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Informality and firm performance in Myanmar

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Abstract: Using a novel panel survey of enterprises in Myanmar, we compare the performance of manufacturing firms by three different informality definitions. The first is binary, based on whether firms pay taxes. The second captures five categories of registration with the authorities, and the third definition relates to three groupings of the informality status of a firm's workers. Depending on the informality concept used, formalization has positive, insignificant, and negative performance outcomes. However, our analysis shows that independent of the informality definition, differences between formalizers and non-formalizers are mostly because of disparities in the number of employees, capital, and use of power-driven machinery. Education, business practices, gender, location, and sector only play a role for some of the definitions and performance variables.

Key words: firms, informality, Myanmar, business registration, manufacturing

JEL classification: D22, O17, N65

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1 Introduction

After 50 years of military dictatorship, Myanmar's first and free general elections took place in 2015. Now, the southeast Asian country is gradually shifting towards a democratic and market-based system. It is slowly opening up to the world market, and its economy is among the five fastest growing in the world at a rate of 6 per cent in 2018 (World Bank 2019). While agriculture represents around 23 per cent of gross domestic product (GDP), the industrial sector accounts for 36 per cent and services for 40 per cent (CSO 2018). Manufacturing firms form a substantial part of the industrial sector, and the development of a strong industry carries with it the potential of high and dynamic economic growth and employment generation, which are critically important for a low-income country like Myanmar (Szirmai 2009). In-depth information on Myanmar manufacturing firms, however, is scarce because of a lack of data.

In 2017, the Myanmar Central Statistical Organization (CSO) started to implement a nationally representative survey of micro, small, and medium enterprises (MSMEs), and a second round followed in 2019. The panel data set allows for the analysis of various aspects of Myanmar's manufacturing MSMEs including firm informality. In the Asia-Pacific region, about 80 per cent of all entrepreneurs are estimated to be informal (ILO 2018), and for Myanmar, the informal economy is said to represent more than half of its GDP (Medina and Schneider 2018), while 85 per cent of workers are engaged in informal activities (World Bank 2019). Because of this high incidence of informality, it remains a priority topic for policy relevant research.

While knowledge about Myanmar MSMEs is scarce, we understand even less about informal firms despite them representing the majority of businesses. Hence, this study compares formal with informal Myanmar firms in terms of performance using a number of standard indicators. We look at firm performance as a dependent variable because formal firms across countries exhibit higher performance than informal businesses. We want to see if we can find the same pattern in Myanmar and investigate the reasons that lie behind performance gaps.

We use three informality definitions, with one of them being the standard binary definition. The remaining two definitions are based on (in)formality indices. Informal firms are highly diverse, so a continuum between fully informal and fully formal firms, with different levels in between, is arguably more representative of (informal) enterprises than a dichotomous variable (Guha-Khasnobis et al. 2006). Further, multiple definitions of informality are used by researchers, and we wish to establish whether different definitions lead to different findings.

The study begins by setting out the context for informal firms in low-income countries. This is followed by an outline of the business registration procedure in Myanmar, including the construction of the three (in)formality definitions. After describing the methodology, we run fixed-effects regressions of several firm performance variables on whether a firm has formalized between 2017 and 2019. We employ an Oaxaca-Blinder decomposition to better understand the drivers behind the performance gap between formalizers and non-formalizers.

We find that formalization may have positive, statistically insignificant, or even negative outcomes, depending on the informality definition deployed. At the same time, costs in terms of taxes and fees increase for all of the formalizers independent of the informality concept. A caveat is that we are looking at a relatively short time period of two years. Research that only looks at two survey rounds mostly finds positive effects of formalization (e.g., Boly 2015; Rand and Torm 2012), while a recent study that considers longer time periods does not find any impact of formalization on firm performance once it controls for differential trends (McCaig and Nanowski 2019). At the

same time, scholars recently found that social security contributions, which we also take into account in two of our informality definitions, have positive impacts on firm profits only after a longer period (Lee and Torm 2017).

Our Oaxaca-Blinder decompositions show that differences between formalizers and non-formalizers are mostly associated with disparities in the number of employees (even when restricting the sample to micro firms), capital, and the use of power-driven machinery; the informality definition does not play a role. Education, business practices, and location only play a role for some of the definitions and performance variables.

2 Firm informality

What does 'informality' actually imply? 'A bewildering range of (often implicit) definitions are used to discuss the formal and informal' (Guha-Khasnobis et al. 2006: 4). In turn, there does not exist a unique interpretation of informality (ibid). It is up to the individual researcher to define the phenomenon, and at the same time, informality is country- and context-specific (Lindell 2010). However, in broad terms, the informal economy can be understood as 'all economic activities that are—in law or in practice—not covered (or insufficiently covered) by formal employment arrangements' (ILO 2007: 1). Accordingly, the informal economy consists of both unincorporated firms that are not registered or only partly registered with the authorities and workers who are unregulated or unprotected by law.

Economic theory predicts that the informal economy will shrink with advancing economic development (Stifel and Thorbecke 2003). However, this is contrary to what we see in many countries in the Global South. It is safe to affirm that the informal economy will not disappear in the near future, and it is even growing in some places because the formal labour market cannot absorb the increasing number of new entrants (Nelson and De Bruijn 2005; Perry et al. 2007). In the Asia-Pacific region, almost 80 per cent of entrepreneurs[1] and about two-thirds of the employed are believed to be operating in the informal economy (ILO 2018). Regarding Myanmar, Medina and Schneider (2018) estimate that the country's informal economy accounts for up to 51 per cent of GDP. So far, no precise estimate of the number of informal firms in Myanmar exists despite the utter importance of enterprises for the livelihoods of many. However, it is clear that the majority of MSMEs in the country operate fully or partly informally. Thus, the percentage of firms being informal may even be higher than in other countries in the region (Stokke et al. 2018). In 2013, the OECD assessed 83 per cent of enterprises in Myanmar to be unregistered (OECD 2013).

Most economic studies that investigate enterprise informality use a binary definition. Firms are informal when they do not register at a specific authority, such as when they do not sign up with the tax authority, and formal when they are registered. However, reality is not as straightforward. Informal businesses are highly complex and diverse in terms of registration (as well as in other characteristics). Some do not register with any government office. Although others register with one or more authority, they do not register with all of the authorities required to be officially formal. For instance, firm owners might obtain business licenses from local governments such as the city council, but they do not pay any taxes at the national level (De Castro et al. 2014). Others pay taxes yet do not sign up their workers for social security. Firm compliance with some regulations and not others seems to be the rule rather than the exemption, as found for example in about 80 per cent of firm samples in both Pakistan (Williams and Shahid 2016) and Ecuador

[1] Entrepreneurs are employers or own-account workers.

(Medvedev and Oviedo Silva 2015). In our Myanmar sample, more than 60 per cent of businesses are neither fully informal nor fully formal (see Figure 4).

While the costs of taxes and business certificates play a role in the choice of becoming (more) formal, other factors such as the possibility of obtaining credit and the entrepreneur's ambitions and uncertainty about the future also influence a firm's formalization decision. As outlined, firm owners can often select among different types and levels of registration, depending on their assessment of costs and benefits of registration. Accordingly, as formalization is a reversible process, it is argued that entrepreneurs assess the costs and benefits of each (in)formality category (or step) and become more informal when a higher level is regarded as too costly (Diaz et al. 2018). In countries where business, tax, and social security registrations are separate and enforcement levels by the authorities are weak, it seems to be common for enterprises to be able to stop their payments of taxes or social security for workers when these fees do not seem to be beneficial to the firm (anymore). Further, they might be able to decide not to renew certain business licenses (Perry et al. 2007). Consequently, while a binary definition might capture some features of informality, they may lead to biased results when used alone. A combination of several definitions is suggested to arrive at more nuanced findings (Benjamin and Mbaye 2012). Overall, 'we need to move beyond formality and informality to make progress in understanding the realities of economic activities in poor countries' (Guha-Khasnobis et al. 2006: 2).

As background to this study, we did a literature survey on firm informality and encountered many different (in)formality definitions, most of which were binary in nature. Some use tax payment as a formality indicator (e.g., McKenzie and Sakho 2010), while others regard a firm as formal when it has a business registration license (e.g., Demenet 2016) or when it is registered with a specific government authority (e.g., Sharma 2014). These different definitions make it challenging to compare analytical results. What we aim to do in this study using several informality definitions is to establish whether they have different implications for the empirical results. Specifically, we look at the association between a firm's decision to formalize and its performance.

In comparison with the most formal enterprises, firms of lower (in)formality categories are often less productive and employ fewer workers, and their owners tend to hold lower educational levels (Medvedev and Oviedo Silva 2015; Shahid et al. 2020). In contrast, businesses of higher formality categories have bigger profits because of better access to credit and higher revenue from sales through the issuance of tax receipts (Medvedev and Oviedo Silva 2015). However, this is only one part of the story. In many countries, there seems to exist a group of informal enterprises with traits that are similar to those of formal firms (Aga et al. 2019; de Mel et al. 2010). In Sri Lanka, for example, around one-third of informal micro-entrepreneurs were comparable to owners of formal small and medium enterprises (de Mel et al. 2010). Besides, many samples of informal firms are small and unrepresentative even though there exist more informal than formal enterprises in the Global South. Therefore, it is premature to claim that the characteristics of informal businesses are fully understood (Diao et al. 2018).

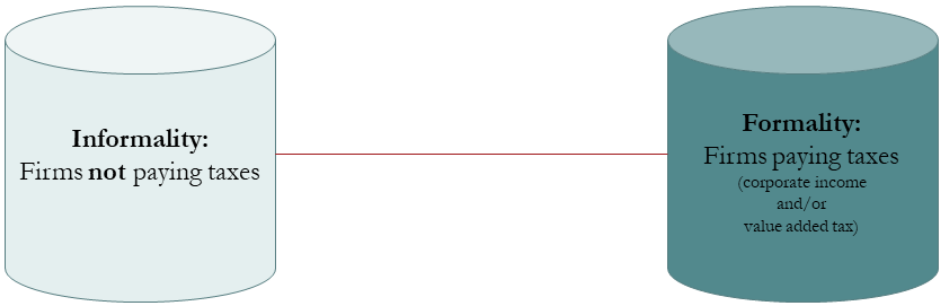
To our knowledge, there is only one descriptive study of informal firms in Myanmar. It uses a binary informality definition and finds that informal enterprises are less productive than formal forms. However, the productivity gap is substantially smaller than in other countries. The educational level of firm managers correlates positively with productivity, and one widely cited obstacle to growth is scarce access to finance. Further, most entrepreneurs do not think of formalization as being beneficial (Amin 2016).

