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# Good business practices improve productivity in Myanmar's manufacturing sector

## Evidence from two matched employer–employee surveys

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**Abstract:** We look into the relationship between business practices and enterprise productivity using panel data with matched employer and employee information from Myanmar. The data show that micro, small, and medium-size enterprises in Myanmar typically do only a few modern business practices. Even so, through estimates of value-added functions and labour demand relations we find a positive and economically important association between business practices and productivity. The results are confirmed when we utilize employer–employee information to estimate Mincer-type wage regressions. In combination, the value-added functions and the Mincer regressions show that at least half of the productivity gain from improved business practices stems from selection effects of employment of more productive workers. This sorting channel is important to keep in mind when supporting enterprises in Myanmar's manufacturing sector through entrepreneurial training activities. While our results indicate that implementation of more structured business practices could be a key ingredient of a private sector development strategy in Myanmar, the full effect of such a strategy may take time to materialize. Moreover, entrepreneurial training should be accompanied by labour market initiatives aimed at improving productive matches of employers and employees.

**Key words:** business practices, management, productivity, Myanmar

**JEL classification:** D22, L2, M21, O53

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# 1 Introduction

Micro, small, and medium enterprises in emerging economies generally operate under larger constraints than otherwise comparable firms in more developed parts of the world. Relatively poor performance is therefore often attributed to external factors such as malfunctioning institutions, financial constraints, or low-quality infrastructure (Bigsten et al. 2003; Dollar et al. 2005; Falco et al. 2011; Hansen et al. 2009; Rand 2007; Rand and Tarp 2012). On the other hand, researchers also highlight internal factors; among these, differences in management practices are found to be important (Anderson et al. 2018; Bloom and Van Reenen 2007; Bloom et al. 2012a; Bruhn et al. 2018; Mano et al. 2012; McKenzie and Woodruff 2017).

Even though modern management practices enhance both profitability and firm survival, far from all firms adopt them. Indeed, adoption of good management and business practices is much lower among micro, small, and medium enterprises (MSMEs) in emerging economies than elsewhere (Bloom and Van Reenen 2010; Bloom et al. 2012b).

In this paper, we examine the use of business practices among private manufacturing firms in Myanmar and investigate how they relate to firm performance assessed by their association with sales, productivity, and wages. Myanmar is an interesting country for analysing business practices in the private sector, as it is an emerging post-conflict economy, struggling with high unemployment and underemployment rates, low levels of human capital, and a low-performing manufacturing sector. Improving private enterprise performance is therefore a crucial component of the MSME development policy in Myanmar (Government of Myanmar 2015).

Myanmar has experienced several regime changes during the past 60 years, all of which have had implications for private sector development. While government leaders over time have steered the country towards a more market-oriented economy, Myanmar has faced several sanctions and trade restrictions by the international community during this transition (Dosch and Sidhu 2015; Martin 2012). As a response, many types of foreign investment have been prohibited in Myanmar (Meyer and Thein 2014); on top of this, most American and European multinational companies withdrew from Myanmar, meaning foreign investment until 2010 predominantly came from other Asian countries not backing the sanctions (Bernhardt et al. 2017). However, foreign capital was only allowed to enter in the form of joint ventures with state-owned enterprises, while private firms were overshadowed by domestic conglomerates brought about by privatization of formerly state-owned enterprises, whose new owners typically enjoyed close personal connections with military personnel (Ford et al. 2016). After the elections in 2010, the new government initiated political and economic reforms amid a weak industrial base. International sanctions were lifted in 2013, and Myanmar embarked on an accelerated industrialization process backed by a more diversified portfolio of foreign investments. By 2015, when the National League for Democracy (NLD) won the general election, the industrial share of the gross domestic product reached 34 per cent, surpassing the agricultural share of 28 per cent. However, the recent coup d'état, following the 2020 election, may overturn the progress made over the past ten years, and it is unclear how businesses and the international community will respond to a return to increasing uncertainty and stricter market control.

Today, the manufacturing sector in Myanmar mainly consists of micro enterprises (about 70 per cent of all manufacturing enterprises). The main industries are the food industry (55 per cent), textiles and apparel (12 per cent), and the wood industry (6 per cent) (Berkel et al. 2018). Enterprises mostly specialize in producing a single product using hand tools or old second-hand machinery, which does not leave much room for innovation (Berkel et al. 2018). In 2017,

manufacturing enterprises reported facing significant constraints, including inadequate access to infrastructure, finance, skilled labour, and technological knowledge. For example, not all firms had access to electricity or public water, 5 per cent were connected to the internet, and around 40 per cent were found to be credit rationed or constrained (Berkel et al. 2018). While the strains of external factors for business growth in Myanmar are well recognized (Berkel et al. 2018; Danquah and Sen 2021; Tanaka 2019), the role of internal factors, such as specific business factors and practices, remains less understood.

To increase the knowledge and understanding of the use and importance of business practices in the manufacturing sector in Myanmar, we analyse enterprises included in two nationally representative surveys of firms with panel data gathered in 2017 and 2019. Based on survey questions developed by McKenzie and Woodruff (2017), the Myanmar surveys have information about management quality in the form of 20 business practices related to marketing, buying intermediate supplies, record-keeping, and financial planning. The business practices questions are relatively straightforward with 'yes, it has' or 'no, it has not' responses about business activities. In line with the literature, we create a simple index that measures the share of the 20 practices each enterprise has implemented up to three months prior to the interview. We use this information to estimate the association between use of more of the business practices and firm productivity. The analysis is in line with McKenzie and Woodruff (2017) and thus with Bloom et al. (2016). However, inspired by Bender et al. (2018), we look into the relative importance of differences in capital and labour productivity.

Our sample of firms use, on average, 26 per cent of the 20 business practices, while the median is 20 per cent and no less than 28 per cent of the firms did not apply any of the practices in 2017 or 2019. Thus, MSMEs in Myanmar appear to have ample room for improvement. Applications of individual practices and the total share are unstable over time. In our balanced panel, we find a correlation of only 0.19 between 2017 and 2019. Nevertheless, application of the business practices appears to be valuable for those that actually apply them. Differences in the use of business practices of one standard deviation (26 percentage points; equivalent to an increase from applying none to applying slightly more than five business practices) is associated with a difference of 12 per cent in sales per employee, conditional on standard firm and owner/manager characteristics. We split the association with sales into price and productivity effects by estimating constant elasticity of substitution (CES) value-added functions. The analysis shows that the price link is modest—just below 2 percentage points—such that the main association is with productivity. We estimate the association with productivity both directly from the CES value-added functions and from a first-order condition for cost minimization (labour demand) and find that a one standard deviation difference in application of business practices is associated with a 10–25 per cent difference in productivity. We test whether there is a difference between the labour- and capital-enhancing productivity, and find that we cannot reject the null hypothesis of equal productivity effects from better business practices.

The strong link between business practices and labour productivity is confirmed when we use information from employee questionnaires and run regressions of individual workers' education and subsequently individual workers' wages on the business practice score for the enterprise in which they are employed alongside standard Mincer regression controls. Specifically, we find that workers with higher education are more likely to be employed by firms applying more business practices and, moreover, that a one standard deviation difference in business practices is associated with a 4–5 per cent difference in wages, conditional on workers' education, experience, tenure, and sex, as well as regional and sectoral factors. This wage difference amounts to 20–50 per cent of the difference in labour productivity estimated from the firm data. Thus, by combining information from different parts of the survey questionnaires, we conclude that firms with better business practices have higher labour productivity in large part through employment of more

productive (more educated) workers. This implies that the full gain of improved business practices may take time to materialize.

Our study relates to several strands of research on firm performance. First, our findings are part of and consistent with recent research pointing to the importance of managerial quality for sales, profits, and productivity (Anderson et al. 2018; Bender et al. 2018; Bloom and Van Reenen 2007; Bloom et al. 2012b; Broszeit et al. 2019; Forth and Bryson 2019; McKenzie and Woodruff 2017). Second, our study is related to work analysing key factors of MSME growth in developing countries (Baptist and Teal 2014; Bigsten et al. 2003; Hansen et al. 2009; Rand 2007; Rand and Tarp 2012; Söderbom and Teal 2004; Van Biesebroeck 2005). Finally, this paper relates to a growing body of studies of the private enterprise sector in Myanmar, which have until now covered areas of industrial agglomeration, market access, informal institutions, access to credit, and the gender wage gap (Danquah and Sen 2021; Hansen et al. 2020b, 2021; Min and Kudo 2013; Mueller et al. 2020; Rand et al. 2019; Tanaka 2019).

The remainder of the paper is organized as follows. Section 2 gives a brief overview of the directly related literature, mainly to present the quantitative results obtained for firms in other countries. Section 3 describes our data, with a focus on the application of business practices in our samples of firms in 2017 and 2019. This is followed by a description of our empirical models, clarifying our use of both direct estimation of value-added CES functions, estimates using first-order conditions, and finally Mincer-type wage regressions. Our empirical results are presented in Section 5, and we offer some concluding remarks in Section 6.

