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WIDER Working Paper 2019/20

## **Managerial attributes and enterprise access to formal credit in Myanmar**

Henrik Hansen, John Rand, Finn Tarp, and Neda Trifkovic\*

March 2019

**Abstract:** Using data from a new survey of small and medium-sized enterprises in Myanmar, we analyse enterprise demand for formal credit and the extent to which they are constrained in the formal credit market. We account for firms self-selecting out of the credit market in Myanmar. Our data contain information about individual firm owner/manager gender, managerial capacity, and attitude towards risk. We use this information to test whether the allocation of scarce loanable funds is systematically associated with these attributes. It emerges that managerial capacity and risk attitudes are positively associated with the probability of firms demanding credit, while firms with female owner/managers have lower probabilities of demanding credit. On the supply side we find no discernible links to any of the three traits, whereas firm's size and age have substantial impacts on the probability of obtaining credit. As such, the allocation of credit could improve if banks were better at identifying managers' managerial capacity and personality traits.

**Keywords:** formal credit, gender, managerial capabilities, Myanmar, personality traits

**JEL classification:** G21, L25, L26, O16, O17

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# 1 Introduction

In this paper, we analyse the the importance of owner/manager attributes for enterprise debt demand and credit constraints. These attributes are arguably exogenous to the functioning of the credit system and they have been shown to be related to firm-level productivity. We use data from the Myanmar Enterprise Monitoring System (MEMS), which has newly developed information on owner/manager attributes. Specifically, we have information about managerial capacities (McKenzie and Woodruff 2017) and attitudes towards risk (Dohmen et al. 2011).

McKenzie and Woodruff (2017) find a positive relationship between owner/manager capacity and the ease with which firm owners/managers learn and adopt good business practices, and they show that the implementation of business practices—related to financial planning, marketing, and record keeping—increase firm-level productivity. However, their study does not say much about the mechanisms linking managerial abilities and firm productivity. An obvious channel could be through easing the access to capital. Bruhn et al. (2018) show that managerial capabilities are important for firm performance and they stress that there is a need for uncovering the mechanisms through which managerial skills influence firm performance across risk-taking abilities.

While managerial characteristics can be observed through the actual management and business practices, this does not necessarily reveal all relevant information about inherent talent and entrepreneurial traits. Bandiera et al. (2017) document that owner/manager behaviour and management practices are correlated, and that they are likely to influence aspects of doing business, such as credit demand, in different ways. Moreover, differences in risk preferences have been linked to both credit demand and firm performance (Cramer et al. 2002). Following Dohmen et al. (2011), we use questions about risk attitudes and create an index measuring firm owner/manager attitudes towards risk. Experimental evidence has validated such a risk scale by showing that the index is capable of predicting differences in investment choices fairly well (Dohmen et al. 2011).

We conceive the gender of the firm owner/manager as a third potentially important attribute affecting debt demand and credit constraints. This is motivated by Niederle and Vesterlund (2007), who show how gender differences in confidence and preferences for performing in competitions affect manager decisions, conditional on ability and risk preferences.

We estimate a simultaneous model of debt demand and credit constraints. Following Bigsten et al. (2003), who initiated the direct approach to firms' access to credit, we argue that a model describing the attributes of credit-constrained firms must be estimated jointly with a model of debt demand. Limited credit may lead firms into a mode of self-selection, depressing debt demand. Thus, as a firm can only be credit constrained if it has debt demand, we condition the credit restriction outcome on the probability of a firm having a debt demand when assessing the extent to which formal banks in Myanmar use (aspects of) managerial capabilities and traits in their decisions to grant loans to manufacturing firms.

A central aspect of our empirical results is in line with findings from other developing countries with thin credit markets: bank funds are allocated to larger and older firms. For Myanmar, this probably reflects the excessive collateral requirements in a financial system with heavy regulation, including strict bounds on interest rates.

Our main findings are that firms with high-capacity managers and firms with less risk-averse managers have relatively higher credit demand, while female-run firms have relatively lower

demand. Moreover, conditional on demand, formal bank decisions to grant credit seem to have no systematic association with the three manager attributes. Hence, it appears that formal banks in Myanmar use quite limited information about firm managers in their assessment of loan applications. As such, business training programmes for managers of small and medium enterprises (SMEs) in Myanmar should be accompanied by training programmes for credit providers and revised financial sector regulation, assuming the aim is to maximize the growth potential of the SME sector.