3 Business registration

In Myanmar, there are various government authorities responsible for licensing or registering businesses, both at the local and federal level. Therefore, it is common for firms to register with several government offices and to hold multiple permits. One national authority can be in charge of a specific sector only. At the same time, it is mandatory to register with certain government offices at the national level to be able to obtain a bank loan or electricity of higher horsepower. Thus, while it is not legally binding for businesses to register with national authorities, they are only able to acquire certain benefits when they do register above the local level. Overall, the most relevant authority and the legal situation in terms of business registration and licensing is somewhat fluid (Berkel et al. 2018). This ambiguity is also one of the reasons why we want to investigate multiple (in)formality definitions and levels.

We aim at exploring three different (in)formality definitions and how they are associated with firm performance indicators. The first definition we use is binary to establish a benchmark for the other two (in)formality definitions. A binary definition also allows us to compare our results with other studies that use the same dichotomous concept. Firms are formal when they pay taxes (corporate income tax or value-added tax) and informal when they do not (see Figure 1).

Figure 1: First definition of firm (in)formality in Myanmar



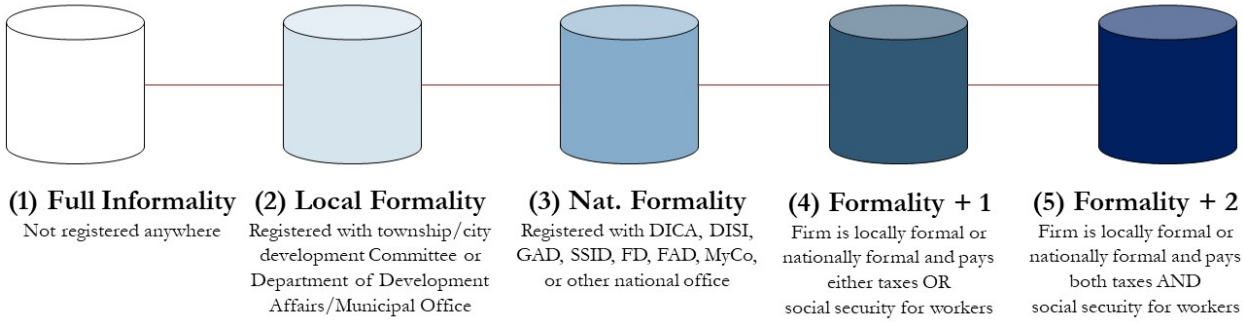
Source: authors' illustration.

The second definition consists of an index with five different categories of (in)formality and is related to the authority with which a firm is enrolled. The first category is **full informality.** This refers to situations where firms have neither registered with nor obtained a license from any Myanmar authorities. The second consists of enterprises that have only signed up with the local government, which is their municipality or township development committee in most cases. We refer to this category as **local formality**. The third dimension consists of businesses that register at one or more national government offices, i.e. **national formality**. These are, among others, the Directorate of Investment and Company Administration (DICA), the Directorate of Industrial Supervision and Inspection (DISI), the General Administration Department (GAD), the Small Scale Industry Department (SSID), the Forestry Department, the Food and Drug Administration, and MyCo.[2] The national formality category also includes all businesses that register with both local and national authorities. **Formality+1** is the fourth category and is composed of firms that are registered with any local and/or national authority and additionally pay either taxes or social security contributions for their workers. Lastly, **formality+2** implies that an enterprise is signed up with a local and/or national government office and also pays both taxes and social security

[2] For a detailed description of each authority, see Berkel et al. (2018).

benefits for their labour. Hence, both the firm and its workers are formal. For an overview of each (in)formality dimension, see Figure 2.

Figure 2: Second definition of firm (in)formality in Myanmar

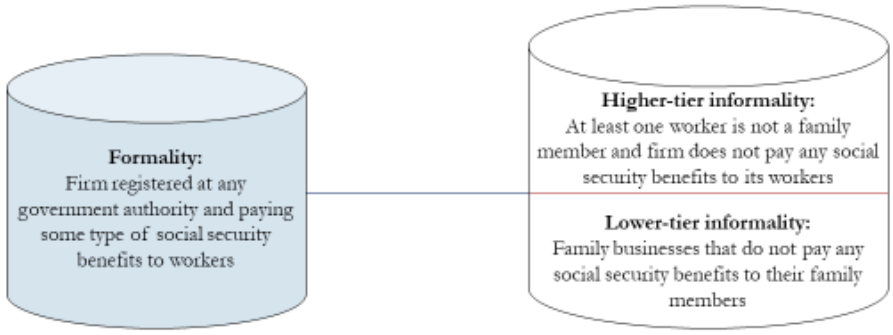


Source: authors' illustration.

The third definition is inspired by a recent study by Danquah et al. (2019) and is based on the employees' work status instead of the registration status of the firm. It consists of three categories of (in)formality. A firm is **formal** when the firm is registered at a government agency and pays some type of social security for its workers such as sick or maternity leave with pay, compensation in case of work-related accidents, any payment when a worker retires, pension contributions, or severance pay for laid-off workers.[3]

Informal businesses may be registered with the government while not paying any social security benefits to their workers. We split these into two categories, **upper-tier** and **lower-tier informality**. Firms of upper-tier informality need to carry out an economic activity that requires some type of professional training as defined by the International Standard Classification of Occupations (ISCO) groups 1–4 or have to employ at least one person who is not a family member. In our understanding, all manufacturing activities require some kind of professional training, i.e. all of them belong to ISCO groups 1–4. Therefore, we classify manufacturing firms that do not pay social security and employ someone from outside the family as upper-tier informal. Family businesses that do not pay social security contributions consequently belong to the category of lower-tier informality. See Figure 3, which illustrates our third definition of enterprise informality in Myanmar.

Figure 3: Third definition of firm (in)formality in Myanmar



Source: authors' illustration.

[3] In most cases, these social security benefits are paid directly by the firm to its employees, i.e. no intermediate state channel such as a social security institute is involved in the transfer to workers. In Myanmar, there exists an official social security board. However, very few firms in our sample make contributions to the board, while many more enterprises privately pay benefits to their workers.

4 Data

In 2017, the Myanmar Central Statistical Organization (CSO) of the Ministry of Planning, Finance, and Industry launched the so-called Myanmar Enterprise Monitoring Systems (MEMS). The Government of Denmark provides financial support, while UNU-WIDER and the University of Copenhagen cooperate on a technical level to provide support. The project's overall aim is to create a robust database on MSMEs in the manufacturing sector. The Myanmar government will use the data to assess and implement evidence-based industrial policies. The first survey round was carried out in 2017 and the second in 2019.

The data set includes 964 enterprises that responded to the registration questions in both years, i.e. they form a balanced panel.[4] The enterprises are located in 35 townships from the 14 regions and states of Myanmar and additionally in Nay Pyi Taw. The vast majority of firms surveyed (78 per cent) are micro size, which means they employ between one and nine workers. Next come small (19 per cent) and medium (3 per cent) enterprises.[5] The five biggest aggregated sectors[6] are food (38 per cent); textiles (21 per cent); metal (10 per cent); coke, chemicals, rubber, and minerals (9 per cent); and wood, paper, and printing (9 per cent).

In terms of formality status, when using the binary definition based on tax payments (definition 1), 71 per cent of the sample are informal and 29 per cent formal. When measuring (in)formality along the authorities at which enterprises are registered (definition 2), 22 per cent are fully informal, 14 per cent belong to the formality+2 category, and the remaining firms are registered with one or several authorities at different levels. Definition 3 takes workers' (in)formality status into account and shows that around 21 per cent of the sample are lower-tier, 47 per cent upper-tier informal firms, and 32 per cent formal enterprises. Figure 4 additionally depicts these shares by year.

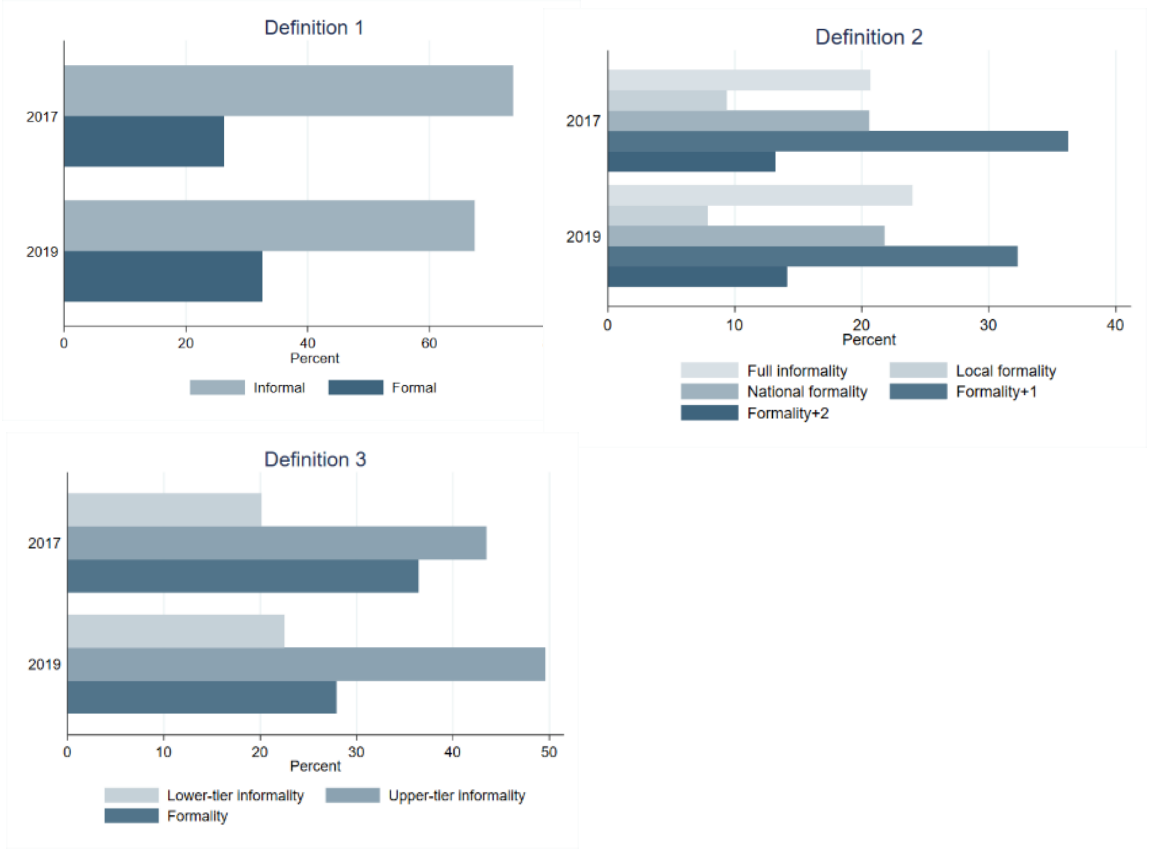
We deflate the financial data by the Consumer Price Index and winsorize to avoid biases caused by outliers. Additional details on the data set are available in the MEMS Descriptive Report 2019 (Hansen et al. 2020).