## 2 A brief overview of related literature

Using a novel survey instrument for measuring management practices, the seminal work of Bloom and Van Reenen (2007) demonstrates that better managerial practices are strongly associated with firm performance. They distinguish between 'good' and 'bad' management based on 18 different management practices that describe firms' operations, monitoring, targets, and incentives. The proposition is that if companies closely monitor their processes, set measurable targets, and incentivize workers, they will outperform those that do not monitor their operations, have few or vague targets, and do not consider employee performance. The empirical results show that their management performance index is significantly associated with total factor productivity gains.

Bloom and Van Reenen's results spurred interest in investigating the relationship between managerial practices and firm performance across countries. Thus, in a follow-up study, Bloom et al. (2012a) use a subset of the management practices measures from the original study (12 in total) to investigate how management practices affect firm performance in 12 transition economies. They find that a difference in management score from the lowest to the highest quartile is associated with differences in sales of 7–13 per cent.

Equally inspired by Bloom and Van Reenen (2007), McKenzie and Woodruff (2017) aim at measuring business practices thought to be especially beneficial for micro and small firms in emerging economies. They construct an index based on 26 practices related to marketing, buying and stock control, record-keeping, and financial planning activities that firms perform. The activities are all meant to be practices that can be learned rather than innate entrepreneurial abilities. McKenzie and Woodruff have business practice data from seven emerging economies and show that application of more of the practices is associated with positive differences in sales in microenterprises. Across the seven countries, a one standard deviation (25 percentage points) increase in business practices is associated with a 22 per cent increase in sales, on average.

Advancing in a different direction, Bender et al. (2018) examine the extent to which management practices contribute to increased productivity through manager and employee ability in middle-sized manufacturing plants in Germany. They find a strong relationship between employee ability and management practices and higher productivity among firms with higher human capital stock. Controlling for employee ability when estimating the production function parameters reduces the association of productivity with management practices by 30–50 per cent, but the scores for management practices remain highly significant, indicating that good practices work through both labour and capital productivity.

Training to improve management practices has also been an active area of both activities and research, and McKenzie (2021) presents a meta-study of 15 experiments reported in 11 studies. Based on intent-to-treat results, McKenzie finds that most of the studies have low power considering the perceived effect size, indicating that all experiments have wide confidence bounds, and most include zero. However, the weighted average of the experiments shows a statistically significant impact of training on sales of just below 5 per cent.

Among the studies that McKenzie does not include in his overall average is an experiment in Ghana that offers basic management training to firms in industrial clusters. The study shows that such training can improve business practices and some aspects of firm performance (Mano et al. 2012). However, while the experiment demonstrates a strong effect of the training programme on firm survival, evidence of the impact on firm sales and profitability is much weaker. In another large-scale study, Bloom et al. (2013) implement a field experiment in which they provide free consulting on management practices to randomly selected large textile firms in India. They find large and positive effects of their intervention. Adopting a bundle of new management practices (i.e. increasing the management score by 37.8 percentage points) raises productivity by 17 per cent in the first year and leads to opening of more production plants within three years. Bloom et al. (2013) suggest that improved quality and efficiency and reduced inventory are the key activities that enable achieving these performance improvements. In a follow-up study in which the plants were revisited nine years after the initial experiment, Bloom et al. (2020) find that about half of the practices implemented in the experimental plants had been dropped. Even so, the authors still find a large and significant gap in practices between the treatment and control plants.

## 3 Data

We use data from the nationally representative Myanmar Enterprise Monitoring Survey (MEMS) conducted in 2017 and 2019 (Berkel et al. 2018; Hansen et al. 2020a). The sample includes about 2,500 enterprises in each survey round, which are representative of about 70,000 privately owned MSMEs in the manufacturing sector in Myanmar. In the first round, the selection of firms followed a stratified, two-stage area sampling approach to ensure that firms from all regions and states of Myanmar were included. Within each state and region, urban townships were selected randomly using probability proportional to size. The number of sampled townships in each state/region was proportional to the number of townships in the state/region, while the probability of selection was determined by the number of registered firms in each township relative to the total number of registered firms in the state/region. Subsequently, within each township, registered firms were selected randomly without replacement. In the second wave of the survey, all firms still in operation were re-interviewed and replacements for those that had stopped operating were selected within the same township. All data were gathered using face-to-face interviews with

owners or managers of the firms and the questions we use from the surveys refer to the previous fiscal year.[1]

In each selected township, the enumerators were asked to identify and interview random firms not listed in the sampling frame but visually identifiable within the township. This on-site 'block' identification of informal firms operating alongside formal entities generated a sample of informal firms. Thus, while the listed firms represent the formal manufacturing sector, our sample of informal businesses is not representative of the (unknown) population of 'non-listed' manufacturing firms in Myanmar. Rather, they represent the more established and productive informal entities. These informal enterprises comprise 15 per cent of the sample in 2017 and 12 per cent in 2019.[2]

The MEMS survey questionnaire has a firm module and an employee module. Responses were acquired by face-to-face interviews with the owner or manager of the firm and with 1–5 workers. The goal was to interview five employees in all enterprises whenever possible. In family firms with no external workers, family members working in the enterprise were interviewed.

The data include information needed for estimation of production functions, such as revenue, profits, value added, employment, labour costs, material costs, and the value of total assets for the last financial year before the interview. The data also contain key information about the owner or manager, such as sex, age, experience, and education, and similar information about the interviewed workers, in addition to information about their individual wages.

In order to get reliable estimates of the value-added function parameters, we omit firms that do not have wageworkers or financial records of sufficient quality. Starting from the full samples of 2,496 firms in 2017 and 2,497 firms in 2019, we omit 47 firm observations in 2019 that do not have any paid employees and 505 firm observations with errors in their financial accounts.[3] After cleaning, we have 2,263 firms in 2017 and 2,178 firms in 2019 (thus omitting about 10 per cent and 13 per cent of the firms). Of the 4,441 total firm observations, 3,686 (83 per cent) are from 1,843 firms we observe in both years. Moreover, we have 9,534 employee responses from workers in the firms we observe in both years.

### 3.1 Business practices

We have information about 20 different practices that have been identified as beneficial for business performance in previous studies. In identifying business practices, the MEMS surveys include questions from McKenzie and Woodruff (2017) and inquire about specific firm activities related to (1) marketing, (2) buying supplies of intermediates, (3) record-keeping, and (4) financial planning.[4] The activities are recorded as 'yes' or 'no', and we code these as 1 and 0. Table 1 gives an overview of the 20 business practices and their two-year evolution.

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[1] The fiscal year has recently changed in Myanmar. The information in the surveys cover the periods 1 April 2016 to 31 March 2017 for the 2017 survey, and 1 January to 31 December 2018 for the 2019 survey.

[2] More details about sampling and the surveys generally are available from Berkel et al. (2018) and Hansen et al. (2020a).

[3] The errors include not obeying minimal consistency in accounts, negative value-added, negative labour costs, gross profits in excess of sales revenues, and non-positive total assets.

[4] The surveys include a subset of the 26 business practices from McKenzie and Woodruff (2017). The smaller number of business practices is context-dependent, as some record-keeping and financial practices do not exist in Myanmar.

Table 1 shows that modern business practices are not in widespread use in the manufacturing sector in Myanmar. The most common practice, used by about half of the firms, is to negotiate prices with suppliers (49 per cent of the firms in 2017) and to compare suppliers (48 per cent in 2017). This focus on suppliers makes sense in micro firms in which intermediate inputs make up a large fraction of the variable costs. At the other extreme, only 5 per cent of the firms advertised in any form in 2019 (down from 12 per cent) and only 6 per cent of the firms kept formal accounts in 2017, increasing to 13 per cent in 2019.

Table 1: Application of the individual business practice components

| | 2017 | 2019 | Both years | Balanced panel | Instability 2017–19 |
|---|---|---|---|---|---|
| *Marketing* | | | | | |
| 1. Visit competitor to see prices | 0.26 | 0.16 | 0.21 | 0.21 | 0.32 |
| 2. Visit competitor to see products | 0.24 | 0.14 | 0.19 | 0.20 | 0.29 |
| 3. Ask customers about offer of other products | 0.30 | 0.17 | 0.23 | 0.24 | 0.36 |
| 4. Talk with customers to see why stopped buying | 0.21 | 0.13 | 0.17 | 0.17 | 0.27 |
| 5. Use special offer to attract customers | 0.21 | 0.07 | 0.14 | 0.14 | 0.25 |
| 6. Ask supplier which products sell well | 0.13 | 0.15 | 0.14 | 0.15 | 0.24 |
| 7. Advertise in any form | 0.12 | 0.05 | 0.09 | 0.09 | 0.15 |
| *Buying supplies* | | | | | |
| 1. Negotiate lower prices with suppliers | 0.49 | 0.32 | 0.41 | 0.41 | 0.48 |
| 2. Compare alternative suppliers | 0.48 | 0.38 | 0.43 | 0.43 | 0.51 |
| *Record-keeping* | | | | | |
| 1. Keep formal accounts | 0.06 | 0.13 | 0.10 | 0.09 | 0.11 |
| 2. Record every purchase and sale | 0.27 | 0.40 | 0.33 | 0.34 | 0.36 |
| 3. Able to document cash balance | 0.36 | 0.35 | 0.36 | 0.36 | 0.38 |
| 4. Use financial records to know if sales increase or decrease | 0.33 | 0.32 | 0.33 | 0.33 | 0.36 |
| 5. Detailed costs of each product | 0.40 | 0.26 | 0.33 | 0.33 | 0.41 |
| 6. Have a monthly written budget | 0.29 | 0.23 | 0.26 | 0.26 | 0.32 |
| *Financial planning* | | | | | |
| 1. Review financial performance monthly | 0.35 | 0.36 | 0.36 | 0.37 | 0.41 |
| 2. Have sales target for next month | 0.27 | 0.21 | 0.24 | 0.25 | 0.35 |
| 3. Compare actual sales to target set | 0.28 | 0.22 | 0.25 | 0.27 | 0.36 |
| 4. Have annual profit and loss statements and cash flow statements | 0.28 | 0.36 | 0.32 | 0.32 | 0.37 |
| 5. Have annual income/expenditure sheet | 0.27 | 0.35 | 0.31 | 0.31 | 0.34 |
| Observations | 2,263 | 2,178 | 4,441 | 3,672 | 1,843 |

