mel et al. (2013) conducted a field experiment giving informal firms with 1 to 14 workers incentives to formalize. Treatments in which firms were given information on the registration process or were reimbursed their direct costs did not lead to more business registrations. Payments between half and twice the median firm's profits did lead to more business registrations, but the impact on firm performance remained limited to a few firms. In Benin, the government simplified registration and exempted newly registered firms from paying taxes. Nevertheless, formalization rates were low: an intervention that provided information on the new regime increased formalization by 9.6% and combining this with tax assistance and connecting to a bank led to an increase 16 percentage points in business registration rates (Benhassine et al. 2018).

Despite the success of some of these interventions in achieving formalization, full elimination of informality rarely happens, even in countries with simple, cheap and transparent processes to register a business. For countries in the upper quart of the income distribution measures of informality suggest that on average informality represents around 8% to 17% of GDP (La Porta & Shleifer 2008; ILO 2018).

Given the cost of registration and the costs of formalization encouragement programs, encouragement programs targeting all firms may not be cost-effective (Benhassine et al. 2018).[4] Instead, the question is whether there is a subset of firms that would benefit most from formalization and should be targeted.

World Bank Enterprise Survey data across the world suggests that informal entrepreneurs tend to have received less education than formal entrepreneurs and score lower across a wide range of skill metrics (La Porta & Shleifer 2008). Informal entrepreneurs are also more likely to be "necessity entrepreneurs", whose main rationale to become an entrepreneur is a lack of an outside

[4] This does not mean necessarily that there are no further benefits to formalization, as some of the benefits may accrue to other firms that are already formal or to potential new entrant firms.

option, while formal entrepreneurs are more likely to be "opportunity entrepreneurs", who made an active choice to become an entrepreneur to take advantage of a perceived unexploited or underexploited business opportunity (Acs 2006).

It is likely that many of the informal entrepreneurs would take up wage employment if the opportunity came along. In Sri Lanka, De Mel et al. (2010) compare the characteristics of informal entrepreneurs with those of larger firm owners and wage workers. They find that about two thirds to three quarters of informal entrepreneurs have characteristics that are very similar to wage workers. The attraction of wage work can have consequences for business growth: Koelle (2019) argues that entrepreneurs who anticipate that at some point a wage opportunity will come along, invest rationally less in their business.

However, some studies suggest that there is a subgroup of informal firms with capacity to grow. For example, in the De Mel et al. (2013) study in Sri Lanka, there was a small group of high-growth firms (about 5% of the sample) who following registration significantly increased their performance. To identify these informal firms that can grow, earlier studies have taken two approaches: identifying firms that perform on par with the formal sector (high-performance firms) or firms that in characteristics are similar to formal firms (high-resemblance firms). Diao, Kweka & McMillan (2017) take the first approach and show that in Tanzania a significant degree in overlap in productivity exists between formal and informal micro, small and medium-sized enterprises (MSMEs), and informal "in-between" firms contributed significantly to overall labor productivity growth. De Mel et al. (2010) study in Sri Lanka is an example of the second approach – it uses a species classification analysis to show that about a quarter to a third of microentrepreneurs share similar characteristics as those of larger enterprises.

There is some evidence that these firms with an overlap in characteristics with the formal sector are more likely to formalize. Bruhn (2011) replicates this species classification in Mexico and shows that the group of informal business owners sharing characteristics with formal entrepreneurs – about half of the informal business owners – was more likely to register their business as part of a formalization campaign than informal entrepreneurs resembling wage workers. Likewise, in Benin, Benhassine et al. (2018) classify 18% of (initial) informal businesses as being similar to formal enterprises, and these firms were 4 to 12 percentage points more likely to register than other firms.

3 Data and empirical strategy

Data

For this analysis, we rely on newly collected data for the Mozambique 2018 *World Bank Enterprise Survey*. Formal firms are sampled from firm listings maintained by the national statistical agency (*Instituto Nacional de Estatistica*), and for firms with five or more employees, also from the previous edition of the Enterprise Survey, which was conducted in 2007. The survey for micro firms (0-4 employees) was stratified by province (Cabo Delgado, Nampula, Zambézia, Tete, Manica, Sofala and Greater Maputo) and by industry (mining and quarrying, food and beverages, metals/machinery/computers/electronics, other manufacturing, tourism, retail and other services). The survey for small, medium and large enterprises (more than 5 employees) was stratified by region, industry and size. Most of our analysis of formal firms as a comparator group relies on the micro firm survey data.

For the first time in Mozambique, the Enterprise Survey also interviewed informal firms.[5] The informal firms survey covered firms in the three biggest cities (Beira, Maputo and Nampula, where 2.4 million people live or 9% of the country's total population). A firm is considered informal in Mozambique when it lacks either an operating license, a business registration certificate, or a taxpayer's identification number (NUIT) in name of the owner.

Informal firms – by definition – are not included in the business register and are therefore sampled using an alternative method, Adaptive Cluster Sampling (Thompson 1990). This method relies on dividing the surveyed cities into a grid of 150 by 150 squares, with each square stratified into four different categories based on the likely concentration of informal business – low, medium, high concentration areas, and market centers.

A total of about 400 squares were randomly selected - within strata of the likelihood of identifying informal firms - for a full enumeration (see Annex-1 for distribution of the sample by city). All informal firms in these squares were enumerated by administrating few questions to capture information on the type of activity, physical location, and the number of workers, etc. Since

[5] The datasets for both formal and informal firms are available at https://www.enterprisesurveys.org/data.

businesses can be operated from within the household premises, enumeration required knocking on every house in the square to check if there are informal businesses activities in the house. A sub-sample of the enumerated informal businesses were selected randomly, using the tablet device, and administered the main questionnaire for the survey. The selection of businesses to the main interview is conducted in real time while enumeration is being conducted, and it is pre-programmed in to the CAPI system such that enumerators have in principle no control on which informal business will get selected for the main questionnaire.

The process is adaptive, namely that the enumeration and main data collection is expanded to all adjacent squares if the number of informal firms found in a given square is above a pre-defined threshold. This process is repeated until the number of firms found in a square is lower than the set threshold or a maximum number of iterations was reached.