The paper is structured as follows. In Section 2 we give a brief overview of the formal financial sector in Myanmar and report on earlier findings of credit scarcity in the manufacturing sector. In Section 3 we describe the current status of manufacturing firms with regard to formal credit as it emerges from the MEMS survey. In addition, we demonstrate a strong link between the two firm owner/manager traits, managerial capacity and attitudes towards risk, and the propensity to invest and innovate, which is *not* accompanied by strong associations from the traits to access to formal finance. Subsequently, in Section 4 we formulate and estimate the model of debt demand and credit constraints, again focusing on the influence of owner/manager traits on debt demand and credit constraints. The paper ends with a brief conclusion in Section 5.

## 2 Enterprise access to finance in Myanmar

The formal financial sector in Myanmar has historically been highly restricted and it remains among the most regulated in the world. Following the general elections in 2010, a reform process has begun, which includes economic reforms and financial liberalization (Win 2018). Even though there have been some improvements, especially under the 2016 Myanmar Financial Institutions Law, the financial sector in Myanmar continues as one of the most underdeveloped in the ASEAN region (Chassat and Foerster 2016; Schellhase and Sun 2017). In the 2018 *Doing Business* report (World Bank 2018) Myanmar ranked among the lowest in Asia by all indicators in the ‘Getting Credit’ section. Fixed interest rate spreads, strict collateral requirements and complex application procedures in combination with financial illiteracy and the low quality of loan applications, as well as liquidity problems of banks, seem to be the most crucial constraints to financial and SME development in the country.

Myanmar has four dominant state-owned banks.<sup>1</sup> In recent years their dominance has declined. Their share of total banking assets decreased from 67 per cent in 2013 to 46 per cent in 2016, while their share of total domestic banking deposits decreased from 50 to 36 per cent, and the share of total domestic banking loans from 43 to 18 per cent (Chassat and Foerster 2016). Deposit and loan activities are now also undertaken by Myanmar’s 24 domestic private banks and 13 foreign banks. The domestic private bank sector is dominated by three major banks.<sup>2</sup>

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<sup>1</sup>The Myanmar Economic Bank (MEB) and the Myanmar Agricultural Development Bank (MADB), established in 1954 and 1953, respectively, and the Myanmar Investment and Commercial Bank (MICB) and Myanmar Foreign Trade Bank (MFTB), both established in 1990 under the first Financial Institutions Law (Chassat and Foerster 2016). Besides providing services for the commercial domestic sector, MICB and MFTB are important in the foreign exchange market. MEB plays an important role in the interbank market and is the financier of many state-owned enterprises. MADB is the largest provider of loans to farmers and also the largest provider of loans in terms of the number of clients. However, until recently, MADB’s services were limited to certain crops and included only cultivation, excluding all other steps in the agricultural value chain (Schellhase and Sun 2017; World Bank 2015).

<sup>2</sup>The Kanbawza Bank, the Ayeyarwady Bank, and the Co-operative Bank. The Kanbawza Bank is by far the biggest (Schellhase and Sun 2017).

Together, these three banks hold about two-thirds of all loans and deposits and more than half of all bank branches in the country (Schellhase and Sun 2017). Lack of competition in the formal financial sector therefore remains a serious concern (Chassat and Foerster 2016; Waldschmidt and Scheck 2016).

Despite a large increase in banking assets between 2012 and 2016 (120 per cent according to Schellhase and Sun (2017)), access to finance is generally considered as the major constraint to business development by enterprises, banks, and politicians in Myanmar (World Bank 2015). Fifty-four percent of Myanmar's SMEs report that they have unmet financial needs (Bernhardt et al. 2017) and the majority of loanable funds is handed out to a segment of large borrowers with high amounts of collateral, concentrated in urban areas (Annamalai 2017). As a result, the share of SMEs involved with the formal financial system is limited (Annamalai 2017; World Bank 2015). Many small enterprises therefore depend on other sources of finance.