Note: the questions asked begin with the statement 'During the last 3 months has your business …'. Confirmation ('yes') is recorded as 1 while negation ('no') is recorded as 0. The numbers given in the table are the fractions of firms confirming they have done the business practice activity. Instability is the average absolute change in each of the business practice scores from 2017 to 2019. This is equal to the share of firms that changed the use of the business practice.

Source: authors' calculations based on Myanmar MSME data.

The average frequencies over the two years for all firms and for the balanced panel, respectively, show that the business practices for the firms in the balanced panel are not different from those for the firms that are only in the panel in one of the years as the averages are quite close. Further, our measure of instability—the share of the firms in the balanced sample that changed to use or

Furthermore, for the present analysis, we had to exclude a question about stock-keeping because of ambiguity in the translation of the question.

not use the specific business practices—illustrates how these practices are clearly not something owners and managers always or never do. Considering the most widespread practices, comparing and negotiating with suppliers, we find that half of the firms in our balanced sample (48 per cent and 50 per cent) changed to, or from, using this practice from 2017 to 2019. The other activities show less variation over time, but even for the important activity 'keeping formal accounts', we find that 47 per cent of the enterprises in our panel sample that kept such accounts in 2017 reported not keeping such accounts in 2019.

Following McKenzie and Woodruff (2017), we create sub-component indices and an overall business practice index by adding-up the number of practices each firm uses and then dividing the firm totals by the number of possible practices. In this way, both the sub-component indices and the overall business practices index are in the interval (0; 1) by construction and all individual practices have the same relative importance. Summary statistics for the indices are given in Table 2 and distributions of the overall indices for 2017 and 2019 are shown in Figure 1.

Table 2: Business practices and their components

| | 2017 | | 2019 | | Both years | | Balanced panel | | | Instability | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Corr. | Mean | SD |
| Business practices | 0.28 | 0.26 | 0.24 | 0.25 | 0.26 | 0.26 | 0.26 | 0.26 | 0.19 | 0.26 | 0.22 |
| Marketing | 0.21 | 0.27 | 0.12 | 0.23 | 0.17 | 0.26 | 0.17 | 0.26 | 0.10 | 0.24 | 0.27 |
| Buying | 0.48 | 0.46 | 0.35 | 0.44 | 0.42 | 0.46 | 0.42 | 0.46 | 0.01 | 0.49 | 0.44 |
| Record-keeping | 0.29 | 0.34 | 0.28 | 0.36 | 0.28 | 0.35 | 0.29 | 0.35 | 0.26 | 0.30 | 0.30 |
| Financial planning | 0.29 | 0.38 | 0.30 | 0.37 | 0.30 | 0.38 | 0.30 | 0.38 | 0.17 | 0.34 | 0.34 |

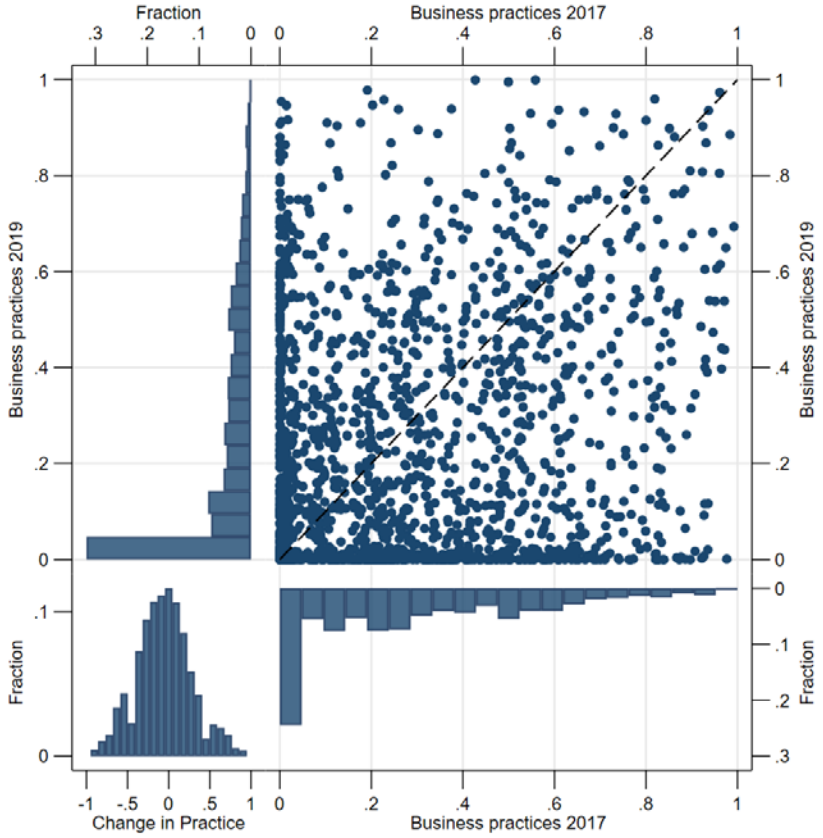
Note: instability is the average absolute change in the business practice score from 2017 to 2019. With $T = 2$ this is equal to the average absolute deviation from the firm-specific mean.

Source: authors' calculations based on Myanmar MSME data.

On average, our sample of firms apply 26 per cent of the 20 measured practices while the median firm applies 20 per cent. However, there is a large variation (the standard deviation is 26 per cent). As seen from Figure 1, in each year it is most common not to use any practice; 23 per cent of firms in 2017 and 31 per cent of firms in 2019 answered 'no' to all 20 business practice questions. At the other extreme, only nine firms report using all 20 practices and none of these are doing so in both years.[5]

[5] In comparison, McKenzie and Woodruff (2017) find that, on average, firms use 39 per cent of the total number of business practices measured. However, there is large variation within and across countries. While firms in Mexico, on average, applied 30 per cent of all practices measured, firms in Kenya applied 52 per cent and firms in Nigeria 72 per cent, on average. Comparing our averages with those of McKenzie and Woodruff (2017) may not be meaningful as the samples they work with are not nationally representative. For example, their sample from Nigeria comprises young, highly educated entrepreneurs, which could explain the observed high score for firms from this country.

Figure 1: The distributions of business practices in 2017 and 2019




Note: random noise (jitter) has been added to the individual observations in the cross-plot to increase readability.

Source: authors' calculations based on Myanmar MSME data.

The change from 2017 to 2019 is towards using fewer practices. On average, the firms employed 28 per cent of the business practices in 2017, decreasing to 24 per cent in 2019. Thus, overall the average quality of management in the enterprises, as measured by the business practice index, has declined from 2017 to 2019. Moreover, given the instability in the use of the individual practices, the weak correlation between the business practice index in 2017 and 2019 (0.19) is not surprising. The average absolute change in the use of business practices is 26 per cent, indicating that the change over time is of the same order of magnitude as the average use within each year. The cross-plot in the upper right corner and the histogram in the lower left corner of Figure 1 illustrate how the change in the use of business practices almost covers the full range. The mean of the change in business practices for the balanced panel is –5.5 percentage points, and the distribution is slightly right-skewed.[6] While 554 firms in 2017 and 691 firms in 2019 did not apply any business practices, only 138 (7 per cent of the balanced panel) did not use any of the practices in both years.

In brief, the use of good business practices is low among manufacturing MSMEs in Myanmar and the persistence in the use appears extremely low. In particular, very few firms use formal accounts, although about one-third of the firms have annual profit and loss and cash flow statements. For

[6] The detailed statistics for the changes are as follows: minimum –0.95, maximum 0.95, median –0.05, skewness 0.13, and kurtosis 3.15.

buying supplies activities, we find rather extreme instability from 2017 to 2019, indicating that some practices may be strongly influenced by market conditions.

# 4 Empirical models

## 4.1 Firm productivity

Turning to the association between business practices and firms' performance, McKenzie and Woodruff (2017) take a broad view by explaining how good business practices may affect all parts of production decisions, including quality of supplies and even input and output prices. They therefore focus on the association between sales (and profits) and business practices in their empirical analysis. However, looking beyond profitability, it is important to open up the black box as some channels may be short-lived and part of zero-sum games in the market (say, some marketing practices), while other channels may lead to lasting increases in factor productivity (say, employing more productive workers).