A total of 982 squares were surveyed in Mozambique, leading to a listing of 11,000 informal firms. Of these, 554 firms were randomly selected for the full-length Enterprise Survey informal firms' questionnaire.[6]

Empirical strategy

We start by examining whether informal firms have lower sales and profits. We run local linear regressions of log sales/profits on informality. Next, we examine cross-sectional associations with productivity by estimating for firm i in industry j and location p:

$$y_{i,j,p} = \alpha_l l_{i,j,p} + \alpha_k k_{i,j,p} + \alpha_n n_{i,j,p} + \beta I_{i,j,p} + \delta Z_{i,j,p} + \mu_{i,j.p} \quad \text{(Eq. 1)}$$

where y is log sales or log profits, l is log labor, k is log capital, n is log inputs, and I is a dummy variable taking the value of 1 if the firm is informal. Z is a vector of additional controls that are predicted to affect firm performance, such as firm characteristics (e.g. firm age) and business owner characteristics (e.g. gender).[7]

To better understand the drivers behind performance gaps between informal and formal firms, we use the Oaxaca-Blinder (OB) decomposition. Consider that informal and formal firms differ in their characteristics. These different characteristics contribute to the productivity gap between

[6] Questionnaire modules included in Appendix Table 3.
[7] See Table 3 for full description of the controls used.

formal and informal firms (e.g. formal firms tend to be larger than informal firms and large firms are more productive). But also, the relationship between these characteristics and performance could differ between formal and informal firms (e.g. a formal firm can benefit more from adding an employee compared to an informal firm). The OB decomposition decomposes the gap into the part explained by formal and informal firms differing in observable characteristics (the "endowment effect") and the part explained by how these characteristics influence performance differently between formal and informal firms (the "structure effect" or "coefficients effect").

For the OB decomposition, we follow O'Sullivan et al. (2014) and Fortin et al. (2011). We estimate the following equation with outcome measure Y (e.g., log sales):

$$Y_g = X'\beta + \varepsilon \qquad \text{(Eq. 2)}$$

where g indicates the firm type, X' is a matrix $(n \times K)$ with K observable owner's and firm's characteristics; β is the associated vector of intercept and slope coefficients; and ε is the error term under the assumption that $E(\varepsilon_{FA}) = E(\varepsilon_{FB}) = 0$ where FA is a firm-type A[8] and FB is a firm-type B.[9] The gap between firm types G is expressed as the mean outcome difference:

$$G = E(Y_{FA}) - E(Y_{FB}) \qquad \text{(Eq. 3)}$$

Replacing Eq. (3) into Eq. (2) and taking the expectations, the gap is:

$$G = E(X')\beta_{FB} + E(\varepsilon_{FB}) - E(X')\beta_{FA} - E(\varepsilon_{FA}) = E(X')\beta_{FB} - E(X')\beta_{FA} \qquad \text{(Eq. 4)}$$

and Eq. (4) can be rewritten as:

$$G = \beta_{0,FB} + \sum_{k=1}^{K} E\left(X_{k,FB}\right)\beta_{k,FB} - \beta_{0,FA} - \sum_{k=1}^{K} E\left(X_{k,FA}\right)\beta_{k,FA} \quad \text{(Eq. 5)}$$

Rearranging Eq. (5) and adding and subtracting the intercept coefficient of the pooled regression β_0^* and the terms $E(X_{t,k})\ \beta_k^*$, we obtain:

$$G = \underbrace{\sum_{k=1}^{K}\left[E\left(X_{k,FB}\right) - E\left(X_{k,FA}\right)\right]\beta_k^*}_{Component\ 1:\ Endowment\ \ Effect} +$$

[8] Firm-type A: Informal.
[9] Firm-type B: Formal

$$\underbrace{\underbrace{\left(\beta_{0,FB}-\beta_0^*\right)+\sum_{k=1}^{K}E(X_{k,FB})\,\left(\beta_{k,FB}-\beta_k^*\right)}_{Firm\ Type\ B\ Structural\ Advantage}+\underbrace{\left(\beta_0^*-\beta_{0,FA}\right)+\sum_{k=1}^{K}E(X_{k,FA})\left(\beta_k^*-\beta_{k,FA}\right)}_{Firm\ Type\ A\ Structural\ Advantage}}_{Component\ 2:\ Structure\ Effect} \quad \text{(Eq. 6)}$$

where $\beta_{0,FA}, \beta_{0,FB}, \beta_0^*, \beta_{k,FA}, \beta_{k,FB}, \beta_k^*$ $(k = 1, \dots, K)$ are the intercept and slope coefficients of each covariate included in the regressions of firm type A, firm type B and pooled samples.

Eq. (6) shows the aggregate decomposition. The first component is the endowment effect, the second component is the structure effect – the firm type B structure advantage and the type A structure advantage.

4 The informal sector in Mozambique

Informal firms are smaller, younger, mostly in retail and are more likely to be owned by women

Table 1 describes the informal and formal firms present in Mozambique in 2018. The vast amount of informal enterprises in Mozambique are small retail firms. An estimated 72% of informal firms are in retail, against 52% of formal enterprises. Other common industries are other manufacturing (7.4%), personal service activities (6.1%) and food manufacturing (4.8%).

Informal firms are on average smaller than formal firms. The average size of an informal enterprise is 1.6 employee, while the average size of a formal enterprise is 14.1. For the retail sector, the most common informal enterprise, the average size is 1.5, against an average size of 5.6 of formal firms in the retail sector. About 62% of informal firms only have one person engaged, and practically no informal firm (0.1%) has more than five employees.

Informal firms are on average younger than formal firms. Their average age is 4.7 years, against 8.0 years for micro formal enterprises (fewer than five employees) and 14.9 years for larger formal enterprises (five or more employees).

Informal firms are also more likely to be owned by women. Almost half (49.5%) of informal firms are majority-owned by women, while less than a quarter (24.2%) of formal firms have a majority ownership by women. Retail informal firms are more likely to be majority-owned by women (52%, against 45% for manufacturing and 38% for services).

Table 1. Non-agricultural Firms in Mozambique: characteristics by group

	Informal	Formal Less than 5 (micro)	5 and more	All formal
Sector (%)				
Manufacturing	16.5	6.4	22.0	10.5
Retail	72.7	61.6	27.2	52.7
Other services*	10.8	31.9	50.9	36.8
Average number of employees	1.6	3.1	45.7	14.1
Average age	4.7	8.0	14.9	9.8
Average monthly sales (in USD)	98	2,749	90,645	25,521
Average monthly sales per employee	69	972	1,900	1,213
Share with majority female ownership (%)	49.5	26.5	17.6	24.2
Number of observations	554	120	650	770

Source: WB Enterprise Survey. *Other services include transport, personal services, repair services and other services not classified elsewhere.

Last, informality is lowest in Maputo City. For every formal firm in Maputo, four informal firms were enumerated, while in Beira the ratio was 17 informal firms per formal firm, and it was 36 in Nampula.

A subnational Doing Business study (World Bank, 2019) done for 10 cities in Mozambique at the same time as the Enterprise Survey revealed that Beira and Nampula not only have the higher informal/formal firm ratios, they also make it more difficult to register a new company than Maputo. Maputo ranked 1st among the 10 cities surveyed with 10 legal procedures, 17 days and a cost of 120 percent of the GNI per capita of Mozambique. By comparison, Beira and Nampula ranked 9 and 10 with 11 procedures, a wait time of 39 and 40 days and a cost in the order of 133 and 130 percent of the GNI per capita, respectively.