[4] Initially, we had a larger data set. However, because of missing responses in the questions about firm registration, we had to exclude those firms.

[5] Following the World Bank definition, micro: 1–9 employees, small: 10–49 employees, medium: 50–299 employees, and large: >300 employees.

[6] These are based on Myanmar Standard Industrial Classification.

Figure 4: Share of firms by (in)formality category and year



Source: authors' calculations based on MEMS data.

5 (In)formal firms in Myanmar

Tables 1–3 illustrate descriptive statistics of Myanmar firms by (in)formality definition, category, and year. Further, the tables compare firms that changed their (in)formality category between 2017 and 2019 ('formalizers') with those that did not do so ('non-formalizers'). Regarding various performance variables and binary definition 1, informal and formal firms are significantly different from each other. The average annual firm sales are MMK208 million for formal and MMK74 million for informal enterprises in 2019. Further, businesses that formalized in the two-year period exhibit significantly higher sales in both years (MMK133 million and MMK167 million) than firms that remained in the same informality category (MMK57 million and MMK60 million). While formal enterprises generally exhibit significantly higher performance levels than formalizers and non-formalizers, those firms that formalized have a higher sales growth rate (3.2 per cent) than formal (2.8 per cent) and informal businesses (2.6 per cent), but the differences are not statistically significant.

Both formal firms and formalizers hold more assets than informal firms do. While informal firms employ the fewest workers (six on average), formalizers had 13 and formal businesses 16 employees in 2019. Formal firms are older; have fewer female owners and managers, more internet and electricity access, and higher education; and are more likely to have applied for credit and use more business practices and power-driven machinery than their informal counterparts. Formalizers mostly exhibit average values somewhere between formal and informal firms' mean

values. In terms of gender, formalizers have particularly few female owners or managers (23 per cent) when compared to the formal (29 per cent) and informal (39 per cent) groups.

When looking at the five different categories of definition 2, one identifies the following characteristics with a few exemptions: The higher the (in)formality category (increasing from full informality to formality+2), the higher the average firm performance. Enterprises in the highest category (formality+5) have a mean revenue of MMK310 million in 2019, and this value is much higher as well and is significantly different from all the other categories' averages. The category below (formality+1) depicts MMK125 million and the lowest one (full informality) MMK44 million. Exceptions are the local and national formality categories, which have similar mean sales. The value for local formality firms (MMK81 million) is slightly higher than for enterprises of national formality (MMK77 million), and there is no significant difference. The mean sales of fully informal businesses are smaller but not significantly different from these two categories (local and national formality) either. In terms of labour productivity, it increases by formality category, but the only categories that are significantly different from each other in labour productivity are the fully informal and local formality ones in 2019.

Table 1: Myanmar firm characteristics by (in)formality category (definition 1)

		Definition 1: Tax payment			
		Informality	**Formality**	**Formalizer**	**Non-formalizer**
(Log) profits	2017	15.09	16.30***	15.83	14.89***
	2019	15.43	16.55***	16.34	15.34***
Sales (MMK millions)	2017	73.80	229.93***	132.56	57.01***
	2019	74.14	207.74***	166.50	60.19***
(Log) sales	2017	16.82	18.20***	17.44	16.65***
	2019	17.13	18.12***	17.81	60.19***
Sales growth (%)	2019	2.58	2.82	3.24	2.72
(Log) labour productivity	2017	15.72	16.18***	15.97	15.66***
(sales/total work h)	2019	15.97	16.14**	16.14	15.94
(Log) total assets	2017	16.67	18.62***	17.53	16.42***
	2019	17.16	18.62***	18.20	16.98***
Employees	2017	5.87	15.75***	9.96	4.67***
	2019	5.88	16.47***	12.75	5.14***
Firm age	2017	11.64	15.60***	13.23	11.18**
	2019	12.74	16.52***	15.63	12.31***
Female owner or	2017	0.32	0.29	0.22	0.35***
manager (Yes=1, No=0)	2019	0.39	0.29***	0.23	0.40***
Internet (Yes=1, No=0)	2017	0.03	0.08***	0.09	0.01***
	2019	0.02	0.10***	0.08	0.02***
Electricity	2017	0.85	0.92***	0.87	0.84
(Yes=1, No=0)	2019	0.89	0.95***	0.93	0.87
Education	2017	0.34	0.67***	0.49	0.30
(high school or above=1)	2019	0.32	0.59***	0.47	0.28
Applied for credit (Yes=1,	2017	0.04	0.15***	0.06	0.04
No=0)	2019	0.04	0.11***	0.08	0.03***
Business practices (BPs)	2017	5.21	7.43***	5.62	5.10
(index counting the number of BPs used)	2019	3.99	6.75***	5.76	3.74***
Power-driven machinery	2017	0.54	0.73***	0.64	0.52***
(Yes=1, No=0)	2019	0.59	0.81***	0.78	0.57***
Yangon (Yes=1, No=0)		0.11	0.23***	0.27	0.08***
N	2017	711	253	158	553
	2019	650	314	158	553

Note: mean estimates are by year; stars represent significance levels for t-tests. *Significance at a 10% level, **significance at a 5% level, ***significance at a 1% level. The number of observations in the two (in)formality categories differ by year because several enterprises formalized or informalized between 2017 and 2019 (see Table 4).

Source: authors' calculations based on MEMS data.

The higher categories hold significantly more assets, have higher education, and use more business practices and power-driven machinery. The individual categories do not always differ significantly in the various control characteristics. However, they differ in some of them. Thus, we may get skewed results if we jointly analyse several of them as one category instead of acknowledging their heterogeneity.

Businesses that switched to a higher formality category of definition 2 between 2017 and 2019 exhibit significantly higher performance in terms of profits, sales, labour productivity, and assets than firms that did not change their category. However, they do not differ significantly in most of their characteristics. The only outstanding and statistically significant features are the percentage of female owners and managers, the business practices and power-driven machinery used. Among formalizers, only 28 per cent of owners or managers were female in 2019, while this was the case for 37 per cent of non-formalizers. Regarding business practices, non-formalizers used 4.8 practices, on average, in 2019 and formalizers 5.7. Further, formalizers were more likely to use power-driven machinery (71 per cent) than non-formalizers (63 per cent).

Surprisingly and contrary to definition 2, various firm performance indicators do not automatically increase with the informality category when using definition 3. While formal enterprises exhibit the highest performance levels, businesses in the upper-tier informality group have lower average firm performance in terms of the log of sales (17.11) and labour productivity (15.91) than lower-tier informal firms (17.41 and 16.22). Hence, family businesses with informal workers seem to be performing better than non-family businesses with informal workers. However, in terms of assets, their value is increasing by (in)formality category, with lower-tier informal firms exhibiting logs of assets of around 17, upper-tier informal businesses of 17.4, and formal enterprises of 18.4. Further, the growth rate in sales is highest for the upper-tier informality category.

In terms of firm characteristics, enterprises significantly differ in a few of them by informality category. Firms that are more formal have fewer female owners or managers, higher internet access, higher educational levels, and use more business practices. Concerning access to electricity and use of power-driven machinery, however, lower-tier informal firms exhibit higher mean values than higher-tier informal businesses. Firms that changed to a higher (in)formality category between the two years report higher sales and own more assets than non-formalizers. However, there are no firm characteristics by which they can be distinguished in either year.

Overall, more formal firms and formalizers exhibit higher firm performance than less formal businesses and non-formalizers. However, when applying definition 1, formal and informal enterprises differ in almost all possible firm-specific characteristics, while they diverge in fewer characteristics when using definition 2 or 3. Education and business practices are features by which the different (in)formality categories can be distinguished when using any of the three definitions. For formalizers of definitions 1 and 2, the number of business practices and access to power-driven machinery distinguishes them from non-formalizers. These two characteristics are less relevant for enterprises of definition 3.

In our estimations, which are outlined in more detail in Section 6, we control for differences in (i) firm size, (ii) firm age, (iii) gender of owner, (iv) firm's capital endowments, (v) education of owner, (vi) management experience of owner, (vii) business practices, (viii) use of power-driven machinery, (ix) firm having applied for a bank loan, (x) internet access, (xi) electricity access, (xii) water access, and (xiii) risk attitude of owner.[7] We justify the selection of these control variables

[7] When using labour productivity as a dependent variable, the control variables slightly change (see appendix Table A4).

as follows. First, we control for firm size, i.e. the number of employees, because larger firms have a productivity advantage because of scale efficiency, which ultimately leads to higher profits (Tybout 2000). Second, the age of a firm was found to positively influence performance in developing countries (e.g., Osunsan et al. 2015)—perhaps because older enterprises have more experience. Third, businesses owned or managed by women may be less productive. Women are more likely to care for their families in addition to operating their firms, and this could explain the productivity gap (Martínez-Zarzoso 2017). Fourth, capital endowments affect firm performance (Ahmad et al. 2012) such that we control for the log of capital stock. Fifth, the owner's education may influence a firm's formality status and performance. Porta and Shleifer (2008) find that an owner's lower educational level can partly explain the productivity gap between formal and informal businesses. Therefore, we create a dummy that takes on the value of 1 when a firm owner or manager has a high school degree or above and 0 otherwise.