Bloom et al. (2016) develop a structural model in which business practices affect productivity directly as the activities are an independent part of the production function (business practices as technology). Bender et al. (2018) present a different approach as they show how business practices are associated with the human capital of the employees, arguing that better managers hire more productive workers and managers. We seek to combine these approaches by formulating simple empirical models of the association between application of business practices and firm productivity.

Thus, we consider the production decision by firm $i$ in a given sector, at a given location, and at a given time (we suppress indicators of sector and location). The firm's revenue may be given by

$$P_{it}Q_{it} = P_t(b_{it})F(A_{it}, K_{it}, L_{it}, b_{it}) + S_t(b_{it})M_{it} \tag{1}$$

where $P_{it}$ and $Q_{it}$ are the output price and quantity, respectively. We assume a Leontief production function in intermediate inputs $M_{it}$, while the value-added function is a standard neoclassical production function in capital $K_{it}$, labour $L_{it}$, business practices $b_{it}$, and the general productivity level $A_{it}$. As several of the business practices are related to prices of supplies and to marketing, we think of the output price and the prices of intermediate inputs as functions of the business practices. To simplify the modelling we link input and output prices to the business practices. Specifically, we assume that the two price functions $P_{it} = P_t(b_{it})$ and $S_{it} = S_t(b_{it})$ are continuous and monotonic and, given the choice of business practices, firms are price-takers.

Next, we specify the value-added function as a CES function in which we allow for differential effects of business practices on capital and labour productivity, respectively:

$$P_t(b_{it})Q_{it} - S_t(b_{it})M_{it} = Y_{it} = P_t e^{\gamma_p b_{it}} A_0 e^{\omega_{it}} \left[ \pi (e^{\gamma_k b_{it}} K_{it})^{\frac{\sigma-1}{\sigma}} + (1-\pi)(e^{\gamma_l b_{it}} L_{it})^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \tag{2}$$

Here, $\sigma > 0$, is the elasticity of substitution between capital and labour inputs, $\pi$ is the capital intensity parameter, and $\gamma_j$, $j = p$, $k$, and $l$ are the impacts of business practices on the output and input prices, capital productivity, and labour productivity, respectively, and $\omega_{it}$ is an unobservable firm-specific productivity process.

When modelling in value terms, we cannot separate marketing and other intermediate and output price effects from total factor productivity. This is a version of the output price bias discussed by De Loecker and Goldberg (2014). As we have information about unit output prices, we also formulate a value-added model in 'quantity terms':

$$Y_{it} / P_{it} = A_0 e^{\omega_{it}} \left[ \pi (e^{\gamma_k b_{it}} K_{it})^{\frac{\sigma-1}{\sigma}} + (1-\pi)(e^{\gamma_l b_{it}} L_{it})^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \quad (3)$$

Comparing the estimates of the two formulations will give an indication of the size of the association between output prices and business practices.

Turning to the associations with capital and labour productivity, we note that if good business practice is a technology, as suggested by Bloom et al. (2016), then we would expect $\gamma_k \geq \gamma_l$, while we expect $\gamma_k < \gamma_l$ if good business practice is associated with employing higher-quality workers as in Bender et al. (2018). In the latter case, the business practice index is acting as a proxy for differences in workforce education or innate worker ability across firms in the production function. The distinction between business practice as a capital- or labour-enhancing technology is important as the actions and activities in our business practice index are not directly measuring human resource management.

We estimate linearized versions of the value-added functions using Kmenta's (1967) Taylor-series approximation. Thus, using small letters to denote log-transformed variables, we estimate the parameters of the value-based value-added function from the equation

$$\begin{aligned} y_{it} - l_{it} = \omega_{it} + \beta_b b_{it} + \beta_l l_{it} + \beta_k (k_{it} - l_{it}) + \beta_{kk} (k_{it} - l_{it})^2 + \beta_{kb} [(k_{it} - l_{it}) b_{it}] \\ + \mathbf{z}_{it} \boldsymbol{\beta}_z + a_{it(r)} + \delta_{it(s)} + \varepsilon_{it} \end{aligned} \quad (4)$$

where, in addition to capital, labour, and business practices, we include $\mathbf{z}_{it}$, which are firm-specific control variables capturing differences in legal structure and characteristics of the owner or manager that may be correlated with business practices. $\alpha_{it(r)}$ are region/state fixed effects and $\delta_{it(s)}$ are sector fixed effects. Both of these sets of fixed factors can vary over time.

Most of the parameters of the value-added function (2) can be derived from the linearized equation. Specifically, $\beta_k = \pi$ and $\beta_{kk} = \frac{1}{2}\pi(1 - \pi)(\sigma - 1)/\sigma$, while $\beta_l$ is the deviation from constant returns to scale in the production function. The individual productivity impacts of business practices cannot be identified from the linearized equation. However, a weighted sum is identified: $\beta_b \approx \gamma_p + \pi\gamma_k + (1 - \pi)\gamma_l$. Thus, we can quantify the business practices association with value added, as such. Furthermore, the coefficient on the interaction term between the capital–labour ratio and business practices includes the difference between the capital and labour productivity. Thus, we can test whether business practices enhance the productivity of one input significantly more than the other.

When estimating the parameters of the quantity version of the value-added function (3), we follow De Loecker et al. (2016) and seek to remove the input price bias using a control function. In our model, the input price bias mainly comes from the capital input, which we measure as the total value of assets. To separate the quality from the quantity of capital, we assume the quality is a function of output prices and unit input costs ($C_{it}$), conditional on sector and location. Thus, the linearized quantity version of the value-added function includes a polynomial function of the output price and the unit cost to control for quality differences in output and capital. The polynomial function is indicated by $P(p_{it}, c_{it})$:

$$(y_{it} - p_{it}) - l_{it} = \omega_{it} + \beta_b^q b_{it} + \beta_l l_{it} + \beta_k (k_{it} - l_{it}) + \beta_{kk} (k_{it} - l_{it})^2 + \beta_{kb} [(k_{it} - l_{it}) b_{it}] + \mathbf{z}_{it} \boldsymbol{\beta}_{\mathbf{z}}^q + a_{it(r)}^q + \delta_{it(s)}^q + \mathrm{P}(p_{it}, c_{it}) + \varepsilon_{it}^q \quad (5)$$

In this regression we only have 'physical' effects of business practices as the estimated coefficient is the input-share weighted average of the capital and labour productivity effects $\beta_b^q \approx \pi\gamma_k + (1 - \pi)\gamma_l$. The coefficient on the interaction term between the capital–labour ratio and business practices is $\beta_{kb} = 2\beta_{kk}(\gamma_k - \gamma_l)$. Hence, from the regression parameters, we can identify the two productivity parameters: $\gamma_l = \beta_b^q - \beta_k\beta_{kb}/(2\beta_{kk})$ and $\gamma_k = \beta_b^q + (1 - \beta_k)\beta_{kb}/(2\beta_{kk})$. Clearly, the identification is only meaningful if $\beta_{kb}$ and $\beta_{kk}$ are significantly different from zero. The remaining parameters should be close to the parameters of Equation (4) if the input and output price biases are small.

We estimate the parameters of the two value-added functions by ordinary least squares (OLS) and using the proxy variable approach (Ackerberg et al. 2015). Thus, we assume the productivity process $\omega_{it}$ follows an exogenous stationary first-order Markov process and that the intermediate inputs and labour are flexible in the sense that the volumes of inputs are determined after the realization of the random productivity level in period $t$. Hence, the owner/manager is assumed to know $\omega_{it}$ when the decision about the volume of intermediate supplies and labour input is made, and the decision is assumed to be static, whereas capital may be determined according to a dynamic decision rule. These assumptions allow for non-parametric estimation of the productivity level based on time $t$ observations of the input variables, capital, labour, and intermediates. Subsequently, information about input decided at time $t - 1$ is used to purge the unobserved productivity shock (the innovation in $\omega_{it}$) that may be correlated with current material and labour inputs.[7]

Following the value-added function estimation, we further use the information about wages, unit costs, and output prices to estimate the impact of business practices on labour productivity, $\gamma_l$, using one of the first-order conditions for cost minimization (wages equal the marginal productivity of labour). For the CES function, the first-order condition is log-linear and can be formulated as

$$w_{it} - mc_{it} = \beta_w((y_{it} - p_{it}) - l_{it}) + \beta_{bl} b_{it} + \mathbf{z}_{it} \boldsymbol{\beta}_{\mathbf{z}}^w + a_{it(r)}^w + \delta_{it(s)}^w + \varepsilon_{it}^w \quad (6)$$

where $w_{it}$ is the log of the firm-specific average wage for production workers and $mc_{it}$ is the log of the marginal cost of production. We include firm- and owner-specific characteristics that may be correlated with business practices, as well as time-varying region/state and sector fixed effects as in the value-added regressions. The marginal cost of production can be estimated from the value-added function, but we use information from the survey to get as much independent variation as possible. Thus, we use the reported unit cost as a lower bound on the marginal cost and the output price as an upper bound.