In the city of Yangon it is estimated that only 14 per cent of the SMEs obtained a formal loan while 23 per cent got an informal loan in the period 2012–14 (Kapteyn and Wah 2016). The latter comes with considerable costs as interest rates on informal loans are on average 39 per cent per year compared to 8.5–13 per cent for formal loans. Moreover, loan amounts offered in the informal sector are on average only one-third of those offered by formal financial institutions (Kapteyn and Wah 2016). Consequently, a significant proportion of SMEs in Yangon rely on retained earnings for financing working capital and new investments. Kapteyn and Wah (2016) find that 89 per cent of the SMEs use personal or family savings as start-up capital, and 52 per cent use them for business operations and expansion.

Several reasons for the general lack of loanable funds available to SMEs have been highlighted in the literature. One problem is the general lack of financial depth (Waldschmidt and Scheck 2016). Interest rates are regulated, currently with a minimum deposit interest rate requirement of 8 per cent and a maximum loan interest rate of 13 per cent. The result is that banks focus on fewer and larger customers rather than smaller firms to reduce operational costs (Waldschmidt and Scheck 2016). Accordingly, SMEs (often with rather risky business profiles) have difficulties in obtaining loans from the formal banking system. Many private financial institutions are aware of the growth potential of smaller firms and have started to focus on financial products designed for SMEs. However, due to the regulatory environment, these products do not really differ from regular financial products and do not meet the needs of SMEs in terms of interest rates, maturity, and collateral requirements (Waldschmidt and Scheck 2016: 77).<sup>3</sup>

While the terms of the formal loans are relatively favourable, the application process is both complex and demanding. First, enterprises need to apply at the Central Department of Small and Medium Enterprises Development (CDSMED). The CDSMED checks the application and,

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<sup>3</sup>Currently, the main provider of SME loans is the Small and Medium Industrial Development Bank (SMIDB; Chan Mya Htwe 2017). The SMIDB is mandated to promote SME development, and it receives loans at lower interest rates from state-owned banks, especially from MEB (SMIDB 2018). To qualify for a loan from SMIDB, enterprises must have at least three years of business experience (Htin Lynn Aung 2018a). SMIDB works together with international development agencies, which provide large amounts of SME loans (Ei Shwe Sin Tun 2016; Htin Lynn Aung 2017a; Thiha Ko Ko 2018). From 2015 to 2017, the total loan volume from, for example, the Japan International Cooperation Agency (JICA) to SMEs was about 60 billion Kyat, of which the largest share (about 25 per cent) was allocated via SMIDB (Thiha Ko Ko 2018). Those state or overseas development assistance (ODA) subsidized SME loans come with an interest rate of 8.5 per cent, compared to the usual 13 per cent (Ei Shwe Sin Tun 2016; Thiha Ko Ko 2018). SMIDB loans have longer maturity periods (3–5 years) compared to regular bank loans (normally only one year), even though the legally imposed one-year cap on maturity has been lifted (Schellhase and Sun 2017).

if approved, sends a recommendation to the SMIDB, where the enterprise then officially must apply for the loan (CDSMED 2018). Further, the enterprise must be an SME member of the Republic of the Union of Myanmar Federation of Chambers of Commerce and Industry (Htin Lynn Aung 2018a).<sup>4</sup> The application procedure and a generally low level of knowledge about access to finance serve as barriers to loans. In 2014, 41 per cent of SMEs in Yangon that did not apply for loans stated ‘that they did not understand or were not familiar with the procedures for bank loans, or bank loan procedures were lengthy and complicated, or both’ (Kapteyn and Wah 2016). Banking officials say that ‘the lack of proper accounts, financial statements and a solid business plan are the main reasons for denying applications’ (Htin Lynn Aung 2018b).

Another major constraint is the strict collateral requirements. Banks are in general only allowed to grant fully secured loans with hard collateral, such as land and buildings (Waldschmidt and Scheck 2016). While the value of the collateral has to be at least twice the loan size (Win 2018), the requested collateral usually exceeds the loan amount by more than this. Kapteyn and Wah (2016) find the average collateral to be more than five times as valuable as the loans for SMEs in Yangon. The high collateral requirements are difficult to fulfil for many SMEs, and 19 per cent of the enterprises in Yangon that did not apply for loans between 2012 and 2014 state that the strict collateral requirement was the reason (Kapteyn and Wah 2016). Banks themselves perceive these requirements as a major constraint, and they report that the approved amount of credit usually depends on the collateral value rather than on the financial needs and the risk profile of the client (Waldschmidt and Scheck 2016). Acknowledging this constraint, a credit guarantee insurance (CGI) was introduced in 2014, designed to reimburse lenders to SMEs about 50 per cent of the loan in the event of default. However, only very few SMEs made use of this scheme as banks have been reluctant to approve CGI-backed loans due to lack of trust in the project’s underlying institutional conditions.