Few informal firms transition into the formal sector

Furthermore, transition from the informal sector to the formal sector is limited. Of the micro formal firms, 15.1% were not registered when they began operations, and of larger establishments, 5.9% were not registered during the start-up process. Manufacturing formal firms are more likely to have started informally than retail and services firms (17.7% in manufacturing against 13.0% and 10.7% in retail and services respectively). Firms in Maputo are also more likely to have started informally (22.8% against 6.7%).

Very few informal firms are currently considering or have considered transitioning to the formal sector. About 9.0% of informal firms considered registering the business in the last three years, and only 5.5% of informal firms took steps to register their business in that period. About a tenth (10.6%) of informal firms would currently be interested.

Table 2. Reasons for not registering

	All informal firms		*Informal firms with a high resemblance to formal enterprises*	
Reasons for not registering	Percentage answering "yes"	Percentage selecting as main reason	Percentage answering "yes"	Percentage selecting as main reason
Time, fees and paperwork	33.4	26.1	50.4	68.7
Taxation	27.5	10.9	42.2	2.9
Inspections	13.6	1.4	24.4	4.3
Bribes	12.9	1.8	22.2	0.0
No benefit for business	45.3	33.5	22.3	14.6
Lack of information	43.0	18.6	37.2	8.7

Source: WB Enterprise Survey.

As presented in Table 2, firms indicate as the main reason for not registering that they do not see a benefit of registering for the business (33.5% gives this as the main reason). Other important reasons raised are the time, fees and paperwork (26.1% indicates this as the main reason) and the lack of information (18.6% report to be the main reason). For firms that in their characteristics look like formal enterprises (see Section 6 for a discussion of this classification), time, fees and paperwork were indicated as the key reason for not registering (it was the main reason for 68.7% of them). These high-resemblance firms are 50% less likely to see no benefit of formalization compared to the entire sample of informal firms.

Informal firms rarely report that (possible) clients refuse to do business with them because of their lack of registration (only 2.1% of firms report that this has happened before). Also, few informal firms (4.1%) report that they provided informal payments or bribes to remain unregistered and 8.5% think that other firms are doing so. However, informal firms that resemble formal firms in their characteristics are twice as likely to be asked for a bribe as the average informal firm.

Formal firms see competition from informal firms as an obstacle

Formal firms report that competition from informal firms is an obstacle. Two-thirds (66.5%) of formal firms compete against unregistered establishment. This share is the highest for the services sector (73.6%). More than half of formal firms (54.6%) sees competition from informal firms as a

more than minor obstacle and about a third (31.8%) sees it as a major or severe obstacle. This share is larger in the retail sector, the sector in which informality is the most prevalent: 36.2% of formal retail firms see competition from informal firms as a major or severe obstacle. Formal firms that used to be informal are more likely to see competition from informal firms as more problematic (49.1% against 28.6%).

Micro formal firms are more likely to see competition from informal firms as an obstacle than larger formal firms (33.7% against 24.4%). However, the reported percentage of formal firms with at least 5 employees considering competition from unregistered firms as an obstacle is below the Sub-Saharan average (39.3%).

5 Comparing informal and formal firms

Performance and productivity of informal firms

Informal firms sell less, are less productive and less profitable than micro formal firms. Table 3 shows the relationship between formalization status and sales and profit. Formalization status has a negative coefficient in all regressions. The coefficients suggest that informality is associated with selling 25 times less than formal firms (column (1)) and selling 15 times less than formal firms with fewer than 5 employees (column (2)). Informal firms are also between 17 and 19 times less profitable than formal firms (column (5) and (6)). Much of this difference is explained by differences in capital, labor and inputs, as well as sectorial, location, firm and business owner differences. After controlling for this, the ratio between formal and informal firms are between 2 and 3 times less productive than formal micro firms (columns (3) and (4)).[10]

[10] Columns (3) and (4) include number of total employees as a regressor, resembling the structure of a Cobb Douglas production function. The coefficient on informality can therefore be interpreted as the (partial) correlation between informality and total factor productivity.

Table 3. Informality, Performance and Productivity

Dependent variable	(1) Log month sales	(2) Log month sales	(3) Log month sales	(4) Log month sales	(5) Log month profits	(6) Log month profits	(7) Log month profits	(8) Log month profits
Sample	All firms	Informal + micro formal	Informal + micro formal	Informal + micro formal	All firms	Informal + micro formal	Informal + micro formal	Informal + micro formal
Firm is informal	-3.232	-2.696	-1.008	-0.698	-2.945	-2.823	-1.248	-1.393
	[0.205]***	[0.247]***	[0.275]***	[0.295]**	[0.205]***	[0.264]***	[0.285]***	[0.343]***
Log total employees			0.483	0.747			0.081	0.164
			[0.126]***	[0.125]***			[0.149]	[0.170]
Log capital			0.037	0.057			0.078	0.092
			[0.025]	[0.024]**			[0.043]*	[0.058]
Log month total costs			0.562	0.509			0.607	0.546
			[0.054]***	[0.058]***			[0.079]***	[0.106]***
Implied ratio formal/informal	25.33	14.82	2.74	2.01	19.01	16.82	3.48	4.02
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maputo dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other controls	No	No	No	Yes	No	No	No	Yes
Observations	1,253	603	453	347	1,204	599	442	339
R^2	0.419	0.315	0.669	0.723	0.332	0.285	0.599	0.693
Adjusted R^2	0.416	0.309	0.663	0.708	0.329	0.279	0.591	0.676

Note. Linear regression. Observations are weighted by sample weights. Other controls include firm age, experience owner, gender owner, skills. Standard errors clustered by stratum in parentheses. The implied ratio is calculated by $\exp(-\beta)$, with β the coefficient on "firm is informal". *** p < 0.01, ** p < 0.05, * p < 0.1

Drivers of productivity differences

Table 4 shows informal firms differ fundamentally in their characteristics compared to micro formal firms. It includes regressions of informal status on employment, capital, costs, access to banking and finance, business practices and skills.[11] As discussed above, informal firms have significantly lower number of workers, capital and inputs than micro formal enterprises. They have also lower levels of education, and weaker use of business practices. They are less likely to have a bank account. The percentage of formal microenterprises that have a loan from a bank is 3%, while that for informal firms is 0.45%. While this difference is not statistically significant when accounting for differences in size of firms, as the use of bank loans is quite small overall, both types of firms use other mechanisms of financing their business. The share of informal firms with access to loans including from suppliers, customers, family or friends is 9.7%, and for microenterprises, that proportion is 14.7%.

[11] The business practices index is based on a subset of business practice indicators designed by McKenzie & Woodruff (2016), covering practices in marketing, stock-keeping, record- keeping, and financial planning.