Sixth, management experience was found to influence firm performance (Hamori and Koyuncu 2015). Thus, we create a dummy for the owner or manager of the firm having five or more years of management experience. Seventh, business practices also seem to play a role in developing countries (Aga et al. 2019; McKenzie and Woodruff 2015). Therefore, we use almost all of the questions as compiled by McKenzie and Woodruff (2015) to create an index of 21 management practices (see Berkel et al. 2018 for more details). Eighth, whether an enterprise uses power-driven machinery or only manual tools might affect its performance. Hence, we use a dummy to control whether a firm uses power-driven machinery. Ninth, access to credit may positively influence productivity as it increases a firm's financial means (Fowowe 2017). We create an indicator variable of 1 whenever a firm has applied for a loan previously and 0 when it has never applied. Tenth, internet access may positively influence productivity because firms receive better market information, can coordinate their production more effectively and may find new business opportunities (Paunov and Rollo 2015). Therefore, we create a dummy that controls whether a firm has access to the internet. Eleventh, electricity has been found to influence performance of certain types of informal firms (Grimm et al. 2013). Hence, we create a dummy indicating whether a business has access to electricity. Twelfth, reliable water access, similar to electricity access, can positively impact productivity (Islam and Hyland 2018). Thirteenth, entrepreneurs with high risk propensity may influence performance (Boermans and Willebrands 2017), and therefore, we control for a risk propensity scale that reaches from 0 (unwilling to take risks) to 10 (fully prepared to take risks).

Because of the panel structure of our data, we can investigate whether it is common for Myanmar firms to change their (in)formality category, as is the case in other countries (Berkel et al. 2018; De Castro et al. 2014). Table 4 shows that changing (in)formality category is prevalent among Myanmar enterprises. Around one-third of the firms in our sample did so between the two survey rounds. The enterprises that switched to a higher formality category are shown in green, and the ones that changed to a lower one in yellow. Around 26 per cent of our binary sample changed their category either to formality or informality. When looking at (in)formality in terms of registration with authorities (definition 2), 15 per cent formalized and 24 per cent informalized. When using the workers' status as the (in)formality definition, 10 per cent switched to a higher category and almost 20 per cent to a lower one.

Table 2: Myanmar firm characteristics by (in)formality category (definition 2)

		Definition 2: Registration with Authorities						
		Full Informality	Local Formality	National Formality	Formality+1 Registered with local or national authority and paying either taxes or social security	Formality+2 Registered with local or national authority and paying both taxes and social security	Formalizer Firms who changed their category to a higher one	Non-formalizer Firms who did not change category
(Log) profits	2017	14.72	14.86	15.10	15.68***	16.65***	15.67	15.24***
	2019	15.11	15.56**	15.56	15.94*(**)	17.09***	16.10	15.64***
Sales (MMK millions)	2017	37.16	50.99	58.75	133.10***	318.97***	119.01	121.47
	2019	44.05	80.51	76.71	124.69	310.62***	147.88	103.55
(Log) sales	2017	16.38	16.58	16.93	17.47***	18.50***	17.40	17.01***
	2019	16.63	17.06**	17.44	17.68***	18.61***	17.76	17.29***
Sales growth (%)	2019	2.83	2.71	2.37	2.69	2.72	2.92	2.69
(Log) labour productivity	2017	15.52	15.75	15.76	15.98	16.18	15.95	15.75**
(sales/total work hours)	2019	15.68	16.06**	16.22	16.09	16.12	16.14	15.94**
(Log) total assets	2017	15.92	16.22	17.20***	17.47	18.99***	17.37	17.01**
	2019	16.45	16.86	17.61***	18.10***	19.06***	17.85	17.51**
Employees	2017	3.29	4.04	6.06	8.61	23.06***	9.90	8.63
	2019	3.49	4.87	4.80	9.20	29.07***	12.94	8.82
Firm age	2017	10.34	13.53**	12.66	13.13	14.57	12.82	12.50
	2019	11.49	13.33	13.12	15.52	29.07	14.89	13.87
Female owner or	2017	0.39	0.4	0.28*(**)	0.28	0.27	0.28	0.34
manager (Yes=1, No=0)	2019	0.51	0.50	0.30***	0.28	0.29	0.28	0.37**
Internet (Yes=1, No=0)	2017	0.02	0.01	0.03	0.06	0.09	0.07	0.03***
	2019	0.01	0.01	0.02	0.05	0.15***	0.05	0.05
Electricity access	2017	0.87	0.88	0.86	0.85	0.93	0.87	0.90
(Yes=1, No=0)	2019	0.85	0.84	0.93*(**)	0.94	0.96	0.90	0.92
Education	2017	0.24	0.27	0.37*(**)	0.52***	0.65***	0.46	0.39
(high school or above=1)	2019	0.21	0.34**	0.40	0.48*(**)	0.63***	0.42	0.39
Applied for credit	2017	0.03	0.04	0.05	0.08	0.16**(*)	0.05	0.07
(Yes=1, No=0)	2019	0.03	0.05	0.04	0.08	0.10	0.07	0.06
Business practices (BPs)	2017	4.43	4.84	6.15**(*)	5.60	8.57***	5.24	5.79
(index counting the number of BPs used)	2019	3.40	4.46	3.87	5.32	8.29***	5.68	4.80**
Power-driven machinery	2017	0.39	0.40	0.70***	0.64	0.75	0.60	0.59
(Yes=1, No=0)	2019	0.39	0.41	0.81***	0.77	0.81	0.71	0.63**
N	2017	194	90	198	349	127	241	456
	2019	231	76	210	311	136	241	456

Note: mean estimates by year, stars represent significance levels for t-tests. For the indices, ANOVA and t-tests for data with unequal variances were carried out. For the indices, stars were only set when the differences were statistically significant when compared to the lower group(s), i.e. sales of fully informal, locally formal, nationally formal, and formality+1 firms were significantly different from sales of formality+2 firms. Because there is no statistical difference in sales between fully formal and locally formal firms, there are no stars in the first row, fourth column. The numbers of observations in the five (in)formality categories differ by year because several enterprises changed to higher or lower categories between 2017 and 2019 (see Table 4). *Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

Table 3: Myanmar firm characteristics by (in)formality category (Definition 3)

		Definition 3: Labour (In)formality				
		Lower-Tier Informality	Upper-Tier Informality	Formality	Formalizer	Non-Formalizer
(Log) profits	2017	15.17	15.11	15.91***	15.72	15.32**
	2019	15.44	15.60	16.42***	15.94	15.76
Sales (MMK millions)	2017	69.36	66.52	197.47***	112.00	119.39
	2019	72.68	82.88	215.75***	131.53	123.18
(Log) sales	2017	17.18	16.77***	17.68***	17.45	17.12**
	2019	17.41	17.11***	18.10***	17.77	17.39**
Sales growth (%)	2017	1.94	3.04***	2.56	2.98	2.60
(Log) labour productivity	2019	16.02	15.65***	15.98	15.95	15.81
(sales/total work hours)		16.22	15.91***	16.06	16.03	16.00
(Log) total assets	2017	17.00	16.79	17.74***	17.60	17.07**
	2019	17.09	17.42**	18.45***	18.03	17.54**
Employees	2017	4.75	5.62	13.90***	10.02	8.95
	2019	4.52	5.07	20.79***	13.96	9.51
Firm age	2017	12.61	12.88	12.58	13.24	12.62
	2019	13.50	13.52	15.14	15.18	13.96
Female owner or	2017	0.43	0.30***	0.26	0.29	0.33
manager (Yes=1, No=0)	2019	0.48	0.35***	0.27**(*)	0.29	0.37
Internet (Yes=1, No=0)	2017	0.05	0.02	0.07	0.08	0.04**
	2019	0.01	0.03*	0.09***	0.05	0.04
Electricity (Yes=1, No=0)	2017	0.93	0.85***	0.86	0.88	0.89
	2019	0.95	0.87***	0.94	0.89	0.91
Education	2017	0.31	0.42**	0.50**(*)	0.53	0.40**
(high school or above=1)	2019	0.31	0.39**	0.51***	0.44	0.39
Applied for credit	2017	0.07	0.05	0.09	0.08	0.06
(Yes=1, No=0)	2019	0.04	0.06	0.08	0.07	0.06
Business practices (index counting the number of BPs used)	2017	5.45	5.43	6.42**(*)	5.10	5.75
	2019	3.56	4.51***	6.64***	5.56	5.00
Power-driven machinery	2017	0.69	0.50***	0.65	0.59	0.59
(Yes=1, No=0)	2019	0.76	0.57***	0.75	0.68	0.65
N	2017	194	419	351	119	646
	2019	217	478	269	119	646

Note: mean estimates by year; stars represent significance levels for t-tests. For the indices, ANOVA and t-tests for data with unequal variances were carried out. For the indices, stars were only set when the differences were statistically significant when compared to the lower group(s), i.e. the log profits of lower-tier and upper-tier informal firms were significantly different from sales of formal firms. Because there is no statistical difference in the log profits between lower-tier and upper-tier informal firms, there are no stars in the first row, second column. The numbers of observations in the three (in)formality categories differ by year because several of the firms' workers changed to higher or lower categories between 2017 and 2019 (see Table 4). *Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

Table 4: (In)formalization from and to the different (in)formality categories between 2017 and 2019

		Tax (In)formality 2019					
		Informality		Formality			N
2017	Informality	553		158			711
	Formality	97		156			253
	N	650		314			964
		Registration with Authorities					
		Full Informality	Local Formality	National Formality	Formality +1	Formality +2	N
	Full Informality	144	5	16	29	5	299
2017	Local Formality	18	40	9	21	2	90
	National Formality	14	9	84	77	14	198
	Formality+1	52	18	80	136	63	349
	Formality+2	3	4	20	48	52	127
	N	231	76	209	311	136	963
		Labour (In)formality					
		Lower-Tier Informality	Upper-Tier Informality	Full Formality			N
	Lower-Tier Informality	155	2	37			194
2017	Upper-Tier Informality	0	339	80			419
	Full Formality	62	137	152			351
	N	217	478	269			964

Source: authors' calculations based on MEMS data.

6 Methodology

Firms that modify their informality category might exhibit characteristics that are different from those firms that remain in the same category. While we have a set of control variables, there might still be biases related to unobservable features such as a firm owner's entrepreneurial ability. To address the issue of time-invariant unobservable factors, we use a fixed-effects (FE) model:

$$Y_{it} = \alpha_i + \beta X_{it} + \theta S_i + \phi F_i + \varepsilon_i \quad (1)$$

where i stands for a firm and t for a year, i.e. 2017 or 2019. Further, Y_{it} represents our outcome variables, which are log gross profits, the number of employees (firm size), log value added, log of labour productivity, and log of taxes and fees. We include firm (α_i) and year (θ) fixed effects. X represents the set of firm owner and firm feature variables outlined in detail in the previous section. F is a dummy in the case of (in)formality definition 1, i.e. it takes the value of 1 when a firm pays taxes and 0 otherwise. Hence, the outcome of formalization stands on a comparison between the mean change in outcomes among firms that formalized and the mean change in outcomes among enterprises that did not. In the case of definition 2, we use an index of (in)formality categories ranging from 1 (full informality) to 5 (formality+2). We apply an index from 1 (lower-tier informality) to 3 (formality) for definition 3.