Since the Microfinance Business Law of 2011, microfinance has become the largest provider of credit to poor people and micro-firm start-ups in terms of number of clients with access to regulated and unsecured financial services (Myint Kyaw 2016). Micro-credits are explicitly not allowed to require collateral, and annual interest rates are capped at 30 per cent (Myint Kyaw 2016). However, when it comes to funding for microfinance institutions themselves, regulation requirements are basically the same as for banks. They therefore rely mostly on funds obtained from the MEB and the Myanmar Microfinance Bank. Consequently, smaller microfinance institutions exhibit the same lack of loanable funds access as the traditional banking system (Myint Kyaw 2016).

### **3 Credit, managerial capital, and personality traits**

The strict collateral requirements and complex application procedures in combination with financial illiteracy and the low quality of loan applications alluded to above accentuate the importance of managerial capacity in SMEs when they interact with the formal financial sector.

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<sup>4</sup>The required documents for obtaining a SMIDB loan are (1) a loan application form, including a detailed plan for the use of the loan; (2) a copy of one’s National Registration Card and a copy of the household registration of the owner; (3) a copy of the municipal business licence and copies of other relevant ministry licences (if available); (4) the SME membership card; (5) financial statements for the last three years; (6) receipts of revenue tax for the last three years; (7) receipts for the municipal fee or electricity fee for the last month; and (8) various documents concerning the ownership of properties (grant forms 105, 106, and 107, land ownership affidavits, and photos of the building and business).

We therefore take a closer look at managerial capacity and attitudes towards risk at the firm level and their associations with demand for and access to formal credit using a nationally representative manufacturing enterprise survey, MEMS. The MEMS survey interviewed manufacturing enterprises in the spring and summer of 2017, and it covers both formal and informal enterprises. It is designed to be representative at the state/region level of Myanmar for formal enterprises. While no such claim can be made for the informal firms, their inclusion yields valuable insights.<sup>5</sup>

The distinction between formal and informal enterprises may be important when looking at credit demand and access. Informal firms are not eligible for formal loans in the company name, but they may obtain formal financing based on personal wealth records or through micro-credit, which does not require collateral. Accordingly, we report our results for the population of formal firms and for the sample of both formal and informal firms.

### 3.1 Credit demand and credit-constrained firms

Firm-level credit constraints have been analysed intensively in both developed and developing countries. Still, studies differ in the way they approach the data. Beck and Demirgüç-Kunt (2006), for example, use a perception-based approach in which firms are asked whether they perceive themselves as financially constrained and if this is creating an obstacle to their growth. In Myanmar, 33 per cent [95 percent CI: 28–39] of the formal manufacturing firms report being credit constrained by this definition. In contrast, Hansen and Rand (2014a, 2014b) argue that perceptions about being financially constrained do not imply that the firms are in fact credit constrained.

Boulier and Goldfarb (1998) reason that survey data information can be ranked and they note that the most reliable information is obtained through simple direct questions that are related to an action taken in relation to a given activity and easily verifiable through a third party. Following this approach in the context of identifying credit constraints, we rank a question such as ‘Has your firm during the past two years applied for a bank loan?’ as more reliable than perception-based questions such as ‘Do you think that the access to credit present any obstacle to the current operations of your establishment?’.