Table 4. Informality and firm characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable	Total employees	Log capital	Log of last month total cost	Has checking account	Has a loan from a bank	Business practices (z-index)	Education / skills (z-index)
Sample	Informal + micro formal	Informal + micro formal	Informal + micro formal	Informal + micro formal	Informal + micro formal	Informal + micro formal	Informal + micro formal
Firm is informal	-1.513	-3.446	-1.584	-0.364	-0.012	-1.013	-0.258
	[0.165]***	[0.446]***	[0.255]***	[0.094]***	[0.017]	[0.250]***	[0.087]***
Log total employees		1.592	0.635	0.224	0.017	0.387	0.156
		[0.405]***	[0.205]***	[0.057]***	[0.009]*	[0.156]**	[0.078]**
Implied ratio formal/informal	N/A (levels)	31.37	4.87	1.43	1.01	2.75	1.29
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maputo dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	674	514	587	674	674	674	674
R^2	0.223	0.348	0.243	0.264	0.019	0.205	0.123
Adjusted R^2	0.217	0.340	0.235	0.257	0.010	0.198	0.115

Note. Linear regression. Observations are weighted by sample weights. Standard errors clustered by stratum in parentheses. The implied ratio is calculated by $\exp(-\beta)$, with β the coefficient on "firm is informal". *** p < 0.01, ** p < 0.05, * p < 0.1

An Oaxaca-Blinder decomposition confirms that these differences in characteristics explains most – but not all – of the gap in performance between informal and formal microenterprises. The Oaxaca-Blinder decomposition – even though it does not allow for drawing causal inference – provides information on whether this gap is associated with (i) differences in quantity (or levels) of resources used by these two groups of firms; or with (ii) differences in returns to those factors and resources used by the two groups of firms.

Table 5 shows the results of the Oaxaca-Blinder decomposition. On average, 61% of the gap in performance between formal and informal firms can be explained through the decomposition and the set of control variables available. The results point to the importance of business practices. Informal firms have lower levels of business practices than formal microenterprises. On average, this difference in business practices contributes to one quarter of the performance gap between formal and informal firms.[12] Female ownership and firm size and are also associated with a performance gap between formal microenterprises and informal firms.

Even though differences in education explain some of the performance gap (although not significantly), the results suggest that informal and formal firms face different *returns* to education. The average returns in sales for formal micro-entrepreneurs for the same level of education is

[12] For profits, this contribution from business practices is compensated by the factor being associated with a reduction in returns.

larger than for informal entrepreneurs, when accounting for the all other factors. While the data does not allow to identify the reason behind this, potential reasons could be that education is less important to achieve returns to informal enterprises, or that despite having been in school for the same number of years, informal entrepreneurs have had worse learning outcomes than formal entrepreneurs (and for example, picked up fewer cognitive or non-cognitive skills).

Table 5. Oaxaca-Blinder decomposition

Dependent variable	Log last month sales (USD)		Log last month sales (USD)		Log profits	
Group 1	Micro-formal		Micro-formal		Micro-formal	
Overall	6.588		5.497		6.317	
	[0.236]***		[0.225]***		[0.277]***	
Group 2	Informal		Informal		Informal	
Overall	3.930		3.605		3.152	
	[0.102]***		[0.097]***		[0.133]***	
Difference	2.658		1.892		3.164	
	[0.257]***		[0.245]***		[0.307]***	
Explained	1.661		1.108		1.951	
	[0.239]***		[0.224]***		[0.346]***	
Unexplained	0.998		0.785		1.213	
	[0.291]***		[0.271]***		[0.360]***	
	explained	unexplained	explained	unexplained	explained	unexplained
Log employees	0.405	0.659			0.313	0.470
	[0.130]***	[0.620]			[0.152]**	[0.724]
Education	0.212	0.894	0.196	0.928	0.330	-0.748
	[0.138]	[0.455]**	[0.137]	[0.467]**	[0.151]**	[1.004]
More than the 50% of the owners are female	0.155	-0.069	0.164	-0.063	0.074	-0.288
	[0.066]**	[0.104]	[0.067]**	[0.109]	[0.065]	[0.169]*
Business practices	0.685	-0.220	0.569	-0.128	0.815	-0.737
	[0.162]***	[0.222]	[0.153]***	[0.214]	[0.202]***	[0.259]***
Skills below required	0.070	0.135	0.052	0.109	0.274	0.158
	[0.056]	[0.209]	[0.054]	[0.207]	[0.100]***	[0.223]
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	658	658	658	658	653	653

Note. Oaxaca-Blinder decomposition. Observations are weighted by sample weights. Standard errors clustered by stratum in parentheses. Controls not reported are owner experience, firm age, use of bank loan, whether a firm has to give bribes or informal payments, business activity. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

6 Promising informal firms? High-resemblance and high-performing informal firms

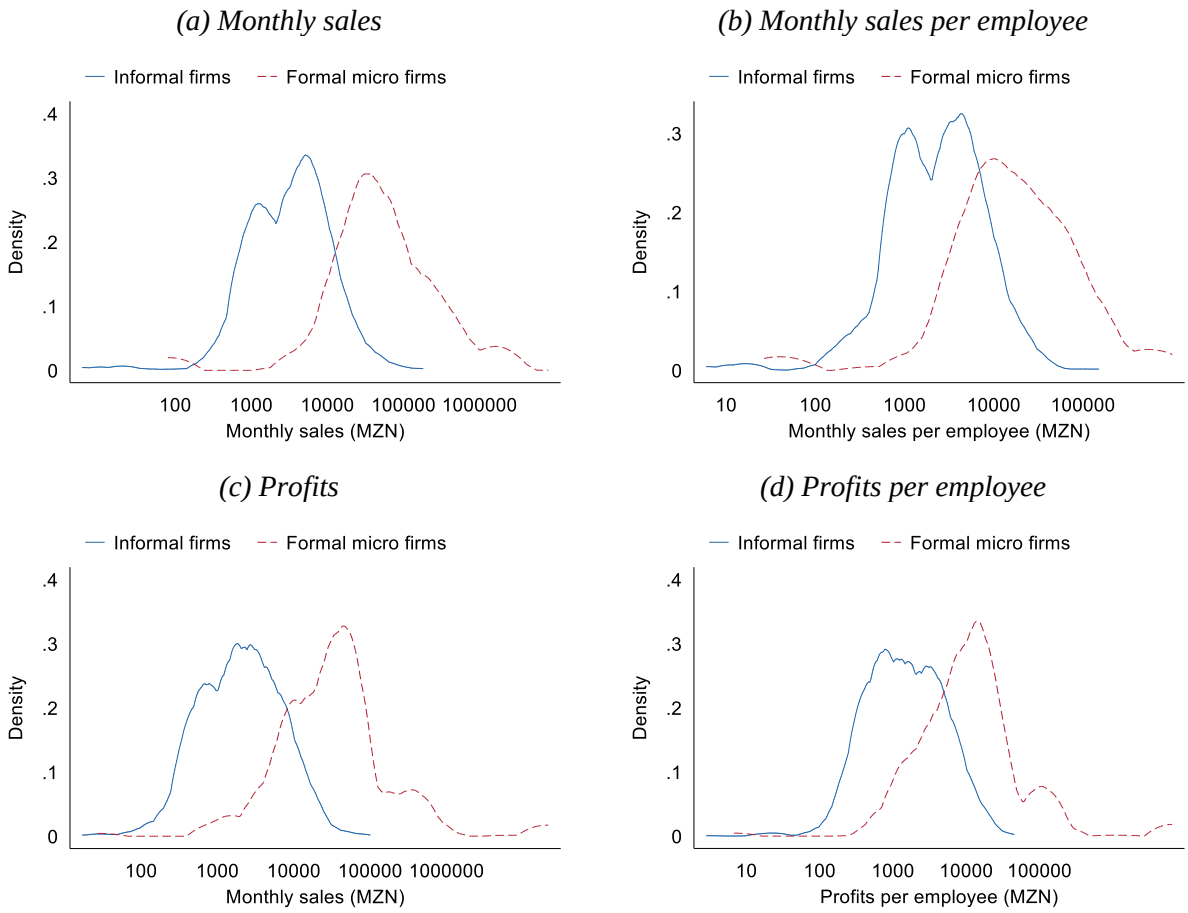
Even though as a group informal firms are smaller and less productive and differ significantly in their characteristics from formal enterprises, we can identify groups of informal enterprises that are have the potential to formalize one day. We identify two main groups: (1) "*high-performance*" firms, which are producing on par with formal microenterprises, and (2) "*high-resemblance*" firms, firms that in their characteristics are similar to formal firms.