Next, we use Oaxaca-Blinder decompositions to explore the performance gap between enterprises that formalized between 2017 and 2019 ('formalizers') and firms that remained in the same informality category ('non-formalizers'). We do not look at the performance gap between informal and formal firms because formalizers and non-formalizers have more similar but still significantly different

performance levels such that we expect to get more informative results when comparing these two groups. The decompositions distinguish three different components of the performance gap. The first component represents differences in observable characteristics between formalizers and non-formalizers (endowment effect). The second component explains how these characteristics influence performance differently (coefficient effect); for example, a formalizer might have different returns to education than a non-formalizer. The third component captures the interaction of the first and second effects.

As described in Jann (2008), we have two groups, F (formalizers) and NF (non-formalizers); the outcome variable Y; and a set of predictors (the control variables used in the FE regressions). We then ask how much of the mean outcome difference, with E(Y) representing the expected value of the outcome variable, explains group differences in the predictors:

$$R = E(Y_F) - E(Y_{NF})$$

$$Y_\ell = X'_\ell\beta_\ell + \varepsilon_\ell, \quad E(\varepsilon_\ell) = 0 \;\; \ell \; \varepsilon \; (F, NF)$$

Using the linear model, with X representing a vector of the predictors and a constant, β capturing the slope parameters and the intercept, and ε containing the error, the mean outcome difference is the difference in the linear predication at the group-specific means of the regressors:

$$R = E(Y_F) - E(Y_{NF}) = E(X_F)'\beta_F - E(X_{NF})'\beta_{NF} \qquad (2)$$

because

$$E(Y_\ell) = E(X'_\ell\beta_\ell + \varepsilon_\ell) = E(X'_\ell\beta_\ell) + E(\varepsilon_l) = E(X_\ell)'\beta_\ell$$

where $E(\beta_\ell) = \beta_\ell$ and $E(\varepsilon_\ell) = 0$ by assumption.

With the aim of determining the contribution of group differences in predictors to the overall outcome difference, equation (2) can be rearranged (Winsborough and Dickinson 1971; Jones and Kelley 1984; Daymonti and Andrisani 1984):

$$R = \{E(X_F) - E(X_{NF})\}' \beta_{NF} + E(X_{NF})' (\beta_F - \beta_{NF}) + \{E(X_F) - E(X_{NF})\}' (\beta_F - \beta_{NF}) \qquad (3)$$

This is a threefold decomposition, meaning that we divide it into three components:

$$R = E + C + I$$

The first component is the 'endowment effect' and is the part of the differential that is associated with group differences in the predictors,

$$E = \{E(X_F) - E(X_{NF}\}' \beta_{NF}$$

The second component is the 'coefficient effect' and captures the contribution of differences in the coefficients,

$$C = E(X_{NF})'(\beta_F - \beta_{NF})$$

The third part is an interaction term, incorporating the fact that differences in endowments and coefficients exist simultaneously between formalizers and non-formalizers.

7 Performance of (in)formal firms

In Tables 5–7 and appendix Tables A1–A4, we report FE estimates for the three informality definitions with the objective of ruling out that unobserved, time-invariant effects drive our results. When looking at binary definition 1, there is a positive association between becoming formal, i.e. starting to pay taxes, and several performance variables. Specifically, formalization is positively associated with gross profits, value added, and labour productivity. Becoming formal associates with a 24–25 per cent increase in profits, depending on whether we look at the whole sample or only micro-sized firms (see Table 5). Further, formalized enterprises enhance their labour productivity by 16 per cent (see appendix Table A5). For businesses of all sizes, formalization is also associated with an increase in size of 12 per cent. However, there is no statistically significant association between formalization and size for micro firms (see Table 6). Further, formalization correlates with enterprises paying between 67 and 71 per cent more taxes and fees (see appendix Table A3).

When using definition 2, there is no statistically significant relationship between formalization (to any of the four higher categories and all of them aggregated) and most of the performance variables. The only positive association is between becoming more formal and firm size (see Table 6). Firm size increases by 4 per cent for micro firms and by 5 per cent for the whole sample. Enterprises that formalize to formality+1 drive this, and their size consequently grows by 8 per cent (see Table 7). Further, there is a positive link for formality+2 and labour productivity for the whole sample. Costs in the form of taxes and fees seem to increase for formalizers of definition 2, and this association holds when looking at formalizers to individual categories (see appendix Tables A3 and A4). For example, formalizing to formality+1, i.e. either starting to pay taxes or social security, is associated with a 28 per cent increase in costs and changing to formality+2 (starting to pay both taxes and social security) with a 51 per cent increase. As higher costs seem to play an important role for enterprises that formalize, these costs might outweigh the benefits of formalization such that we only find very few statistically significant links between formalizing and firm performance.

Concerning definition 3, there are two negative associations between changing to a higher category and performance. First, formalization negatively correlates with value added for the whole sample, but this association becomes statistically insignificant when only looking at micro businesses (see appendix Table A1). Second, it negatively links with labour productivity for the whole sample. The only positive and significant relationship is between becoming more formal and firm size, i.e. the log of workers. Formalizing to full formality, i.e. starting to pay social security contributions for their workers, is associated with a 9 per cent increase in workers. However, the significance does not hold when only looking at micro firms. Overall, even though one might expect a firm to be able to attract higher-skilled workers when paying social security benefits, an improved formality status of a firm's employees, if anything, seems to influence the enterprise negatively.

Overall, these results show that the empirical conclusion differs depending on the (in)formality definition used. When using a binary definition based on tax payment, formalization seems to have a positive impact on firm performance. Tax payment, however, is already a quite high formality level, as shown by definition 2. A more heterogeneous definition along multiple levels of registration with

authorities (definition 2) depicts less optimistic outcomes. Most of the associations between formalization and various performance indicators are statistically insignificant. Formalization is only positively associated with performance if enterprises switch to the two highest degrees (formality+1 or formality+2). This is in line with the positive outcomes of definition 1, which also look at a rather high degree of formality. When aggregated, however, formalizers do not seem to benefit significantly. Further, formalization increases costs in terms of taxes and fees. Lastly, when using the workers' status of a firm (definition 3), switching to a higher formality category seems to have negative impacts on performance (at least in the short period that we are exploring).

In any case, there is a performance gap between formalizers and non-formalizers in all of our definitions. We therefore explore this gap in more detail in the next section.

Table 5: Formalization and profits

Dependent variable	(1) Log profits	(2) Log profits	(3) Log profits	(4) Log profits	(5) Log profits	(6) Log profits	(7) Log profits	(8) Log profits
Sample	Definition 1	Definition 1	Definition 1 (only micro)	Definition 2	Definition 2 (only micro)	Formalizers to 4 (only micro)	Definition 3	Definition 3 (only micro)
(In)formality index	0.268**	0.235*	0.248*	-0.012	0.006		-0.060	-0.017
	[0.117]	[0.128]	[0.147]	[0.047]	[0.052]		[0.085]	[0.098]
Formality+2						0.102		
						[0.119]		
Log labour		0.357***	0.249**	0.371***	0.256***	0.288***	0.372***	0.258***
		[0.088]	[0.098]	[0.088]	[0.098]	[0.097]	[0.087]	[0.098]
Log capital		0.088***	0.082**	0.091***	0.083**	0.089**	0.091***	0.082**
		[0.033]	[0.035]	[0.033]	[0.031]	[0.037]	[0.034]	[0.035]
Business practices		0.021*	0.038***	0.021*	0.037***	0.016	0.022*	0.038***
		[0.011]	[0.013]	[0.011]	[0.013]	[0.014]	[0.011]	[0.013]
Power-driven		0.145	0.196	0.143	0.200	0.147	0.140	0.198
machinery		[0.131]	[0.133]	[0.131]	[0.135]	[0.147]	[0.131]	[0.135]
Owner's risk attitude		-0.031	-0.041**	-0.026	-0.037*	-0.036*	-0.026	-0.037*
		[0.019]	[0.021]	[0.019]	[0.020]	[0.021]	[0.019]	[0.21]
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,864	1,656	1,387	1,656	1,387	1,445	1,656	1,387
R^2	0.05	0.10	0.11	0.09	0.11	0.10	0.09	0.11

Note: fixed-effects (FE) estimates on the balanced panel with robust standard errors in parentheses. Control variables: firm age, owner/manager being female, 5+ years of management experience, high school degree, firm having applied for a loan, internet access, electricity access, water access, and owner's risk attitude. *Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

Table 6: Formalization and firm size (number of employees)

Dependent variable	(1) Log firm size	(2) Log firm size	(3) Log firm size	(4) Log firm size	(5) Log firm size	(6) Log firm size
Sample	Definition 1	Definition 1 (only micro)	Definition 2	Definition 2 (only micro)	Definition 3	Definition 3 (only micro)
(In)formality index	0.116**	0.076	0.050**	0.036*	0.059	0.051
	[0.053]	[0.055]	[0.021]	[0.022]	[0.037]	[0.036]
Log sales	0.129***	0.104***	0.132***	0.104***	0.134***	0.106***
	[0.019]	[0.019]	[0.019]	[0.019]	[0.019]	[0.019]
Log capital	0.008	0.021*	0.010	0.023**	0.010	0.022*
	[0.012]	[0.011]	[0.012]	[0.012]	[0.012]	[0.011]
Business practices	0.009**	0.006	0.008*	0.006	0.008*	0.005
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
Power-driven	0.081	0.001	0.084*	0.005	0.084*	0.006
machinery	[0.051]	[0.048]	[0.051]	[0.047]	[0.051]	[0.047]
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,707	1,429	1,707	1,429	1,707	1,429
R^2	0.13	0.12	0.13	0.12	0.13	0.12

Note: fixed-effects (FE) estimates on the balanced panel with robust standard errors in parentheses. Control variables: firm age, owner/manager being female, 5+ years of management experience, high school degree, firm having applied for a loan, internet access, electricity access, water access, and owner's risk attitude.
*Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