Another problem encountered when using broad perception-based questions is that firms that report they perceive themselves as financially constrained may actually not demand credit. We argue that such firms are not credit constrained in a classical sense. Here, we follow the method first formulated by Bigsten et al. (2003) and subsequently used in other country settings by, for example, Rand (2007), Byiers et al. (2010), and Hansen and Rand (2014a, 2014b), and address this issue by first identifying firms with demand for credit and, subsequently, conditional on credit demand, we identify credit-constrained firms.<sup>6</sup>

Table 1 classifies all firms in the sample according to their loan status vis-à-vis the formal financial sector. Following the Boulier and Goldfarb (1998) reliability criterion, we use two questions to distinguish between firms with and without credit demand: (1) ‘no need for a loan’ and (2) ‘do not want to incur debt’. Only 8 per cent of the firms in the sample applied

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<sup>5</sup>The survey design is described in Appendix A.

<sup>6</sup>Other studies distinguish between firms that use formal financial services and those that do not. See, *inter alia*, Aterido et al. (2013) and Chaudhuri et al. (2018). See Hansen and Rand (2014a) for a comparison of the three approaches.



Table 1: The number and share of firms with formal credit demand and restrictions

	Yes		No	
Applied for a loan	204 (8) [11]		2,292 (92) [89]	
Problems getting the loan	Yes 54 (26) [23]	No 150 (74) [77]		
Rationed	Yes 150 (100) [100]	No 0 (0) [0]	<i>Reason for not applying:</i> No need for a loan 465 (20) [20] Application procedures too complex 415 (18) [18]	
<i>Reason for problem</i>			Interest rates too high 65 (3) [3] Collateral requirements unattainable 193 (8) [8] Do not want to incur debt 923 (40) [42] Already heavily indebted 33 (1) [1] Other 198 (9) [8]	
Collateral/co-signers unacceptable	6 11 [14]			
Insufficient business description	3 6 [5]			
Complicated regulations	27 50 [55]			
Incomplete loan application	4 7 [6]			
Other	14 26 [19]			
Currently has formal debt	Yes 7 (13)	No 47 (87)	Yes 61 (3)	No 2,231 (97)
Currently has informal debt	Yes 6 (11)	No 48 (89)	Yes 137 (6)	No 2,155 (94)

Note: unweighted percentages in parentheses, weighted in brackets.

Source: authors' calculations based on MEMS.

for a formal loan in 2015–16, corresponding to an estimated 11 per cent (95 percent CI: 8–13) of all registered manufacturing firms in Myanmar. Around 62 per cent of the firms that did not apply for a formal bank loan had no debt demand. Combined with information on each firm’s current debt situation, we thus estimate that only 59 per cent of registered firms ((95 per cent CI: 53–66), 57 per cent of the total sample) had credit demand.<sup>7</sup>

We classify a firm as credit constrained if it applied for and was denied credit or did not apply for credit due to reasons such as ‘application procedures too complex’, ‘collateral requirements unattainable’, or ‘possible loan size and maturity insufficient’. Firms not applying for a loan and responding ‘interest rates too high’ or ‘did not think it would be approved’ as reasons for not applying are also classified as being credit constrained as these answers may reflect that the investment project applied for is not competitive at current interest rates. Based on this classification, we estimate that 35 per cent (95 per cent CI: 31–40) of the registered SMEs in Myanmar are credit constrained. When including the informal firms we estimate that 37 per cent of the firms in our sample are credit constrained.

Very few firms rely on informal loans as a substitute for lack of access to formal financing. While 7 per cent of the firms in the sample have formal loans, only 6 per cent have informal loans (see Table A in Appendix B). Furthermore, loans from formal financial institutions are much larger, much cheaper, and have longer maturities than loans obtained informally (see Table B in Appendix B). As expected, given the institutional settings, collateral is generally required for formal loans.

### **3.2 Managerial capabilities**

Following McKenzie and Woodruff (2015), we have constructed a managerial capacity index (MCI) based on 20 detailed questions about business practices related to (1) marketing, (2) stock and buying control, (3) record keeping, and (4) financial planning. The index takes values from 0 to 20, zero being very low managerial capacity and 20 being excellent capacity.