High-performance informal firms

Even though the average informal firm is 14 times less productive than the average micro formal firm and the median informal firm is six times less productive than the median formal firm, there is a small group of informal firms that produces on par with formal firms.

Figure 1 shows the distribution of monthly sales, monthly sales per worker (labor productivity), monthly profits, and monthly profits per worker, for informal and micro formal firms. For some measures, the overlap is not large: for example, for monthly sales, 89% of informal firms sell less than the 10^{th} percentile of a micro formal firm. For labor productivity, the overlap is more significant: 40% of informal firms are more productive than the 10^{th} percentile of a micro formal firm, and the top 20% informal enterprises produce more than the 30^{th} percentile of formal micro firms. Nevertheless, only few informal firms (5%) are more productive than the median formal firm.

Figure 1. Informal versus micro formal firms

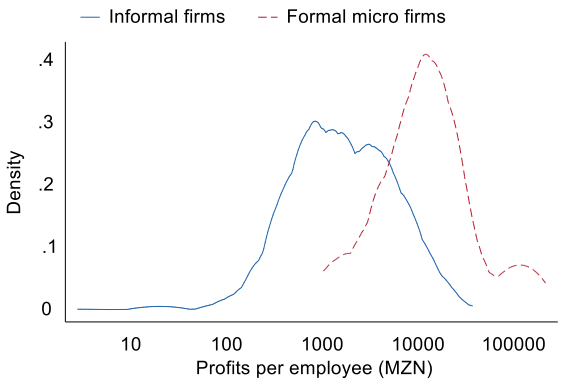


Source: WB Enterprise Survey. Micro formal firms are registered firms with fewer than 5 employees.

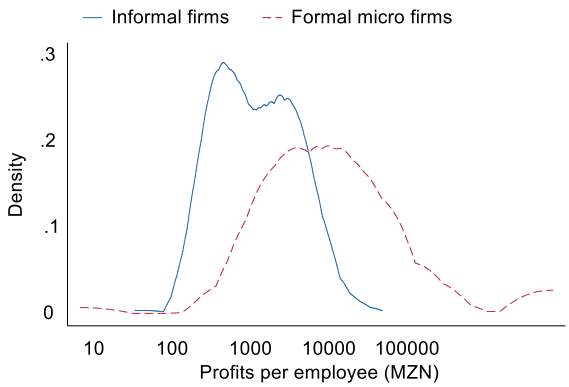
Figure 2 compares the differences in productivity for retail and non-retail firms. The overlap is considerably higher for non-retail firms, suggesting the opportunities to perform like a formal microenterprise are more likely in the non-retail sectors, less than 30% of the population of informal firms.

Figure 2. Differences are larger in retail firms

(a) Monthly sales per employee – Retail



(b) Monthly sales per employee – Non-retail



Source: WB Enterprise Survey. Micro formal firms are registered firms with fewer than 5 employees.

High-resemblance firms

A second approach to identify "promising" firms is to classify which informal firms based on observable characteristics are looking more like a formal firm than an informal firm. These firms we label as "high-resemblance" firms similar to what Diao et al. (2016) labelled "in-between" firms. We use discriminant analysis (also known as *species classification*) to predict whether a firm is formal or informal based on its characteristics.

The firms that are incorrectly classified by the algorithm give an idea of what share of informal firms in their characteristics "look similar" to a formal firm. This was used first on firms by De Mel, McKenzie & Woodruff (2010) to classify microentrepreneurs as being more likely to wage workers or formal business owners and has since been used in several studies to classify firms or entrepreneurs (e.g., Calderon et al. 2017, Benhassine et al. 2018). Table 6 shows the variables used for the discriminant analysis.

Table 6. Characteristics used in the discriminant analysis (*species classification*)

Personal characteristics	Experience and skills	Business practices
Majority female	Owner's level of education	Visit competitor
Age	Years of experience	Ask customers
		Talk to former customers
	Owner's skills (numeracy, problem	Special offer
	solving skills, foreign languages,	Asked supplier
	managerial/leadership skills,	Negotiated with supplier
	interpersonal skills, technical skills)	Never out of stock
		Keep business records
		Target for sales
		Maintain budget for costs
		Profit and loss statement

We use canonical linear discriminant analysis to identify firms that are "incorrectly" classified as informal. We report through this process the share of "leave-one-out" misclassifications. The "leave-one-out" misclassifications are determined by running the classification analysis on the entire sample but one prediction, and then predict the formalization status for the left-out observation. This is subsequently repeated for all observations, so that each observation is "left out" once, to give a prediction of formalization status for each firm.[13]

Table 7 presents the share of "leave-one-out" misclassifications.[14] Depending on the characteristics included, between 10% and 20% of informal firms are misclassified and as such have characteristics that lead the algorithm classifying them as formal enterprises. The misclassification error is larger for formal firms, around a fifth of formal firms are wrongly classified as "informal". This suggests that it is less likely for an informal firm to look like a formal firm than for a formal firm to look like an informal firm.