The links between the regression parameters in Equation (6) and the value-added function parameters are $\beta_w = 1/\sigma$ and $\beta_{bl} = \gamma_l\ (\sigma - 1)/\sigma$. Hence, $\gamma_l = \beta_{bl}/(1 - 1/\beta_w)$. Thus, using the first-order condition, we are removing the possible impact of business practices on prices and capital.

[7] See Ackerberg et al. (2015) for details about the estimator.

In sum, we get an indication of the relative orders of magnitude of the association between business practices and firm productivity by comparing the estimated parameters from Equations (4), (5), and (6).

### 4.2 Workers' education and wages

Moving to the matched enterprise–employee data, we use the information about the educational level of the employee respondents to probe whether firms with higher business practice index are more likely to employ workers who are more educated. We use five education categories: no education, primary school, middle school, high school, and higher education (i.e. college and university education). We estimate the probabilities using a multinomial logit model where, in addition to firm-specific variables $\mathbf{z}_{it}$, $l_{it}$, we include worker-specific information $\mathbf{x}_{jit}$, such as gender, relation to the firm owner, marital status, and tenure in the firm. Moreover, we include region/state and sector fixed effects that vary over time. Thus, for worker $j$ working in firm $i$ at time $t$, the conditional probability that she or he has educational level $h$ is estimated from the multinomial model, in which we normalize on the largest educational group, which is workers with primary schooling:

$$P(education_{jit} = h \mid b_{it}, l_{it}, \mathbf{z}_{it}, \mathbf{x}_{jit}, location, sector, time) =$$
$$\frac{\exp(\lambda_{be,h} b_{it} + \lambda_{le,h} l_{it} + \mathbf{z}_{it}\boldsymbol{\lambda}_{ze,h} + \mathbf{x}_{jit}\boldsymbol{\lambda}_{xe,h} + \theta^{e}_{it(r),h} + \phi^{e}_{it(s),h})}{1 + \sum_{n=1}^{4} \exp(\lambda_{be,n} b_{it} + \lambda_{le,n} l_{it} + \mathbf{z}_{it}\boldsymbol{\lambda}_{ze,n} + \mathbf{x}_{jit}\boldsymbol{\lambda}_{xe,n} + \theta^{e}_{it(r),n} + \phi^{e}_{it(s),n})}, \quad h = 1,\ldots,4 \tag{7}$$

We report the estimated results as the partial effects of the regressors on the probability of an interviewed worker having a given education. Thus, for the business practices the estimated effects are estimates of the changes in the probabilities that the respondent has a given education. As there are only up to five workers from each firm, without strong additional assumptions, we cannot infer anything about the association between business practices and the educational distribution in the total workforce. However, since it is not possible to interview highly educated workers where none are employed, the estimated probabilities will give an indication of the association between business practices and the education of the workers in the firms even if the interviewed workers are not chosen at random among the workers in each firm.

Our final dimension in the analysis is a Mincer-type regression of the interviewed workers' wages. That is, we regress the log of the individual workers' wages on their experience, tenure, and educational level, the latter using the five education categories, and add the business practice index from the firm in which they are employed. Subsequently we expand the model by including sector indicators and firm-specific information. The regression model, which we estimate by OLS, is formulated as

$$\log(w_{jit}) = \lambda_{wb} b_{it} + \mathbf{x}_{jit}\boldsymbol{\lambda}_{wx} + \mathbf{z}_{it}\boldsymbol{\lambda}_{wz} + \theta^{w}_{it(r)} + \varphi^{w}_{it(s)} + \eta_{jit} \tag{8}$$

Here, the coefficient on the business practices measures the average wage premium for workers employed in firms that are applying the given share of business practices. As we condition on education and tenure in the regression, the estimated association with wages can be expected to measure either unmeasured worker abilities that the owner/manager is able to identify or an increased productivity originating from the workplace.

# 5 Results

## 5.1 Firm performance

We show the partial associations between business practices and firm characteristics in Table 3, in which we give means and standard deviations for a set of firm and owner/manager attributes grouped by the firms' applications of business practices.[8] Specifically, we have gathered the firm observations into five categories. Firms that do not apply any business practices make up the first category. Although applying no practices is the most common each year, as seen in Figure 1, the number of firm observations is larger in the second category in which we place all firm observations for which the owner or manager applies 1–5 practices. There are also relatively many firm observations in the third group (6–10 practices), while the two last groups, applying 11–15 and 16–20 practices, have relatively few firm observations, as can be noted from Figure 1. Table 3 illustrates that several of the firm and owner characteristics are significantly associated with the use of business practices.[9]

Table 3: Summary statistics for key firm variables, by business practice categories

| | Business practice categories | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| # practices | 0 | | 1–5 | | 6–10 | | 11–15 | | 16–20 | |
| Index range | 0.00 | | 0.05–0.25 | | 0.30–0.50 | | 0.55–0.75 | | 0.80–1.00 | |
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Employees* | 6.9 | 14.7 | 7.8 | 17.0 | 16.6 | 43.6 | 28.7 | 58.9 | 26.0 | 53.4 |
| Rev./empl. (mill. ky.) | 28.1 | 193.4 | 25.5 | 121.5 | 34.6 | 172.8 | 28.7 | 63.1 | 40.2 | 169.3 |
| VA/empl. (mill. ky.) | 5.9 | 15.5 | 7.7 | 53.4 | 11.1 | 53.2 | 9.4 | 41.4 | 8.9 | 53.9 |
| Interm./empl. (mill. ky.) | 35.6 | 102.9 | 27.6 | 60.3 | 30.2 | 53.9 | 25.7 | 57.7 | 26.4 | 44.7 |
| Assets/empl. (mill. ky.)* | 22.2 | 187.3 | 17.8 | 74.7 | 23.5 | 145.6 | 19.3 | 41.1 | 31.3 | 121.8 |
| Avg. production worker wage ('000 ky.)* | 148.2 | 83.6 | 149.0 | 62.2 | 161.2 | 69.6 | 161.9 | 54.4 | 171.5 | 114.1 |
| Firm age (years) | 17.6 | 13.2 | 17.6 | 13.1 | 17.3 | 11.9 | 18.2 | 12.3 | 19.0 | 13.3 |
| Family firm* | 0.31 | 0.46 | 0.32 | 0.47 | 0.28 | 0.45 | 0.21 | 0.41 | 0.20 | 0.40 |
| Informal firm* | 0.16 | 0.37 | 0.16 | 0.36 | 0.09 | 0.29 | 0.05 | 0.21 | 0.06 | 0.24 |
| No competitor* | 0.30 | 0.46 | 0.34 | 0.47 | 0.28 | 0.45 | 0.29 | 0.45 | 0.27 | 0.45 |
| Number of competitors* | 0.17 | 0.38 | 0.19 | 0.39 | 0.13 | 0.34 | 0.11 | 0.32 | 0.13 | 0.33 |
| Female owner* | 4.23 | 6.90 | 4.41 | 6.49 | 5.03 | 7.41 | 5.23 | 7.15 | 5.17 | 8.16 |
| No education* | 0.06 | 0.23 | 0.03 | 0.17 | 0.01 | 0.12 | 0.01 | 0.09 | 0.01 | 0.10 |
| Primary school* | 0.26 | 0.44 | 0.27 | 0.44 | 0.18 | 0.39 | 0.14 | 0.34 | 0.12 | 0.32 |
| Middle school* | 0.25 | 0.43 | 0.27 | 0.44 | 0.25 | 0.44 | 0.18 | 0.39 | 0.19 | 0.39 |
| High school* | 0.18 | 0.38 | 0.15 | 0.35 | 0.17 | 0.38 | 0.17 | 0.38 | 0.19 | 0.39 |
| Higher education* | 0.23 | 0.42 | 0.26 | 0.44 | 0.37 | 0.48 | 0.49 | 0.50 | 0.48 | 0.50 |
| Observations | 1,245 | | 1,432 | | 946 | | 614 | | 204 | |

Note: * indicates that the variable has a statistically significant association with business practice categories at the 5 per cent level (tested using either ANOVA, for continuous variables, or Pearson's chi-squared test of independence for categorical variables). All monetary values are in 2018 prices. We have used regional consumer price index deflators such that the values are deflated to 2018 prices for an average over the regions and states in Myanmar.

Source: authors' calculations based on Myanmar MSME data.

[8] All monetary values are in 2018 prices. We have used regional CPI deflators such that the values are deflated to 2018 prices for an average over the regions and states in Myanmar. In 2018, US$1 was around 1,430 kyat. Financial values (per employee) can be compared to the national minimum wage in 2018 of 4,800 kyat per day, which is approximately 1.5 million kyat per year.

[9] We test the hypotheses of independence using ANOVA for continuous and count variables (e.g. revenue and employment) and Pearson's $\chi^2$-test of independence for categorical variables (e.g. if the business is a family firm).

The first five rows in Table 3 give the key production and value-added function variables. As shown, larger firms tend to apply more business practices than smaller firms do and average wages for the firms' production workers are also positively correlated with business practices. In contrast, assets per employee (the capital–labour ratio) are negatively correlated with business practices, while neither revenue per employee, value-added per employee, nor input of intermediates per employee are partially associated with the use of business practices.