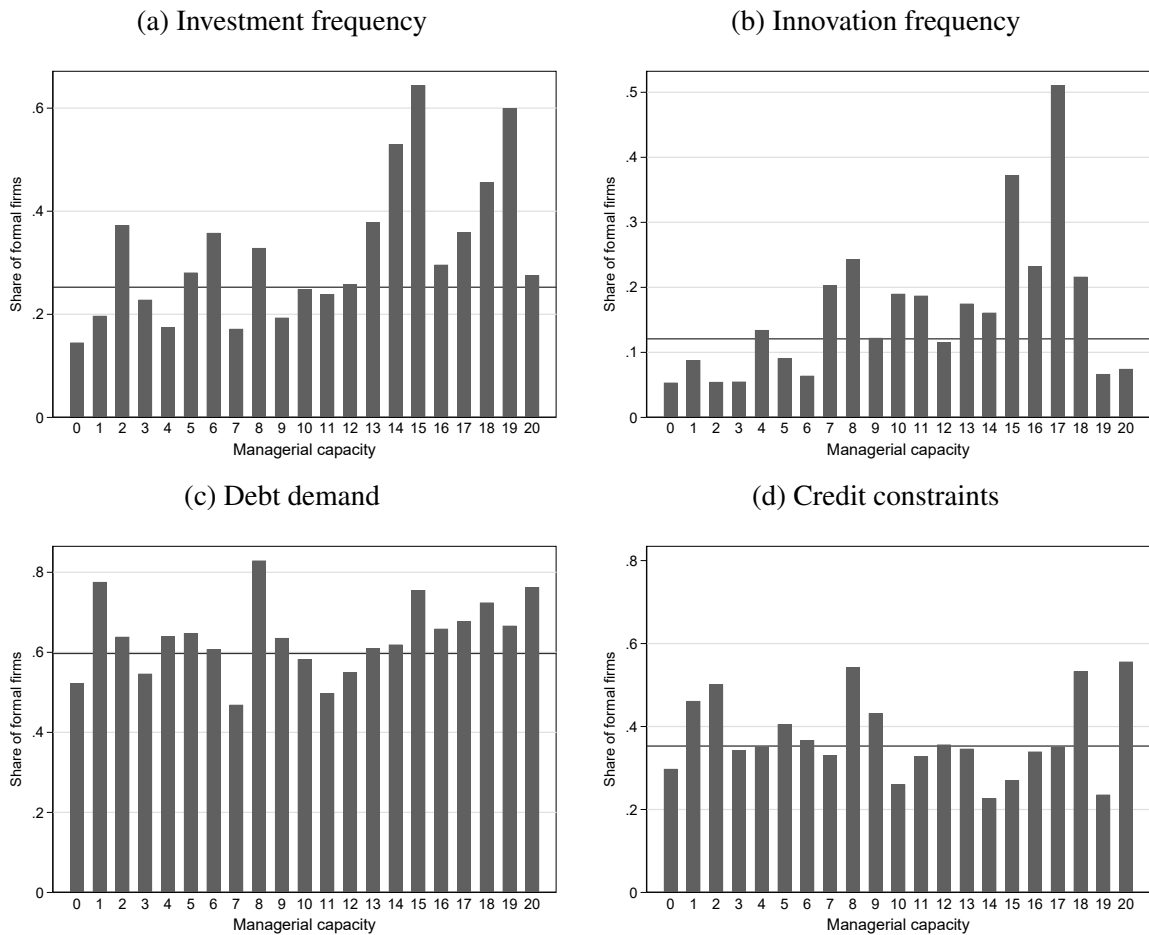
In Figure 1, Panels (a) and (b), we illustrate how the MCI is associated with both investment and innovation. The frequencies reported are based on questions asking whether the firm made investments in 2015 or 2016 (Panel a) or innovated in the sense of having made new or improved existing products or changed specification in the last two years (Panel b). Clearly, a larger fraction of the firms run by owner/managers who scored high on the MCI made investments and (at a much lower rate) more of such firms innovated in the two-year period. Thus, we would argue that McKenzie and Woodruff’s managerial index also captures managerial capacity in Myanmar.

Panels (c) and (d) in Figure 1 show how the proportions of firms with debt demand and credit constraints vary across the index of managerial capacity, while Table 2 reports average levels of the index across firms with and without credit demand and constraints for the population of formal firms and for all firms in our sample. While there is a (weak) tendency for firms with higher managerial capacity to be more likely to demand debt, the average level of managerial

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<sup>7</sup>Firms that applied for a loan are classified as having debt demand. To these we add firms for which balance sheet information shows positive debt holdings, formal as well as informal. Moreover, for firms with incomplete and/or inconsistent balance sheet information, we rely on information about whether firms report having debts larger than current annual revenues. Such firms are also classified as having debt demand. Finally, firms that did not apply for a loan while at the same time not answering ‘do not want to incur debt’ and ‘do not need a loan’ are classified as having debt demand.