Table 7. Misclassifications in the canonical linear discriminant analysis (leave-one-out)

	% predicted misclassified informal firms (Type 1 error, false positive)	% predicted misclassified micro formal firms (Type 2 error, false negative)
Personal characteristics	33.1%	27.1%
Skills (excl. owner skills)*	21.9%	17.4%
Skills (full set)	20.7%	14.3%
Business practices	13.0%	27.6%
All above	11.2%	18.2%
All above (excl. owner skills)*	9.5%	19.3%
Majority female-owned	9.5%	25.8%
Majority male-owned	11.0%	17.4%
Retail firms	7.8%	22.1%
Non-retail firms	17.8%	16.3%

** Note, responses to the owner skill questions are missing for many informal firms.*

Of the three sets of variables used for the analysis, business practices have the lowest share of misclassified informal firms, suggesting that this characteristic is an especially good predictor for formalization. Appendix Figure 1 shows the standardized coefficients used for the discriminant function, to give an idea of the predictive power of a particular variable. The variables with the

[13] The "leave-one-out" cross validation is an application of the K-fold cross validation and ensures that the prediction of formalization status for a particular firm is not based on a dataset that includes the firm itself.

[14] As a robustness check, we also use a multinomial logistic model to perform a similar classification (see Appendix Table 2). The discriminant analysis based on the multinomial logistic regression yields a slightly higher degree of misclassifications than the canonical linear discriminant analysis.

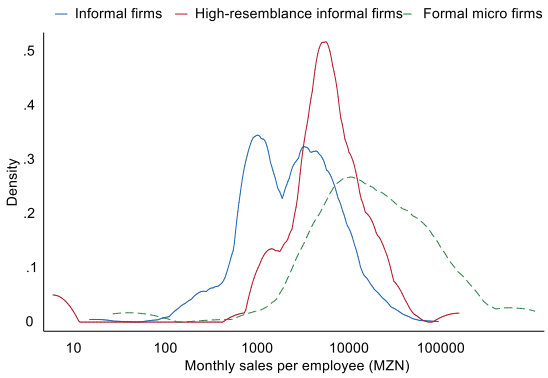
largest positive coefficients are education level, whether a firm keeps business records, the age of the manager or owner, whether a firm negotiated with a supplier and whether a budget for costs is maintained. The largest negative coefficients are whether a firm has never run out of stock, whether a firm is female majority-owned and whether a firm asked a supplier what would sell well.

The performance of high-resemblance firms

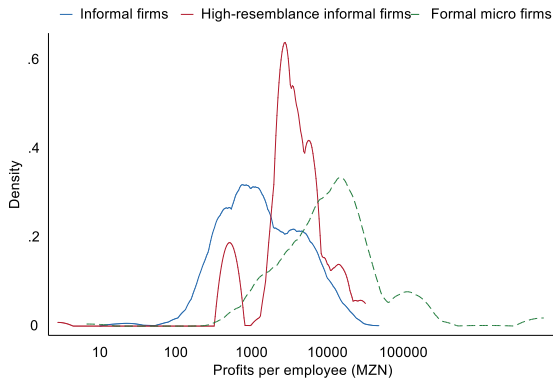
Figure 4 shows productivity and profits for high-resemblance firms. The average labor productivity of a high-resemblance informal firm is 2.6 higher than that of a non-high-resemblance firm. Gaps with formal micro firms nevertheless remain: a high-resemblance informal firm is on average still 6.1 times less productive than a micro formal enterprise.

Figure 4. High-resemblance firms

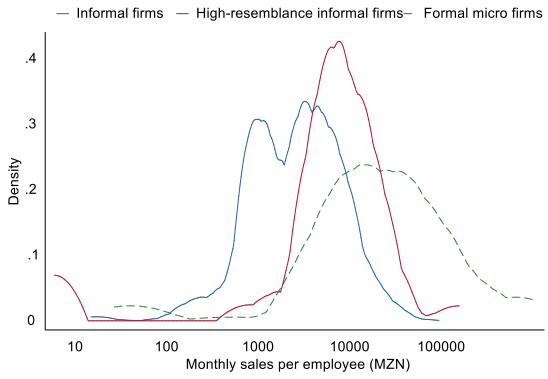
(a) Monthly sales per employee – All firms



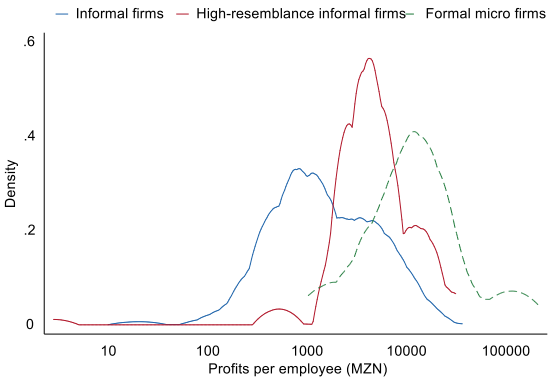
(b) Profits per employee – All firms *



(c) Monthly sales per employee – Retail



(c) Profits per employee – Retail *



Note: The density plots for *Informal firms* exclude high-resemblance informal firms.
* Excludes zero and negative values (corresponding to 3.6% of firms)

Table 8 classifies firms based on their high-resemblance and high-performance classification. The high-resemblance classification is based on the discriminant analysis above. The high-performance classification is based on whether a firm is in the top 40% of the labor productivity distribution of informal enterprises, which corresponds to being above the 10^{th} percentile of micro formal enterprises. This results in four groups of firms:

- *Low resemblance, low performing* – low performance enterprises that do not "look like" formal enterprises. This corresponds to the largest amount of the sample (57.7% of firms, 59.8% of employment in the informal sector).
- *Low resemblance, high performing* – High performance enterprises that do not "look like" formal enterprises. This corresponds to about a third of firms (32.6%) and a quarter of employment (25.5%).
- *High resemblance, low performing* – Low performance enterprises that in their characteristics are similar to formal enterprises. This is the smallest group: 2.0% of firms and 4.1% of employment.
- *High resemblance, high performing* - High performance enterprises that in their characteristics are similar to formal enterprises. This corresponds to 7.6% of firms and a 10.6% of employment.

The share of the last group is the largest for non-retail enterprises: 14.3% of non-retail firms and 16.2% of employment in the non-retail informal sector is in a firm that is both high-resemblance and high-performing.

Table 8. High-resemblance and high-performance informal enterprises

	All informal firms		
	Low resemblance	High resemblance	Total
Frequency			
Low performing (Bottom 60%)	57.7%	2.0%	59.8%
High performing (Top 40%)	32.6%	7.6%	40.2%
Total	90.3%	9.7%	100.0%
Employment			
Low performing (Bottom 60%)	59.8%	4.1%	63.9%
High performing (Top 40%)	25.5%	10.6%	36.1%
Total	85.3%	14.7%	100.0%
Average size			
Low performing (Bottom 60%)	1.6	3.1	1.7
High performing (Top 40%)	1.2	2.2	1.4
Total	1.5	2.4	1.6

Note: Values are weighted by sample weights. *High-resemblance* informal firms are those with characteristics similar to formal enterprises, as determined by the discriminant analysis ("leave-one-out"). *High-performance* firms are those in the top 40% most productive informal enterprises (corresponding to labor productivity of a micro formal firm above the 10th percentile).