Looking at firm types, we find that both family firms and informal firms constitute larger shares of the firms with no or low application of the business practices compared to firms applying many practices. Moreover, relatively more of the firms applying no or few practices report to have no competitors. These results indicate that business practices may not be (perceived as) particularly useful for small firms with specialized (or niche) products.

Neither firm age nor the sex of the owner appear to be associated with the use of business practices. There is, however, a strong association between the educational level of the owner/manager and the use of the practices. In particular, half of the firm owners or managers applying at least half of the practices have a higher education, whereas less than one-quarter of the owners/managers who do not use any of the practices have a higher education.

Table 4: Sales and value-added function estimates of business practices and value added per worker

| Dependent variable (log) | Sales per employee, log | Value-based value added per employee, log | | | Quantity-based value added per employee, log | | |
|---|---|---|---|---|---|---|---|
| Estimator | OLS | OLS | ACF | ACF | OLS | ACF | ACF |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Business practices | 0.109*** | 0.118*** | 0.104*** | 0.106*** | 0.085*** | 0.089*** | 0.093** |
| | (0.020) | (0.024) | (0.032) | (0.029) | (0.020) | (0.037) | (0.038) |
| Employees, log | 0.013 | -0.019 | 0.064 | 0.074 | -0.004 | 0.097 | 0.094 |
| | (0.024) | (0.022) | (0.044) | (0.047) | (0.023) | (0.069) | (0.063) |
| Assets/empl., log | 0.226*** | 0.230*** | 0.299*** | 0.302*** | 0.240*** | 0.301*** | 0.301*** |
| | (0.014) | (0.014) | (0.020) | (0.025) | (0.015) | (0.024) | (0.025) |
| Intermediates/empl., log | 0.170*** | | | | | | |
| | (0.010) | | | | | | |
| Assets/empl., log sq. | | 0.016*** | 0.027*** | 0.026*** | 0.014*** | 0.028*** | 0.028*** |
| | | (0.005) | (0.007) | (0.007) | (0.005) | (0.008) | (0.008) |
| Assets/empl. x business practices | | 0.017 | 0.018 | | 0.017 | 0.010 | |
| | | (0.011) | (0.018) | | (0.012) | (0.017) | |
| $\sigma$ | 1 | 1.213† | 1.344† | 1.332† | 1.188† | 1.363† | 1.360† |
| | | (0.077) | (0.123) | (0.110) | (0.071) | (0.125) | (0.126) |
| $\gamma_l$ | | | | | -0.054 | 0.036 | |
| | | | | | (0.099) | (0.096) | |
| $\gamma_k$ | | | | | 0.524 | 0.214 | |
| | | | | | (0.318) | (0.221) | |
| Observations | 4,441 | 4,441 | 1,843 | 1,843 | 4,441 | 1,843 | 1,843 |

Note: firm and owner characteristics are included in all regressions. State/region and sector fixed effects, interacted with year fixed effects, are also included in all regressions. Robust standard errors in parentheses, clustered at the firm level. Regressions (2) and (4) are generalized method of moments (GMM) estimates based on the procedure described by Ackerberg et al. (2015), with standard errors based on 101 bootstrap replications. Statistical significance is indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. † indicates significantly different from 1 at $p < 0.05$.

Source: authors' calculations based on Myanmar MSME data.

Next, turning to the production/value-added function parameters and productivity estimates, Table 4 reports estimates of the central parameters from regressions with log sales and log value added as dependent variables. In all regressions we condition on the firm attributes described in

Table 3 and, as explained in Section 4, we further condition on state/region and sector fixed effects, both varying by year.[10] Regression (1), using the log of sales as the dependent variable, is presented to facilitate direct comparison with the results of Bloom et al. (2012a) and McKenzie and Woodruff (2017). We find that a one standard deviation (0.26) difference in application of business practices is associated with a 0.11 log-points (12 per cent) difference in sales. This is close to the finding of Bloom et al. (2012a), and about one-third of the difference of 35 per cent in sales in the sample of firms from McKenzie and Woodruff. Thus, we find much less use of business practices in Myanmar compared to the samples from McKenzie and Woodruff, and also a notably weaker association between business practices and sales.

Regressions (2) and (5) in Table 4 are OLS regressions of the value-added functions, while (3), (4), (6), and (7) are GMM regressions based on the procedure described by Ackerberg et al. (2015). The parameter estimates in all regressions indicate that we cannot reject the hypotheses of constant returns to scale, as the parameter estimate on labour is insignificant throughout. Further, comparing the estimated factor intensities in regression (2) vs (3) and (5) vs (6), respectively, we confirm the commonly found bias towards labour in the OLS regressions, as capital's share is just below one-third in regressions (3) and (6), while it is just below one-quarter in regressions (2) and (5). The estimates of the elasticity of substitution are all significantly larger than unity, leading us to reject the hypothesis of a Cobb–Douglas value-added function and allowing us to identify and estimate the impact of business practices on capital and labour productivity.

The estimated coefficient on the interaction term between the capital–labour ratio and business practices is insignificant in regressions in which it is included (regressions (2), (3), (5), and (6)). Thus, we cannot reject the hypothesis that the impacts are equal in size. We report estimates of the impacts in regressions (5) and (6) where the two coefficients are (formally) identified. As seen, we get very imprecise estimates, which is why we estimate the value-added functions under the restriction that the two effects are equal in regressions (4) and (7).

Based on the estimate in regression (4), the log-difference in productivity associated with a one standard deviation difference in application of business practices is 0.106. This point estimate is not statistically different from the association with sales. Moreover, as we find the capital and labour parameters to be very close in regressions (4) and (7), we consider the difference in the estimated coefficient on business practices to be an estimate of the price effect ($\hat{\gamma}_p = 0.106 - 0.090 = 0.016$). Thus, just below 2 percentage points, equivalent to 15 per cent of the total 'productivity' relationship between business practices and value-based value added may be attributed to price effects, while the remaining 85 per cent appears to be associated with factor productivity. Thus, the main part of the association between sales and business practices seems to be differences in productivity.

In Table 5 we report the results of the two regressions using the first-order condition for cost minimization (Equation (6)). In regression (1) we use the unit cost reported by the respondent as a proxy for the marginal cost, while we use the reported unit output price in regression (2). As seen, the results are very close. The estimated elasticity of substitution is 1.2 in both regressions, slightly lower than, but still in accordance with, the results in Table 4. The estimate of the labour-enhancing business practice productivity ($\gamma_l$) is around 0.25 log-points in the two regressions,

[10] The sector fixed effects are based on the Myanmar Standard Industrial Classification. We have firms in 23 different level 2 sectors. In addition, because of the large number of rice mills in the sample, these are gathered in their own sector. Thus, we have 24 sectors and 14 state/region categories each year. Myanmar has 14 regions and states and the Nay Pyi Taw Union Area. In the sampling of firms for the MEMS survey, Chin State and Rakhine State were joined to have a sufficient number of townships and firms in the random selection. We keep this stratification in the regression analyses because the cleaned data only include one firm from Chin State.

showing that a one standard deviation difference in application of business practices is associated with a 28–32 per cent difference in the productivity of labour inputs. This order of magnitude is around three times larger than the estimates based on the direct estimation of the value-added functions, but the standard errors of the estimates in Tables 4 and 5 are such that we cannot reject a hypothesis that the labour productivity association is equal in the two regression formulations. Thus, a difference of about 15–20 per cent in labour productivity associated with a one standard deviation difference in business practices may be a good estimate based on the two sets of regressions. This is substantial compared to the findings of Bloom et al. (2012a), but still lower than the estimates of McKenzie and Woodruff (2017).

Table 5: Estimated business practices associations based on first-order conditions

| Dependent variable | Wage/unit cost, log | Wage/output price, log |
|---|---|---|
| | (1) | (2) |
| Business practices | –0.063*** | –0.053*** |
| | (0.024) | (0.020) |
| Value added/empl., log | 0.816*** | 0.825*** |
| | (0.012) | (0.010) |
| $\sigma$ | 1.225† | 1.212† |
| | (0.018) | (0.015) |
| $\gamma_I$ | 0.282*** | 0.249*** |
| | (0.108) | (0.094) |
| $R^2$ | 0.786 | 0.847 |
| Observations | 4,433 | 4,433 |

Note: firm and owner characteristics are included in all regressions. State/region and sector fixed effects, interacted with year fixed effects, are also included in all regressions. Robust standard errors in parentheses, clustered at the firm level. Statistical significance is indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. † indicates significantly different from 1 at $p < 0.05$.

Source: authors' calculations based on Myanmar MSME data.

## 5.2 Workers' education and wages

Summary statistics of key variables for the interviewed employees are shown in Table 6, using the same structure as in Table 3. As mentioned, the information we have about the employees include their family relation to the firm owner, their gender, marital status, and education. We also know the total number of years they have worked as wageworkers prior to the employment at the current firm and the time they have been employed in the present firm.