Figure 1: Central firm variables by owner/manager’s managerial capacity



Note: population estimates for formal firms. The vertical lines indicate the estimated overall frequencies.  
 Source: authors’ calculations based on MEMS.

capacity is not significantly larger for firms with debt demand compared to firms without for the group of formal firms (Table 2). When informal firms are included, we do find a positive link, though.<sup>8</sup>

The link between credit constraints and managerial capacity also appears weak. This is mainly because the group of firms with the highest recorded managerial capacity is also the group with the highest proportion of credit-constrained firms, while the large group of firms with the lowest recorded capacity have a clearly below-average proportion of credit-constrained firms (Figure 1d). Still, based on Figure 1d there may well be a tendency for firms run by owners/managers with good managerial capacity (say, MCI values in the upper half of the scale) to be less likely to be credit constrained.

### 3.3 Risk attitudes

Managerial characteristics can be observed through the actual management and business practices (illustrated by the MCI). However, this does not necessarily reveal all dimensions related to inherent talent and entrepreneurial traits. Bandiera et al. (2017) document that owner/manager

<sup>8</sup>Figures showing results for all firms are in Appendix B.

Table 2: Means of the managerial capacity and risk attitude indices by financial category

	Formal firms				All firms		
	<i>n</i>	<i>N</i>	Mean MCI	Mean RAI	<i>n</i>	Mean MCI	Mean RAI
All	2,116	71,226	5.946	16.686	2,496	5.747	16.627
Have debt demand	1,208	42,528	6.240	17.155*	1,439	6.187*	17.280*
No debt demand	908	28,697	5.511	15.991*	1,057	5.147*	15.739*
Credit constrained	749	25,135	6.046	17.019	925	5.941	17.257*
Not constrained	1,367	46,091	5.892	16.505	1,571	5.633	16.257*

Note: *n* is the sample size, *N* is the estimated number of firms in the population. An asterisk indicates significant group differences at the 5 per cent level.

Source: authors' calculations based on MEMS.

behaviour and management practices are correlated, and that they are likely to influence aspects of doing business such as credit demand in different ways. Moreover, differences in risk preferences have been linked to both credit demand and firm performance (Cramer et al. 2002), and Niederle and Vesterlund (2007) show that gender differences in risk preferences exist that may influence both debt demand and credit constraints.