Table 7: Formalization and firm size (number of employees)

Dependent variable	(2) Log workers	(3) Log workers	(4) Log workers	Dependent variable	(1) Log workers
Sample definition 2				Sample definition 3	
Local formality				Full formality	0.087*
					[0.048]
National formality	-0.000				
	[0.155]				
Formality+1		0.083*			
		[0.046]			
Formality+2			0.102		
			[0.070]		
Log sales	0.113***	0.112***	0.133***	Log sales	0.134***
	[0.028]	[0.020]	[0.019]		[0.019]
Log capital	0.030*	0.020*	0.009	Log capital	0.010
	[0.016]	[0.013]	[0.012]		[0.012]
Man. experience of	0.136	0.193***	0.177***	Man. experience of	0.185***
5+ years	[0.084]	[0.056]	[0.055]	5+ years	[0.056]
Business practices	0.011	0.009*	0.009*	Business practices	0.008*
	[0.007]	[0.005]	[0.005]		[0.005]
Power-driven	0.112	0.094*	0.080*	Power-driven	0.084*
machinery	[0.068]	[0.055]	[0.051]	machinery	[0.051]
Year dummies	Yes	Yes	Yes	Year dummies	Yes
Other controls	Yes	Yes	Yes	Other controls	Yes
Observations	920	1,489	1,707	Observations	1,707
R^2	0.13	0.11	0.13	R^2	0.13

Note: fixed-effects (FE) estimates on the balanced panel with robust standard errors in parentheses. Control variables: firm age, owner/manager being female, 5+ years of management experience, high school degree, firm having applied for a loan, internet access, electricity access, water access, and owner's risk attitude. Those individual informality categories not depicted here are not reported because of the small number of observations formalizing to these categories. *Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculation based on MEMS data.

8 Explaining the performance gap

To better understand the differences in performance between firms in the various (in)formality categories, we use Oaxaca-Blinder decompositions. Specifically, we compare formalizers with non-formalizers along the three informality definitions. Firms that formalize to a higher category exhibit higher average performance than enterprises that remain in the same (in)formality category between the two years but have lower average performance than enterprises that were formal in both years. Thus, firms that formalize might need to perform on a specific level or acquire certain characteristics before choosing to formalize.

Table 8 shows that formalizers according to definition 1, i.e. firms that start paying taxes, exhibit average log profits of 15.6 and non-formalizers of 14.9. Thus, these two groups differ significantly when it comes to gross profits. Differences in our control variables can explain about 69 per cent of this profit gap. Even though we restrict the sample to micro firms, firm size accounts for a big part of the profit differential (23 per cent). Further, capital endowments (18 per cent) and the use of power-driven machinery (12 per cent) play important roles. The educational level, business practices, and being located in Yangon also provide explanatory contributions to the profit gap, though to a lesser extent. We get similar results when analysing the gap in value added (see appendix Table A7).

Enterprises that changed their informality category to a higher one according to definition 2 have bigger and significantly different profit levels than non-formalizers (see Table 8). Differences in their features explain 66 per cent of this gap. Again, firm size (21 per cent), capital endowments (19 per cent), and the use of power-driven machinery (12 per cent) are important in explaining this difference. The educational level and being located in Yangon play a smaller but statistically significant role. Business practices, however, do not provide a statistically significant explanation of the profit gap. Similar findings hold for the gap in value added (see appendix Table A7).

When using a firm's formality definition along its employees' status (definition 3), its capital endowments play the biggest role in explaining the profit gap between formalizers and non-formalizers (44 per cent), followed by firm size (30 per cent), being located in Yangon (24 per cent), using power-driven machinery (11 per cent), and having a high school degree or above (10 per cent). The influence of business practices is statistically insignificant (see Table 8). Comparable results hold for the value-added gap, with different magnitudes of the control variables. In particular, firm size plays a larger role in explaining the gap (28 per cent) than capital endowments (22 per cent).

Overall, firm size, the level of capital endowments (assets), and electrical machinery explain a big part of the performance gap for all informality definitions. Education level plays a smaller role, while business practices only provide a statistically significant explanation for informality definition 1. The significance of being located in Yangon seems driven by the high share of enterprises in that city, which changed its informality category between the two years. We get comparable results when looking at the gap in value added.

Disparities in sales between formalizers and non-formalizers of all definitions explain the firm size gap (see appendix Table A5). Variables such as intermediate inputs, capital, education, business practices, and being located in Yangon provide less important explanations and only for some—not all of the definitions (see Table A6). Concerning labour productivity (LP), differences in intermediate inputs per worker, in capital per worker, and in the share of temporary workers explain the majority of the gap between formalizers and non-formalizers. Education and operating

in an industrial zone only add little to the understanding of the performance gap of definitions 2 and 3 and the use of electrical machinery of definitions 1 and 2 (see appendix Table A8).

Overall, differences in firm size, capital endowments, and the use of power-driven machinery are statistically significant explanations for the various performance gaps between formalizers and non-formalizers. Further, disparities in having a high school degree or a higher education level, as well as the use of business practices, significantly account for some of the performance gaps and informality definitions. In Myanmar, despite only looking at micro businesses in the Oaxaca-Blinder decompositions, firm size seems to play a more important role in explaining performance differences than in other countries such as Mozambique. Moreover, business practices account much less for performance gaps in Myanmar than in Mozambique. The explanation provided by differences in education seems to be of similar size in the two countries (Aga et al. 2019).

Table 8: Oaxaca-Blinder decomposition

Dependent variable	Log profits			Log profits			Log profits		
Group 1	*Formalizers of definition 1*			*Formalizers of definition 2*			*Formalizers of definition 3*		
Overall	15.625			15.416			15.335		
	[0.109]			[0.087]			[0.132]		
Group 2	*Non-formalizers of definition 1*			*Non-formalizers of definition 2*			*Non-formalizers of definition 3*		
Overall	14.918			15.000			15.012		
	[0.046]			[0.053]			[0.050]		
Difference	0.707***			0.416***			0.323**		
	[0.119]			[0.101]			[0.142]		
Endowments	0.485***	(68.6%)		0.273***	(%)		0.420***	(%)	
	[0.072]			[0.055]			[0.087]		
Coefficients	-0.012			0.003			-0.173		
	[0.174]			[0.102]			[0.141]		
Interaction	0.234			0.140***	(%)		0.076		
	[0.156]			[0.067]			[0.108]		
	End.	Coef.	Int.	End.	Coef.	Int.	End.	Coef.	Int.
Log employees	0.164***	0.094	0.041	0.087***	0.034	0.008	0.096**	-0.219	-0.058
	[0.034]	[0.132]	[0.058]	[0.025]	[0.121]	[0.029]	[0.032]	[0.172]	[0.048]
Log capital	0.125***	3.917***	0.276***	0.078***	1.626*	0.057	0.143***	1.670	0.092
	[0.028]	[1.147]	[0.086]	[0.022]	[0.953]	[0.036]	[0.033]	[1.370]	[0.077]
High school or above	0.037**	-0.073	-0.042	0.021*	0.008	0.002	0.031*	0.126	0.054
	[0.017]	[0.058]	[0.035]	[0.012]	[0.058]	[0.018]	[0.016]	[0.084]	[0.040]
Business practices	0.041*	0.006	0.002	0.017	0.064	0.009	0.021	-0.034	-0.004
	[0.018]	[0.102]	[0.029]	[0.011]	[0.099]	[0.014]	[0.016]	[0.133]	[0.016]
Power-driven machinery	0.082***	0.018	0.007	0.047***	-0.077	-0.015	0.037*	-0.303*	-0.051
	[0.023]	[0.138]	[0.052]	[0.018]	[0.120]	[0.023]	[0.020]	[0.162]	[0.036]
Owner's risk attitude	-0.003	-0.033	-0.002	-0.012	0.436**	0.029	-0.006	0.589*	0.033
	[0.007]	[0.244]	[0.017]	[0.009]	[0.216]	[0.019]	[0.007]	[0.301]	[0.028]
Yangon	0.063**	0.004	0.006	0.032*	0.022	0.025	0.076**	0.011	0.052
	[0.025]	[0.022]	[0.035]	[0.017]	[0.018]	[0.022]	[0.036]	[0.009]	[0.045]
Controls	Yes			Yes			Yes		
Observations	1,137			995			963		

Note: Oaxaca-Blinder decomposition. Additional control variables are: firm age, owner/manager being female, 5+ years of management experience, firm having applied for a loan, internet access, electricity access, water access and sector dummies. *Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

9 Conclusion

In this study, we used a novel firm-panel data set from Myanmar. Particularly, we investigated the association between informality and firm performance with reference to three different informality definitions. This approach allowed us to establish whether different informality concepts have different implications for the results. We find that this is the case. When looking at the first definition, reflected in a traditional binary dummy and based on whether a firm pays taxes, we find that formalization increases firm performance. Using the second informality definition, which is an indicator of several government agencies with which an enterprise can enrol, this mostly leads to insignificant results. Formalization is only positively associated with performance if enterprises switch to the two highest degrees (formality+1 or formality+2). This is in line with the positive outcomes of definition 1, which also look at a rather high degree of formality. Lastly, when investigating the association between the registration status of workers and firm performance, we find a few negative results.

Even though we restrict our sample to micro businesses in the Oaxaca-Blinder decompositions, differences in firm size display statistically significant differences for the various performance gaps between formalizers and non-formalizers, independent of the informality definition at hand. The same is valid for disparities in capital intensity and the use of power-driven machinery. Further, having a high-school degree or a higher educational level, as well as the use of business practices, only accounts in a statistically significant way for some of the performance gaps and informality definitions.

In Myanmar, firm size seems among micro businesses to play a more important role in explaining performance differences than in other countries. Moreover, business practices appear to be a less important factor in explaining performance gaps than elsewhere (Aga et al. 2019). Because of the basic nature of the industrial activities in Myanmar, electricity may play such a substantial role that power-driven machinery accounts for a statistically significant difference among firms. The country's economy has been isolated for many decades, the government suppressed all firms that were not state-owned in the 1980s, and access to finance is limited even for the firms with the highest growth potential (Hansen et al. 2019; Odaka 2016; Stokke et al. 2018; World Bank 2019). Consequently, the development of a diverse manufacturing sector did not take off. This suggests that the potential for future progress is large provided appropriate policies are put in place. This also explains why the difference in performance between formal and informal firms in Myanmar is smaller than in other countries.