Several of the worker attributes vary with the use of business practices. Specifically, family members are more frequently employed in firms that do not apply many practices, and this is also the case for married workers, although to a much lesser extent. In contrast, the share of female workers is higher in firms applying many practices. Workers with higher education are also relatively more frequent in firms that apply many practices. Several of these associations are probably largely driven by the correlation between business practices and firm size.

Table 6: Summary statistics for key employee variables, by business practice categories

| | Business practice categories | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| # practices | 0 | | 1–5 | | 6–10 | | 11–15 | | 16–20 | |
| Index range | 0.00 | | 0.05–0.25 | | 0.30–0.50 | | 0.55–0.75 | | 0.80–1.00 | |
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Family member* | 0.21 | 0.41 | 0.21 | 0.41 | 0.16 | 0.37 | 0.12 | 0.32 | 0.09 | 0.29 |
| Female worker* | 0.29 | 0.45 | 0.35 | 0.48 | 0.35 | 0.48 | 0.38 | 0.49 | 0.41 | 0.49 |
| Married* | 0.30 | 0.46 | 0.25 | 0.43 | 0.28 | 0.45 | 0.23 | 0.42 | 0.21 | 0.41 |
| Prior experience | 2.90 | 5.36 | 2.89 | 5.10 | 2.64 | 4.89 | 2.74 | 5.05 | 2.68 | 4.62 |
| Tenure* | 5.40 | 5.67 | 5.36 | 5.65 | 5.71 | 5.45 | 5.72 | 5.23 | 5.27 | 4.81 |
| No education* | 0.11 | 0.31 | 0.13 | 0.34 | 0.10 | 0.29 | 0.08 | 0.27 | 0.07 | 0.26 |
| Primary school* | 0.39 | 0.49 | 0.41 | 0.49 | 0.40 | 0.49 | 0.35 | 0.48 | 0.36 | 0.48 |
| Middle school* | 0.31 | 0.46 | 0.28 | 0.45 | 0.32 | 0.46 | 0.30 | 0.46 | 0.30 | 0.46 |
| High school* | 0.16 | 0.36 | 0.14 | 0.35 | 0.13 | 0.34 | 0.17 | 0.37 | 0.18 | 0.38 |
| Higher education* | 0.03 | 0.18 | 0.04 | 0.20 | 0.05 | 0.22 | 0.10 | 0.31 | 0.09 | 0.29 |
| Observations | 2,221 | | 2,823 | | 2,241 | | 1,667 | | 582 | |

Note: * indicates that the variable has a statistically significant association with business practice categories at the 5 per cent level.

Source: authors' calculations based on Myanmar MSME data.

Table 7 presents the results of a multinomial logit model by reporting the average partial effects of the explanatory variables on the probability that an interviewed worker has a given education. As we have no explicit economic model for the employees' educational level, the primary result is that application of business practices is positively associated with the educational level of the workers, confirming the findings of Bender et al. (2018).

Application of more business practices is associated with a lower probability of the interviewed worker having low education (no schooling or primary school only) and a higher probability of having higher education, conditional on firm size and the owner's education. However, the only strongly significant change in the probability is for higher education. In addition to the statistical significance, the effect size is large as a one standard deviation difference in business practices is associated with a 1.1 percentage point higher probability that the employee has a higher education. This is substantial, given that less than 6 per cent of the interviewed employees have this level of education.

Table 7 also shows that half of the interviewed workers have primary schooling or less (49 per cent), while the other half have middle school or above. When we combine the educational information into these two groups, a standard logit regression tells us that a one standard deviation difference in business practices is associated with a 1.5 percentage point difference in the probability of employing a worker with middle school education or above, in complete accord with the results in Table 7.

Table 7: Associations between firm and worker characteristics and workers' education: average partial effects

| Dependent variable | Employee's education | | | | |
|---|---|---|---|---|---|
| Category | No schooling | Primary school | Middle school | High school | Higher education |
| | (1) | (2) | (3) | (4) | (5) |
| Business practices | –0.003 | –0.013* | 0.005 | 0.001 | 0.011*** |
| | (0.005) | (0.007) | (0.006) | (0.005) | (0.003) |
| *Worker attributes* | | | | | |
| Prior experience | 0.004*** | 0.004*** | –0.003*** | –0.005*** | 0.000 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Tenure | 0.001 | 0.004*** | –0.002** | –0.002*** | –0.000 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Female worker | 0.019** | –0.033** | –0.027** | 0.012 | 0.030*** |
| | (0.009) | (0.015) | (0.014) | (0.011) | (0.007) |
| Family member | –0.057*** | –0.142*** | 0.038** | 0.074*** | 0.087*** |
| | (0.015) | (0.020) | (0.017) | (0.013) | (0.010) |
| Female x family | 0.016 | 0.095*** | –0.063** | –0.034 | –0.013 |
| | (0.020) | (0.032) | (0.030) | (0.022) | (0.012) |
| Married | 0.039*** | 0.039** | –0.021 | –0.045*** | –0.012* |
| | (0.009) | (0.016) | (0.016) | (0.015) | (0.007) |
| *Firm attributes* | | | | | |
| Employees, log | –0.015*** | –0.028*** | –0.006 | 0.027*** | 0.022*** |
| | (0.005) | (0.008) | (0.006) | (0.005) | (0.004) |
| No competitors | 0.014 | –0.034 | 0.030 | –0.016 | 0.006 |
| | (0.013) | (0.021) | (0.019) | (0.014) | (0.009) |
| # competitors, log | 0.007 | 0.007 | –0.008 | –0.010 | 0.004 |
| | (0.005) | (0.009) | (0.008) | (0.007) | (0.004) |
| Family firm | 0.056*** | 0.007 | –0.046*** | –0.014 | –0.002 |
| | (0.010) | (0.019) | (0.017) | (0.013) | (0.009) |
| Informal firm | 0.021 | –0.005 | –0.018 | 0.005 | –0.003 |
| | (0.015) | (0.024) | (0.022) | (0.016) | (0.014) |
| Firm age | 0.000 | –0.000 | 0.001 | –0.001* | 0.000 |
| | (0.000) | (0.001) | (0.000) | (0.000) | (0.000) |
| Female owner | 0.008 | –0.010 | 0.001 | –0.002 | 0.002 |
| | (0.009) | (0.015) | (0.013) | (0.010) | (0.007) |
| *Owner's education* | | | | | |
| Primary school | –0.061** | 0.013 | 0.074** | –0.037 | 0.010 |
| | (0.027) | (0.042) | (0.034) | (0.034) | (0.012) |
| Middle school | –0.091*** | –0.045 | 0.121*** | –0.003 | 0.017 |
| | (0.027) | (0.042) | (0.034) | (0.034) | (0.012) |
| High school | –0.081*** | –0.058 | 0.103*** | 0.007 | 0.030** |
| | (0.028) | (0.043) | (0.035) | (0.035) | (0.013) |
| Higher education | –0.087*** | –0.073* | 0.102*** | –0.004 | 0.062*** |
| | (0.027) | (0.042) | (0.034) | (0.034) | (0.013) |
| Other | –0.014 | –0.069 | 0.055 | –0.005 | 0.033 |
| | (0.042) | (0.061) | (0.049) | (0.046) | (0.023) |
| Predictive margins | 0.105 | 0.389 | 0.301 | 0.149 | 0.056 |
| Observations | 1,000 | 3,709 | 2,869 | 1,422 | 534 |

Note: all regressions include state/region and sector fixed effects and both are interacted with year fixed effects. Robust standard errors in parentheses, clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: authors' calculations based on Myanmar MSME data.

In Table 8, we move to employees' wages and estimate Mincer-type regressions, augmented with information about the business practices applied by the firm in which the workers are employed. Regression (1) is the standard human capital Mincer regression in which we only condition on the worker's education, experience, tenure, sex, marital status, and family relation with the firm owner. When adding the application of business practices to this set of controls, we find a difference in

wages of 0.037 log-points (3.8 per cent) associated with a one standard deviation difference in business practices. Adding sector fixed effects (varying by year) to control for differences in labour productivity and wages across sectors in regression (2), the difference increases slightly, to about 0.048 log-points (4.9 per cent). Finally, the 'return' drops to 4.4 per cent in regression (3), where we add controls for firm-specific attributes and the education of the owner/manager.[11] Thus, the three regressions show a very constant wage premium to employees working in firms applying good business practices.