7 Discussion

As in other low-income countries, the informal private sector in Mozambique is large, despite efforts by the government to encourage formalization. The data presented in this paper suggests that the "gap" between informal and formal firms is wide: informal firms are smaller, younger and less productive than formal firms and few firms transition from informality to formality. The key differences in performance between formal and informal firms are explained by both the quality of inputs (including human capital and business practices) as well as how by the returns of these inputs in the production process.

There is a group of firms that in their performance or characteristics resembles the formal sector more closely. In Mozambique, about 40% of informal firms have productivity levels common with formal firms (although the bottom half of formal firms) and 10% of informal firms – representing about 15% of employment – share characteristics similar to firms in the formal sector of similar size.

This paper has several consequences for policy. The large differences in both inputs and outputs between formal and informal enterprises suggest that informal firms might require different targeting than formal enterprises. Policies that are designed to target formal enterprises, even small ones, might be less effective for informal enterprises, who have lower levels of skills, human capital and access to finance. Earlier studies of formalization have suggested that benefits from formalization are very much concentrated on a small group of firms (e.g., De Mel et al. 2013) and that high-resemblance firms are more likely to benefit from formalization (e.g., Benhassine et al. 2018).

Table 10. Characteristics across the four groups

	Low resemblance, low performance	Low resemblance, high performance	High resemblance, low performance	High resemblance, high performance	All informal firms	Micro formal
Share of firms	56.8%	33.1%	2.2%	7.8%	100.0%	-
Number of employees	1.6	1.2	3.2	2.1	1.6	3.1
Monthly Sales per employee (MZN)	1356	8916	1683	9161	4391	61802
Share producing above median of micro firms	-	12.7%	-	24.3%	6.0%	-
One-worker firm	57.2%	83.5%	21.0%	39.2%	61.9%	3.2%
Retail	72.5%	84.0%	26.7%	56.0%	72.7%	61.6%
Maputo-based	33.8%	29.4%	22.8%	56.4%	34.3%	33.5%
Majority-female	51.5%	48.9%	78.8%	28.5%	49.5%	26.6%
Operating in household or no fixed premises	79.5%	64.2%	73.8%	52.1%	73.7%	N/A
Actively looked for a wage job in the last two years?	45.5%	41.4%	20.6%	17.6%	38.9%	N/A
Would leave for full-time job with similar income?	67.1%	63.9%	25.2%	51.7%	62.7%	19.7%
Considered registering a firm?	5.6%	7.9%	24.7%	29.3%	9.0%	N/A
Has taken any steps towards registration?	5.2%	5.4%	4.2%	8.0%	5.5%	N/A
Highest level of education is primary school or less	60.5%	43.6%	6.7%	32.7%	51.6%	7.1%
Use of computers	0.0%	0.9%	0.0%	9.1%	0.9%	20.5%
Use of mobile money for business	32.2%	38.3%	50.8%	69.4%	40.8%	N/A
Use of mobile money to pay suppliers	21.5%	21.6%	33.2%	42.1%	25.9%	56.6%
Produce or provides to other businesses?	8.5%	10.5%	8.4%	16.4%	10.0%	N/A

Note. The high-performance classification is based on the labor productivity percentile (top 40% informal firms). The high-resemblance classification is based on the linear canonical discriminant analysis presented in Table 7, stratified by gender.[15]

[15] Whether a business is majority-owned by women is an important determinant of formalization status in the classification analysis, which in practice leads to most female majority-owned enterprises being classified as low-resemblance firms. To give predictive results for female majority-owned businesses, the results in this analysis have been stratified by gender by running the discriminant analyses separately for female and male majority-owned businesses.

The informal firms with low performance and a low resemblance to formal firms are far away from the competitive frontier. This type of firms is likely to be a firm without employees, operating without fixed premises or within the household and run by an entrepreneur with only limited levels of education. For many of these entrepreneurs, the money earned from these business activities provides an important and often primary source of income, but the low performance of these firms also mean that the money earned is often low and potentially volatile. More than two-thirds (67.1%) of the firm owners in this category indicate that they would prefer a wage job with a similar wage but more stable income instead of running their own business. Given the lower potential of these firms and low impact of entrepreneurship interventions on non-high-resemblance firms (McKenzie & Woodruff 2014), these entrepreneurs might benefit more from policies that facilitate transitions to wage employment (e.g. improving skills to increase employability) or policies that offer social protection or support alternative options (e.g. programs to support migration from rural to urban opportunities).

Informal firms with a low resemblance to formal firms but high performance represent about a third of informal enterprises and 84 % of firms in this group are one-worker firms. Like firms in the first group, the percentage of firm owners looking for a wage job is high (41%). However, unlike as for the first group, this outlook does not seem to affect their performance negatively. These firms are less likely to share characteristics or practices with formal microenterprises, but nevertheless produce at similar levels as microenterprises, even though few (12.7%) produce more than the median formal microenterprise. These firms could benefit from policies that target upgrading of business practices (e.g. record-keeping, target-setting) or in specific setting to basic skills that can support continuously expanding performance and make them embrace entrepreneurship rather than looking of a wage job which might undermine their investment in business (Koelle 2019).

Informal firms with a high resemblance to formal firms but low performance share characteristics and practices with formally registered microenterprises. Among informal firms, they are the most likely to have secondary and tertiary education, but nevertheless produce below par. This group is likely to be female majority-owned (almost 80%), more so than any other group. The informal firms with high resemblance and low performance are more likely to have employees besides the owner, and less likely to be located in Maputo. The policy objective for these firms would be to

increase productivity. Based on the evidence in developing economies for this type of firms, policies that likely benefit these firms are those that further improve the capabilities of these firms, especially that go beyond very standard business practices. These policies may include developing non-cognitive skills training (Campos et al. 2017) or rule of thumb approaches to improving financial management (Drexler, Fischer and Schoar 2014). As the vast majority of these firms are owned by women, policies that remove constraint to women-owned and -operated firms will likely benefit this group.

Informal firms with a high resemblance to formal firms and high performance represent about 8 percent of informal firms. About a quarter of these firms produces above the median of microenterprises. They are also significantly more likely to already use a computer, suggesting space for digital opportunities.

These firms are most likely to benefit from policies that also benefit regular SMEs. Policies that facilitate the access of these firms to markets, adopting better technologies, improve firm capabilities through training or consulting are expected to benefit these firms. This group of firms might also be the group of firms that is most likely to benefit from formalization, as was the case in Benin (Benhassine et al. 2018). Compared to other informal enterprises, they are more likely to see a benefit to formalization. In fact, almost a third (29.5%) considered registering their firms in the last three years.[16] High-resemblance firms are more likely to be concerned about time, fees and paperwork than other informal firms (in fact, when prompted, two-thirds of high-resemblance firms indicate this as the key reason why they do not formalize) and about taxation and inspections.