A caveat is that we studied Myanmar firms during a relatively short period. A recent study on Viet Nam shows that when using a binary informality definition and more than two survey rounds, formalization does not result in an increase in firm performance (McCaig and Nanowski 2019). If we could look at more than two survey rounds, we might draw the same conclusions for our binary definition 1. Moreover, social security benefits have been found to have a positive impact on firm performance but only after several years (Lee and Torm 2017), such that, again, we might get different results if it were possible to observe more than two survey rounds.

Further research is required on the effects of formalization on firm performance. There are many programmes around the world that aim to formalize informal enterprises with potentially significant consequences, and some studies show that the outcomes of formalization may not be as positive as initially expected. Further, many different definitions of informality are used in the literature. This means that it is difficult, if not impossible, to draw at this stage a general conclusion about the overall effects of formalization of enterprises. It may be the case that formalization is only associated with positive outcomes when it happens to high (in)formality categories, including

tax payment, and less so when switching takes place for lower categories. A harmonization of the different definitions should be aimed at and include several informality categories. Further, a sole focus on formalization of informal enterprises does not seem to be sufficient because it neglects the heterogeneity of informality. More holistic approaches appear to be more appropriate with a view of supporting the livelihoods of informal entrepreneurs and workers.

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Appendix

Table A1: Formalization and value added

Dependent variable	(1) Log VA	(2) Log VA	(3) Log VA	(4) Log VA	(5) Log VA	(7) Log VA	(8) Log VA
Sample	Definition 1	Definition 1	Definition 1 (only micro)	Definition 2	Definition 2 (only micro)	Definition 3	Definition 3 (only micro)
(In)formality index	0.323*** [0.098]	0.238*** [0.102]	0.302** [0.119]	-0.006 [0.038]	0.015 [0.042]	-0.134** [0.064]	-0.108 [0.072]
Log labour		0.462*** [0.072]	0.423*** [0.076]	0.478*** [0.072]	0.434*** [0.076]	0.485*** [0.072]	0.443*** [0.076]
Log capital		0.086*** [0.028]	0.056** [0.028]	0.089*** [0.028]	0.059** [0.028]	0.088*** [0.029]	0.057** [0.028]
Business practices		0.025*** [0.010]	0.031*** [0.010]	0.025** [0.010]	0.031*** [0.010]	0.028*** [0.010]	0.033*** [0.010]
Power-driven machinery		0.128 [0.098]	0.173* [0.100]	0.127 [0.099]	0.179* [0.103]	0.119 [0.099]	0.169* [0.102]
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,916	1,696	1,420	1,696	1,409	1,696	1,420
R^2	0.05	0.15	0.14	0.14	0.31	0.14	0.14

Note: fixed-effects estimates on the balanced panel with robust standard errors in parentheses. Control variables: firm age, owner/manager being female, 5+ years of management experience, high school degree, having applied for a loan, internet access, electricity access, water access, and owner's risk attitude. *Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

Table A2: Formalization and costs (taxes and fees)

Dependent variable	(1) Log costs	(2) Log costs	(3) Log costs	(4) Log costs	(5) Log costs	(6) Log costs
Sample	Definition 1	Definition 1 (only micro)	Definition 2	Definition 2 (only micro)	Definition 3	Definition 3 (only micro)
(In)formality index	0.709*** [0.099]	0.669*** [0.115]	0.260*** [0.054]	0.238*** [0.061]	0.013 [0.066]	0.008 [0.075]
Log sales	0.127*** [0.046]	0.128*** [0.052]	0.145*** [0.047]	0.139*** [0.054]	0.145*** [0.047]	0.144*** [0.054]
Log capital	0.027 [0.031]	0.038 [0.030]	0.038 [0.031]	0.047 [0.031]	0.045 [0.033]	0.051 [0.032]
Loan	0.309** [0.169]	0.393** [0.192]	0.337** [0.172]	0.447** [0.194]	0.386** [0.171]	0.478*** [0.191]
Internet	0.513** [0.194]	0.466 [0.286]	0.552** [0.197]	0.476 [0.296]	0.532*** [0.194]	0.513* [0.297]
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,228	981	1,228	981	1,228	981
R^2	0.17	0.18	0.12	0.13	0.08	0.09

Note: fixed-effects estimates on the balanced panel with robust standard errors in parentheses. Control variables: firm age, owner/manager being female, 5+ years of management experience, high school degree, business practices, use of power-driven machinery, electricity access, water access, and owner's risk attitude.
*Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

Table A3: Definition 2 and costs

Dependent variable	(2) Log costs	(3) Log costs	(4) Log costs	(5) Log costs	(6) Log costs
Sample	Definition 2	Definition 2	Definition 2	Definition 2 (only micro)	Definition 2 (only micro)
Local formality					
National formality	0.482				
	[0.416]				
Formality+1		0.281***		0.220**	
		[0.107]		[0.113]	
Formality+2			0.509***		0.520***
			[0.119]		[0.133]
Log sales	0.040	0.157***	0.146***	0.141***	0.143***
	[0.095]	[0.053]	[0.043]	[0.058]	[0.054]
Log capital	0.049	0.054	0.037	0.038	0.044
	[0.060]	[0.032]	[0.030]	[0.033]	[0.032]
Loan	0.504	0.379*	0.323**	0.504**	0.436**
	[0.517]	[0.226]	[0.159]	[0.238]	[0.192]
Internet	0.226	0.766***	0.607***	0.573	0.498*
	[0.873]	[0.272]	[0.214]	[0.374]	[0.298]
Year dummies	Yes	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes	Yes
Observations	519	1,012	1,228	875	981
R^2	0.10	0.14	0.11	0.12	0.12

Note: fixed-effects estimates on the balanced panel with robust standard errors in parentheses. Control variables: firm age, owner/manager being female, 5+ years of management experience, high school degree, business practices, use of power-driven machinery, electricity access, water access, and owner's risk attitude.
*Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

Table A4: Formalization and labour productivity

Dependent variable	(1) Log LP	(2) Log LP	(3) Log LP	(4) Log LP	(5) Log LP	(6) Log LP
Sample	Definition 1	Definition 1 (only micro)	Definition 2	Definition 2 (only micro)	Definition 3	Definition 3 (only micro)
(In)formality	0.159***	0.157***	0.010	0.021	-0.061*	-0.032
index	[0.051]	[0.057]	[0.020]	[0.022]	[0.036]	[0.039]
Log labour	-0.169***	-0.200***	-0.158***	-0.193***	-0.153***	-0.188***
	[0.052]	[0.066]	[0.052]	[0.067]	[0.041]	[0.049]
Temporary	0.017***	0.011	0.017***	0.013	0.017***	0.012
labour	[0.006]	[0.011]	[0.006]	[0.011]	[0.005]	[0.013]
Log	0.617***	0.624***	0.617***	0.623***	0.617***	0.623***
intermediate	[0.027]	[0.032]	[0.027]	[0.032]	[0.017]	[0.018]
inputs/employee						
Log capital/	0.042***	0.028*	0.045***	0.030*	0.046***	0.030*
employee	[0.014]	[0.017]	[0.014]	[0.017]	[0.014]	[0.016]
Business	0.009*	0.013***	0.009*	0.012**	0.010**	0.013**
practices	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
Loan	0.163*	0.245*	0.175*	0.263**	0.176**	0.258***
	[0.098]	[0.125]	[0.099]	[0.127]	[0.084]	[0.098]
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,686	1,408	1,686	1,408	1,686	1,408
R^2	0.70	0.71	0.70	0.71	0.70	0.71

Note: fixed-effects estimates on the balanced panel with robust standard errors in parentheses. Control variables: firm age, owner/manager being female, 5+ years of management experience, high school degree, business practices, use of power-driven machinery, electricity access, water access, and owner's risk attitude.
*Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

Table A5: Oaxaca-Blinder

Dependent variable	Log labour			Log labour			Log labour		
Group 1	*Formalizers of definition 1*			*Formalizers of definition 2*			*Formalizers of definition 3*		
Overall	1.095			0.998			0.997		
	[0.046]			[0.037]			[0.057]		
Group 2	*Non-formalizers of definition 1*			*Non-formalizers of definition 2*			*Non-formalizers of definition 3*		
Overall	0.773			0.811			0.786		
	[0.020]			[0.024]			[0.022]		
Difference	0.321***			0.186***			0.211***		
	[0.050]			[0.044]			[0.061]		
Endowments	0.239*** (74.5%)			0.151*** (81.2%)			0.149*** (70.6%)		
	[0.034]			[0.027]			[0.034]		
Coefficients	0.260*** (81.0%)			0.074* (39.8%)			0.037		
	[0.072]			[0.044]			[0.059]		
Interaction	-0.177*** (55.1%)			-0.040			0.026		
	[0.063]			[0.030]			[0.046]		
	End.	Coef.	Int.	End.	Coef.	Int.	End.	Coef.	Int.
Log sales	0.147***	-0.681	-0.025	0.101***	0.299	0.009	0.102***	-1.931	-0.048**
	[0.030]	[1.360]	[0.051]	[0.025]	[1.172]	[0.035]	[0.031]	[1.521]	[0.040]
Log intermediate	-0.042**	0.368	0.016	-0.012	-0.760	-0.025	-0.025*	0.124	0.003
inputs	[0.017]	[1.028]	[0.045]	[0.014]	[0.855]	[0.028]	[0.014]	[1.119]	[0.025]
Log capital	0.030***	-	-0.070*	0.004	0.470	0.017	0.015]	1.350**	0.074**
	[0.011]	1.032**	[0.037]	[0.007]	[0.423]	[0.016]	[0.010]	[0.586]	[0.035]
		[0.523]							
High school or	0.019***	-0.022	-0.013	0.009*	0.003	0.001	0.010	0.049	0.023
above	[0.008]	[0.025]	[0.015]	[0.005]	[0.032]	[0.008]	[0.007]	[0.034]	[0.018]
Business	0.021***	-0.039	-0.011	0.009	-0.022	-0.003	0.009	0.009	0.001
practices	[0.008]	[0.045]	[0.013]	[0.006]	[0.043]	[0.005]	[0.008]	[0.055]	[0.005]
Yangon	0.035***	-0.012	-0.023	0.020**	-0.011	-0.012	0.020	-0.001	-0.008
	[0.012]	[0.010]	[0.019]	[0.009]	[0.009]	[0.010]	[0.015]	[0.004]	[0.019]
Wood, paper, &	0.015*	-0.025*	-0.019	-0.002	0.023	-0.004	0.003	0.044**	0.010
printing	[0.008]	[0.014]	[0.014]	[0.003]	[0.018]	[0.006]	[0.004]	[0.021]	[0.015]
Controls	Yes			Yes			Yes		
Observations	1,155			1,011			975		