Table 8: Business practices and employee wages

| Dependent variable | Real monthly wage (1,000 ky., 2018 prices) log | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Business practices | 0.037*** | 0.048*** | 0.043*** |
| | (0.007) | (0.007) | (0.007) |
| *Worker attributes* | | | |
| Primary school | 0.010 | 0.013 | 0.010 |
| | (0.018) | (0.018) | (0.018) |
| Middle school | 0.043** | 0.045** | 0.043** |
| | (0.019) | (0.019) | (0.019) |
| High school | 0.041* | 0.044** | 0.040** |
| | (0.021) | (0.020) | (0.020) |
| Higher education | 0.175*** | 0.185*** | 0.173*** |
| | (0.028) | (0.029) | (0.029) |
| Prior experience | 0.008*** | 0.007*** | 0.007*** |
| | (0.001) | (0.001) | (0.001) |
| Tenure | 0.022*** | 0.021*** | 0.022*** |
| | (0.003) | (0.002) | (0.002) |
| Tenure, sq./100 | –0.062*** | –0.056*** | –0.055*** |
| | (0.010) | (0.009) | (0.009) |
| Female worker | –0.262*** | –0.204*** | –0.204*** |
| | (0.015) | (0.015) | (0.014) |
| Family member | –0.109*** | –0.126*** | –0.118*** |
| | (0.018) | (0.018) | (0.018) |
| Female x family | 0.048 | 0.044 | 0.048 |
| | (0.031) | (0.030) | (0.031) |
| Married | 0.053*** | 0.058*** | 0.057*** |
| | (0.015) | (0.015) | (0.015) |
| Firm controls | No | No | Yes |
| Sector x year FE | No | Yes | Yes |
| State/region x year FE | Yes | Yes | Yes |
| $R^2$ | 0.259 | 0.301 | 0.305 |
| Observations | 9496 | 9496 | 9496 |

Note: robust standard errors in parentheses, clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: authors' calculations based on Myanmar MSME data.

If workers, on average, are paid in accordance with their marginal productivity, as assumed in the firm-level regressions, then the 4–5 per cent wage premium for working in a firm with a one standard deviation higher business practice is part of the labour productivity effect. As a 4 per cent wage premium is only about 20–26 per cent of the estimated labour productivity effect and about half of the total productivity effect estimated in Table 4, this is strong indirect support for the

[11] In many Mincer-type wage regressions, firm size is also added to control for higher productivity in larger firms. This is, however, not consistent with our estimated models of the value-added function.

hypothesis advocated by Bender et al. (2018) that a large fraction of the productivity difference associated with better business practices should be attributed to employment of more productive workers.

### 5.3 Specific business practice components

As noted in Section 3.1, the business practices are grouped in four categories: (1) marketing, (2) buying intermediate supplies, (3) record-keeping, and (4) financial planning. Anderson et al. (2018) find that owners and managers using marketing practices achieve higher profitability in a different way compared to those using more financial practices. In an experiment involving 852 small firms in South Africa, they find that firms receiving marketing skills training improved profitability through higher sales, larger stocks of material, and by hiring more employees. In contrast, firms receiving financial skills training increased profits by lowering their costs.

As we have no exogenous variation in the application of business practices, we resort to an analysis of the relative strength of the associations between the four sub-components and productivity as estimated from the value-added functions and the first-order condition. To take account of potential cross-component correlations we test the significance of the individual sub-components by adding them to the regression models that already include the business practice index. In this way, the coefficient on the added sub-component measures the change in the association if a firm switches from any of the other sub-components to apply the included component, keeping the total share of applied business practices constant. Table 9 gives the results for the value-added functions, while Table 10 shows the results for the first-order conditions. In Table 10, we present the estimated labour productivity estimates and not the regression parameters. Thus, the estimates in the two tables can be compared directly.

For financial planning, we find insignificant effects in all regression models. Thus for these components, we are unable to state whether they are better or worse than just picking a business practice at random. In contrast, applying (more) marketing practices at the cost of fewer of the other practices appears to weaken the link between business practices and productivity. These results appear to be in direct contrast with the results of Anderson et al. (2018), and they may be worth exploring further.

Record-keeping appears to be the most important sub-component as a change involving more of these activities is associated with a significantly stronger link when evaluated from the value-based value-added regression and the first-order condition using the unit price as the proxy for marginal costs. In the other two regressions, the change towards record-keeping activities is also positive but it is not statistically significant.

Table 9: Associations with the business practice sub-components: value-added function estimates

| Dep. variable | Value-based value added per employee | | | | Quantity-based value added per employee | | | |
|---|---|---|---|---|---|---|---|---|
| Sub-component | Marketing | Buying | Record-keeping | Financial planning | Marketing | Buying | Record-keeping | Financial planning |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Business practices | 0.132*** | 0.098*** | 0.022 | 0.065* | 0.103*** | 0.084*** | 0.055 | 0.080** |
| | (0.025) | (0.023) | (0.035) | (0.036) | (0.026) | (0.023) | (0.035) | (0.036) |
| Sub-component | –0.159** | –0.064 | 0.208** | 0.084 | –0.071 | 0.011 | 0.089 | 0.017 |
| | (0.070) | (0.117) | (0.086) | (0.097) | (0.072) | (0.120) | (0.086) | (0.097) |
| Observations | 4,441 | 4,441 | 4,441 | 4,441 | 4,441 | 4,441 | 4,441 | 4,441 |

Note: all regression use OLS. The regressions include controls as in the matching regressions in Table 4. Robust standard errors, clustered at the firm level, in parentheses. Statistical significance is indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: authors' calculations based on Myanmar MSME data.

Table 10: Associations with the business practice sub-components (first-order conditions estimates)

| Dep. variable | Wage/unit cost, log | | | | Wage/output price, log | | | |
|---|---|---|---|---|---|---|---|---|
| Sub-component | Marketing | Buying | Record-keeping | Financial planning | Marketing | Buying | Record-keeping | Financial planning |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Business | 0.444*** | 0.178 | 0.021 | 0.413** | 0.408*** | 0.197* | –0.099 | 0.374** |
| practices | (0.143) | (0.128) | (0.195) | (0.210) | (0.132) | (0.112) | (0.168) | (0.176) |
| Sub-component | –0.661* | 1.085* | 0.760 | –0.412 | –0.652** | 0.543 | 1.013** | –0.396 |
| | (0.387) | (0.649) | (0.477) | (0.548) | (0.345) | (0.562) | (0.432) | (0.470) |
| Observations | 4,433 | 4,433 | 4,433 | 4,433 | 4,433 | 4,433 | 4,433 | 4,433 |

Note: the regressions include controls as in the matching regressions in Table 5. Robust standard errors, clustered at the firm level, in parentheses. Statistical significance is indicated by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: authors' calculations based on Myanmar MSME data.

With these results in mind, the information in Table 2 may be easier to understand. The application of marketing practices decreased dramatically from 2017 to 2019 alongside buying intermediate supplies. In contrast, financial planning increased slightly while record-keeping was almost constant. Thus, firm owners and managers in Myanmar may be learning the effect of business practices by experimenting on their own, and this may explain the instability in the application of the individual business practices.

## 6 Discussion and conclusion

MSMEs are often seen as the engine for inclusive economic growth and development in emerging economies. Therefore, substantial efforts have gone into understanding and promoting survival and growth of MSMEs in the manufacturing sector in almost all countries across the globe. Both research and policies have mainly concentrated on external constraints such as the investment climate, credit, infrastructure, and institutions. However, a parallel literature has stressed the importance of internal factors, including entrepreneurial abilities, management, and business practices. Understanding the influence of business practices on firm performance is important because such practices can be taught and learned, thereby providing an opportunity for governments to directly support MSMEs through business training.

To increase our understanding of the use and importance of business practices in a setting with a severely constrained and underdeveloped private sector, we look at firms in the manufacturing sector in Myanmar. In contrast to earlier studies of business practices, the firms are sampled from nationally representative surveys. Using closed-end questions developed by McKenzie and Woodruff (2017), the Myanmar surveys have information about the firms' business practices in the form of 20 activities that are relevant for MSMEs.

We use information from 2,598 enterprises interviewed in 2017 and/or 2019, for which 70 per cent of the firms were interviewed in both years. On average, the sampled firms apply 26 per cent of the 20 business practices, while a large fraction (28 per cent) of the firms do not perform any of the business practices in either 2017 or 2019. Moreover, the use of the practices is very volatile over time, as illustrated by the auto-correlation in the business practice index of only 0.19. This demonstrates that the sampled firms in Myanmar are very different from firms included in other studies of business practices.

Still, in line with results of other studies, application of the business practices appears to be valuable. A one standard deviation difference in the business practice index—equal to an increase

from applying none to applying slightly more than five of the practices—is associated with a difference in sales per employee of 11 per cent.

Our study disentangles this effect on sales into price and productivity effects by estimating CES value-added functions. We find the price link to be just below 2 percentage points, which is modest, while the stronger association is between business practices and productivity. We estimate the association with labour productivity both directly from the CES value-added function and from a first-order condition for cost minimization, and find a one standard deviation difference in the business practice index to be associated with a 10–25 per cent difference in labour productivity.

We corroborate the link between business practices and labour productivity when we estimate Mincer-type regressions of individual workers' wages and include the business practice score for the enterprise in which they are employed. The Mincer regressions show that a one standard deviation difference in the business practice index is associated with a 4–5 per cent difference in wages. This is about 20–50 per cent of the difference in productivity estimated from the firm data. Thus, firms with better business practices have higher labour productivity in large part through employment of more productive (more educated) workers.

Overall, our findings point to business practices as an important driver of firm performance, over and above the level of education among the managers and workers of the enterprise. Given the strong association with labour productivity, MSMEs in Myanmar could find in improved business practices an important alley for strengthening their performance, and the government may support the process by developing appropriate small-business training. However, as up to half of the productivity effect is through employment of more productive workers, it may take time before the total impact of improved business practices manifests itself in firm performance. Moreover, business training should be accompanied by labour market initiatives aimed at improving productive matches of employers and employees.

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