Table 11. Policy matrix for different informal firm groups

	Low-resemblance	High-resemblance
Low performance	Social protection policies, improve skills to increase employability	Non-cognitive skills training, financial account training
High performance	Improve of skills, Business practices training	Formalization, connecting to markets, technology adoption

[16] For high-performance firms, 15.3% considered to legally register their firm, and 14.3% indicated to be still interested.

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Appendix Table 1: Sampling Distributions and number of firms enumerated

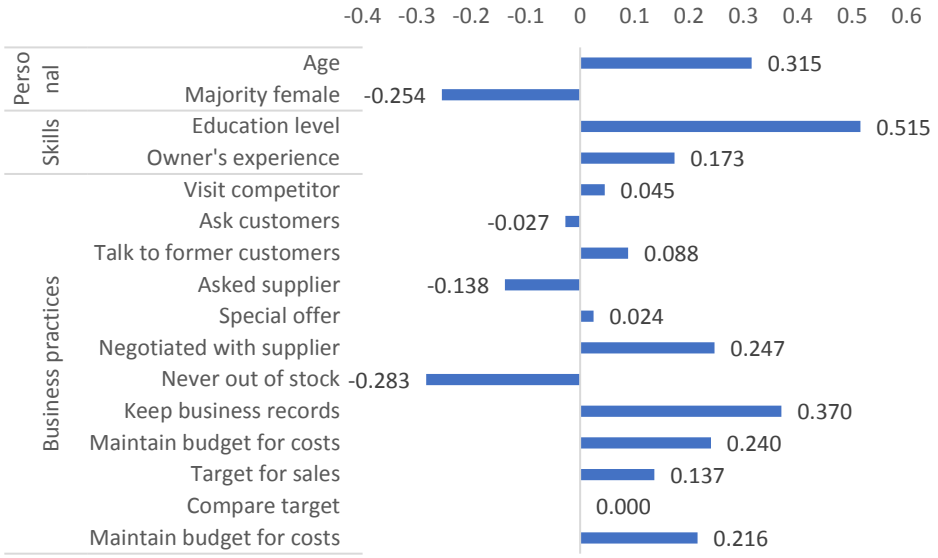
City	*Strata*	*Number of Starting squares Enumerated*	*Total number of Squares Enumerated*	*Total number of informal business units found*	*Average number of informal business units per square*	*Total Number of long-form interviews completed*
City of Beira	Low Probability of Informality	73	91	210	2	16
	Medium Probability of Informality	35	93	649	6	63
	High Probability of Informality	19	74	766	10	77
	Market Center	3	3	156	52	6
City of Nampula	Low Probability of Informality	68	118	867	7	32
	Medium Probability of Informality	28	102	1082	10	32
	High Probability of Informality	34	127	1525	12	46
	Market Center	5	5	172	34	13
Maputo City	Low Probability of Informality	61	178	1895	10	108
	Medium Probability of Informality	39	99	1318	13	73
	High Probability of Informality	22	85	1010	11	52
	Market Center	7	7	1432	204	36
	Total	**394**	**982**	**11082**	**31**	**554**

Appendix Table 2. Multinomial logit regression of formalization on firm characteristics

Dependent variable: Formalization status of firm	(1)	(2)	(3)	(4)
Age of manager and owner	0.048			0.061
	(0.008)***			(0.016)***
More than the 50% of the owners are female	-1.787			-1.309
	(0.264)***			(0.373)***
Has visited competitor's businesses		0.504		0.060
		(0.314)		(0.391)
Has asked to customers whether there are any other products this establishment should provide		-0.081		-0.012
		(0.341)		(0.402)
Has talked with at least one former customer		0.488		1.125
		(0.341)		(0.437)***
Has asked a supplier which products sell well		-0.647		-0.808
		(0.377)*		(0.453)*
Has used any special offer to attract customers		-0.210		0.032
		(0.310)		(0.376)
Has attempted to negotiate with a supplier		1.188		1.251
		(0.300)***		(0.351)***
The business does not run out of stock		-1.725		-2.327
		(0.355)***		(0.468)***
The business keeps written business records		2.210		1.457
		(0.294)***		(0.369)***
The business has a written budget		1.426		0.829
		(0.315)***		(0.393)**
The business has a target set for sales		0.928		1.076
		(0.534)*		(0.624)*
The business compares their sales achieved to their target		0.427		1.424
		(0.817)		(0.909)
The business has a budget of the likely costs their business will have to face o		1.233		1.095
		(0.528)**		(0.671)
the highest level of education completed by the owner			1.111	0.989
			(0.111)***	(0.145)***
Years of experience of the owner			0.115	0.066
			(0.016)***	(0.022)***
Constant	-2.781	-2.975	-7.310	-9.351
	(0.339)***	(0.253)***	(0.602)***	(1.086)***
Number of observations	665	674	659	652
Informal firms incorrectly classified	36.7%	13.7%	21.7%	12.6%
Formal firms incorrectly classified	19.2%	19.2%	17.7%	10.8%

Note: multinomial logit regression of formalization, based on the sample of informal firms and micro formal firms (<5 employees). The discriminant analysis has been performed with Stata's *discrim logistic* command. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix Figure 1. Standardized coefficients of canonical linear discriminant analysis



Note. Standardized coefficients of the canonical linear discriminant analysis of formalization status, based on the sample of informal firms and the sample of micro formal firms (<5 employees).

Appendix Table 3. Enterprise Survey questions overview

Three forms of the Enterprise Surveys have been conducted: the "regular" Enterprise Survey, covering formal firms with five or more employees, a survey of formal micro-enterprises and a survey of informal enterprises. This paper is based on data from the informal firms and micro-enterprises.

Enterprise Surveys		
>= 5 employees (formal)	Micro-enterprises (formal)	Informal firms (of all sizes)
Location, legal status, sector, year of start	Location, legal status, sector, year of start	Location, legal status, sector, year of start
Ownership, foreign/local, female ownership	Ownership, foreign/local, female ownership	Ownership, female ownership
Electricity, water, website, Internet	Electricity, water, website, Internet	Electricity, water, Internet
Land and permits	Land and permits	
Main products and services	Main products and services	Main products and services
Capacity	Capacity	
Workers: number and composition	Workers: number and composition	Workers: number and composition
Sales, costs, material inputs, profits	Sales, costs, material inputs, profits	Sales, costs, material inputs, profits
Assets	Assets	Assets
Finance	Finance	Finance
Exports and imports	Exports (small version)	
Degree of competition	Degree of competition	
Views on business environment	Views on business environment	Interest in registering
Business-Government relations, including government arrears	Business-Government relations	
Crime, theft and corruption	Crime, theft and corruption	Crime and corruption
Management organizational practices	Business Practices	Business Practices
Innovation	Innovation	
Experience of manager	Experience of manager	Experience of owner
Skills: employees' education, years of experience, skills profile, hiring needs, external skills, outsourcing, and training	Skills (short version)	Skills (short version)
		Household characteristics