Note: Oaxaca-Blinder decomposition. Additional control variables are firm age, owner/manager being female, 5+ years of management experience, firm having applied for a loan, use of power-driven machinery, internet access, electricity access, water access, and owner's risk attitude and sector dummies. *Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

Table A6: Oaxaca-Blinder decomposition and costs

Dependent variable	Log costs			Log costs			Log costs		
Group 1	*Formalizers of definition 1*			*Formalizers of definition 2*			*Formalizers of definition 3*		
Overall	11.751			11.511			11.561		
	[0.086]			[0.088]			[0.149]		
Group 2	*Non-formalizers of definition 1*			*Non-formalizers of definition 2*			*Non-formalizers of definition 3*		
Overall	10.500			11.024			11.988		
	[0.050]			[0.070]			[0.062]		
Difference	1.251***			0.487***			0.573***		
	[0.100]			[0.113]			[0.162]		
Endowments	0.493*** (39.4%)			0.200*** (41.1%)			0.281*** (49.0%)		
	[0.068]			[0.073]			[0.099]		
Coefficients	0.941*** (75.2%)			0.207*** (42.5%)			0.033		
	[0.119]			[0.095]			[0.135]		
Interaction	-0.183* (14.6%)			0.079			0.259** (45.2%)		
	[0.104]			[0.056]			[0.112]		
	End.	Coef.	Int.	End.	Coef.	Int.	End.	Coef.	Int.
Log sales	0.050**	-0.517	-0.014	0.036*	0.183	0.003	0.042	0.319	0.004
	[0.021]	[1.304]	[0.036]	[0.020]	[1.460]	[0.026]	[0.026]	[2.048]	[0.028]
Log capital	0.040*	0.731	0.036	0.027	0.921	0.012	0.085***	0.293	0.011
	[0.022]	[1.026]	[0.050]	[0.018]	[1.111]	[0.016]	[0.032]	[1.543]	[0.059]
Log employees	0.053**	-0.062	-0.022	0.037*	-0.070	-0.011	0.036	0.169	0.039
	[0.025]	[0.121]	[0.043]	[0.020]	[0.144]	[0.023]	[0.022]	[0.188]	[0.045]
High school or above	0.037**	0.035	0.011	0.0003	0.131*	0.0002	0.041	-0.071	-0.014
	[0.017]	[0.056]	[0.019]	[0.016]	[0.078]	[0.013]	[0.028]	[0.112]	[0.024]
Business practices	0.008	-0.083	-0.014	0.004	0.111	0.006	0.009	0.157	0.016
	[0.009]	[0.090]	[0.016]	[0.006]	[0.106]	[0.010]	[0.010]	[0.139]	[0.020]
Power machinery	0.013	-0.116	-0.018	-0.002	-0.168	0.003	-0.002	0.001	-0.000
	[0.011]	[0.139]	[0.022]	[0.008]	[0.155]	[0.009]	[0.006]	[0.199]	[0.006]
Yangon	0.104	-0.008	-0.016	0.027	0.030	0.021	-0.001	0.010	0.097
	[0.035]	[0.017]	[0.033]	[0.018]	[0.024]	[0.020]	[0.045]	[0.008]	[0.065]
Textiles, apparel, & leather	0.132***	0.195**	-0.154**	0.058**	-0.056	0.031	0.063**	-0.215	0.124
	[0.032]	[0.086]	[0.070]	[0.027]	[0.068]	[0.039]	[0.027]	[0.132]	[0.083]
Controls	Yes			Yes			Yes		
Observations	726			668			630		

Note: Oaxaca-Blinder decomposition. Additional control variables are firm age, owner/manager being female, 5+ years of management experience, firm having applied for a loan, internet access, electricity access, water access, and owner's risk attitude and sector dummies. *Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

Table A7: Oaxaca-Blinder decomposition and value added

Dependent variable	Log VA			Log VA			Log VA		
Group 1	*Formalizers of definition 1*			*Formalizers of definition 2*			*Formalizers of definition 3*		
Overall	16.191			16.076			16.092		
	[0.093]			[0.072]			[0.103]		
Group 2	*Non-formalizers of definition 1*			*Non-formalizers of definition 2*			*Non-formalizers of definition 3*		
Overall	15.539			15.586			15.599		
	[0.039]			[0.046]			[0.043]		
Difference	0.652***			0.490***			0.493***		
	[0.101]			[0.085]			[0.112]		
Endowments	0.449*** (68.9%)			0.276*** (56.3%)			0.421*** (85.4%)		
	[0.062]			[0.051]			[0.078]		
Coefficients	-0.040			0.130			0.070		
	[0.136]			[0.083]			[0.113]		
Interaction	0.243** (37.3%)			0.084			0.002		
	[0.122]			[0.055]			[0.084]		
	End.	Coef.	Int.	End.	Coef.	Int.	End.	Coef.	Int.
Log employees	0.222***	0.020	0.008	0.120***	-0.029	-0.007	0.137***	-0.296**	-0.079*
	[0.038]	[0.109]	[0.046]	[0.030]	[0.100]	[0.023]	[0.040]	[0.140]	[0.043]
Log capital	0.084***	3.535***	0.240***	0.061***	1.599**	0.059*	0.107***	1.955*	0.109*
	[0.022]	[0.919]	[0.068]	[0.017]	[0.774]	[0.031]	[0.025]	[0.091]	[0.064]
High school or above	0.021*	-0.032	-0.018	0.017*	-0.012	-0.004	0.036**	0.040	0.019
	[0.013]	[0.047]	[0.027]	[0.010]	[0.047]	[0.014]	[0.016]	[0.066]	[0.031]
Power machinery	0.082***	0.002	0.001	0.050***	-0.087	-0.016	0.034	-0.230*	-0.035
	[0.021]	[0.114]	[0.040]	[0.018]	[0.096]	[0.019]	[0.018]	[0.127]	[0.026]
Yangon	0.036*	0.001	0.002	0.012	0.022	0.023	0.062**	0.005	0.028
	[0.018]	[0.019]	[0.033]	[0.011]	[0.016]	[0.019]	[0.031]	[0.007]	[0.038]
Industrial zone	0.021*	-0.020	-0.016	0.006	-0.006	-0.004	0.029*	-0.027	-0.032
	[0.012]	[0.024]	[0.020]	[0.008]	[0.021]	[0.012]	[0.016]	[0.023]	[0.029]
Controls	Yes			Yes			Yes		
Observations	1,161			1,015			981		

Note: Oaxaca-Blinder decomposition. Additional control variables are firm age, owner/manager being female, 5+ years of management experience, firm having applied for a loan, business practices, internet access, electricity access, water access, and owner's risk attitude and sector dummies. *Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.

Table A8: Oaxaca-Blinder decomposition and labour productivity

Dependent variable	Log LP			Log LP			Log LP		
Group 1	*Formalizers of definition 1*			*Formalizers of definition 2*			*Formalizers of definition 3*		
Overall	16.148			16.140			16.095		
	[0.082]			[0.065]			[0.098]		
Group 2	*Non-formalizers of definition 1*			*Non-formalizers of definition 2*			*Non-formalizers of definition 3*		
Overall	15.819			15.825			15.880		
	[0.039]			[0.045]			[0.043]		
Difference	0.329***			0.315***			0.215**		
	[0.091]			[0.080]			[0.107]		
Endowments	0.309***	(93.9%)		0.271***	(86.0%)		0.227**	(106%)	
	[0.078]			[0.070]			[0.100]		
Coefficients	-0.081			0.035	(9.5%)		0.005		
	[0.066]			[0.042]			[0.058]		
Interaction	0.101*	(30.7%)		0.008			-0.016		
	[0.058]			[0.028]			[0.046]		
	End.	Coef.	Int.	End.	Coef.	Int.	End.	Coef.	Int.
Temporary labour force	0.023*	-	-0.019	0.020*	-0.008	-0.009	0.056**	-0.011	-0.028
	[0.013]	0.017**	[0.013]	[0.011]	[0.008]	[0.010]	[0.024]	[0.009]	[0.023]
		[0.008]							
Log intermediate inputs/employee	0.229***	0.922*	0.023*	0.200***	0.762*	0.017	0.093	0.308	0.003
	[0.069]	[0.478]	[0.014]	[0.063]	[0.401]	[0.010]	[0.087]	[0.578]	[0.006]
Log capital/ employee	0.029***	0.990**	0.044**	0.018**	-0.038	-0.001	0.029***	-0.204	-0.008
	[0.010]	[0.464]	[0.022]	[0.008]	[0.406]	[0.008]	[0.010]	[0.598]	[0.023]
High school or above	0.010	-0.011	-0.007	0.010*	-0.029	-0.009	0.018**	-0.018	-0.009
	[0.007]	[0.024]	[0.015]	[0.006]	[0.024]	[0.008]	[0.008]	[0.034]	[0.017]
Business practices	0.003	0.014	0.004	-0.0003	0.063	0.007	0.001	0.030	0.003
	[0.006]	[0.043]	[0.012]	[0.003]	[0.042]	[0.006]	[0.002]	[0.056]	[0.006]
Power machinery	0.022**	-0.019	-0.006	0.013*	-0.065	-0.012	0.007	-0.039	-0.006
	[0.009]	[0.059]	[0.020]	[0.006]	[0.050]	[0.010]	[0.005]	[0.068]	[0.011]
Industrial zone	0.013*	-0.008	-0.006	0.009	-0.006	-0.003	0.017*	-0.005	-0.005
	[0.007]	[0.012]	[0.010]	[0.006]	[0.011]	[0.006]	[0.009]	[0.013]	[0.015]
Controls	Yes			Yes			Yes		
Observations	1,149			1,007			970		

Note: Oaxaca-Blinder decomposition. Additional control variables are firm age, owner/manager being female, 5+ years of management experience, firm having applied for a loan, internet access, electricity access, water access, owner's risk attitude, and Yangon dummy and sector dummies. *Significance at a 10 per cent level, **significance at a 5 per cent level, ***significance at a 1 per cent level.

Source: authors' calculations based on MEMS data.