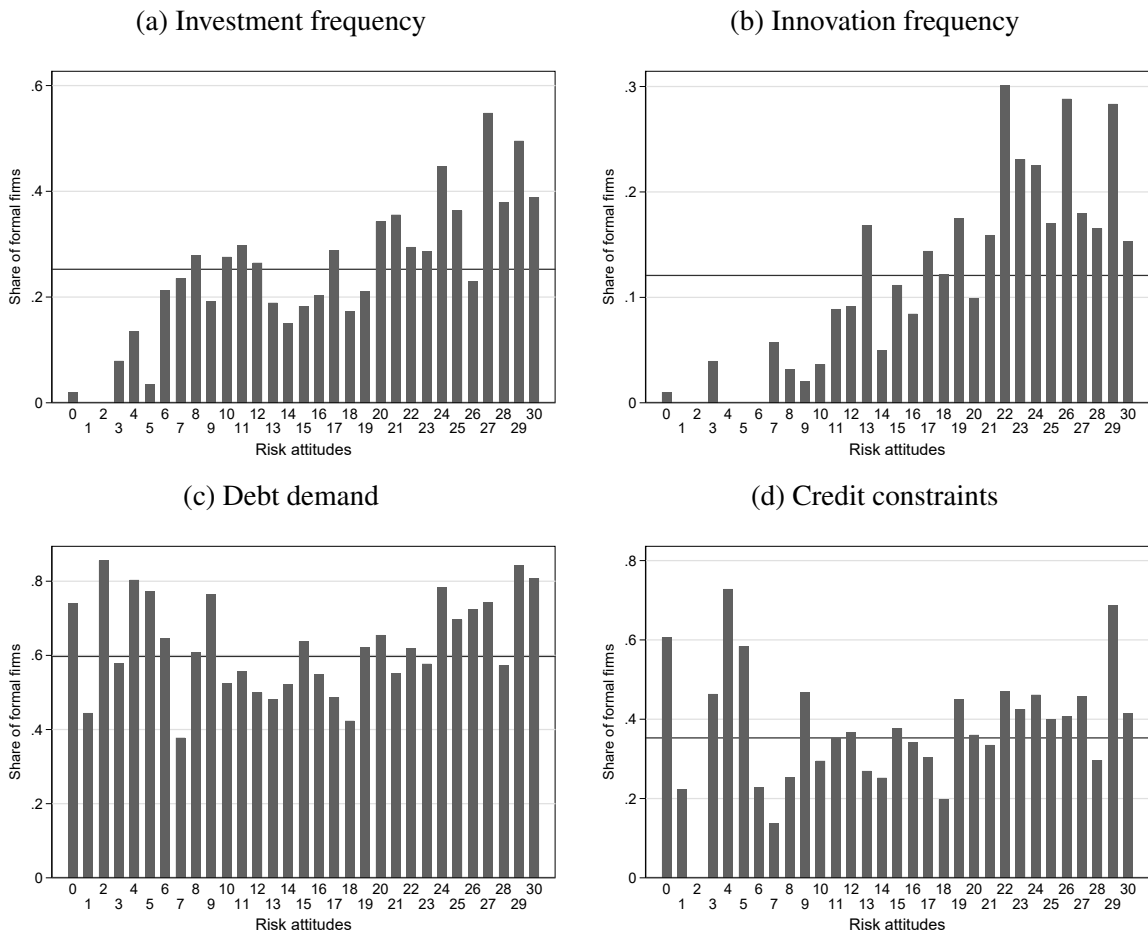
Following Dohmen et al. (2011), we use questions asking whether the owner/manager is generally a person who tries to avoid taking risks (0) or is fully willing to take risks (10). The questions were asked first about a general willingness to take risk and subsequently about risk preferences in the contexts of finance- and business-related matters. Using the answers on an 11-point scale (0–10) for all three questions, we create an index (RAI) ranging from 0 to 30, where 0 means very risk-averse and 30 is highly risk-loving. Experimental evidence has validated this risk scale by showing that an index like this is capable of predicting differences in investment choices fairly well (Dohmen et al. 2011).

For Myanmar, the index of risk attitudes is also a good predictor of firm decisions to invest (and/or innovate), as seen in Panels (a) and (b) in Figure 2. Here we plot the associations between the RAI and the frequencies of firms that invested and/or innovated in 2015 or 2016. As in Figure 1, Figure 2 (Panels c and d) shows how the proportions of firms with debt demand and credit constraints vary across the RAI. Average levels of the index across firms with and without credit demand and constraints for the population of formal firms and for all firms in our sample are given in Table 2.

For risk attitudes we find somewhat stronger associations with debt demand and credit constraints compared to the MCI. Yet, the association appears to be non-linear. Both risk-averse and risk-loving owners/managers appear to have higher debt demand than risk-neutral owners/managers, and these firms appear to have a higher prevalence of credit constraints. Further, in Table 2 we show that owners/managers of firms with debt demand score lower on the RAI, on average, and the same goes for owners/managers of firms with debt demand that are not credit constrained.

The association between owner/manager's managerial capacity and risk attitudes, as it emerges from the questionnaire, is interesting. The scatter plot in Figure 3 indicates a strong positive association. At the same time, the figure illustrates nicely how a fraction of the respond-

Figure 2: Central firm variables by owner/manager's risk attitude



Note: population estimates for formal firms. The vertical lines indicate the estimated overall frequencies.  
Source: authors' calculations based on MEMS.

ents may have misunderstood (or protested against) the capacity and risk attitude questions. Owners/managers with an MCI value of zero have risk attitudes scattered over the whole RAI range, with a weak tendency to be risk-averse. Correspondingly, the extremely risk-loving owners/managers (RAI = 30) are scattered across the full range of managerial capacities. Still, both with and without the extreme responses, we find the positive association, illustrated by the regression line in Figure 3.<sup>9</sup>

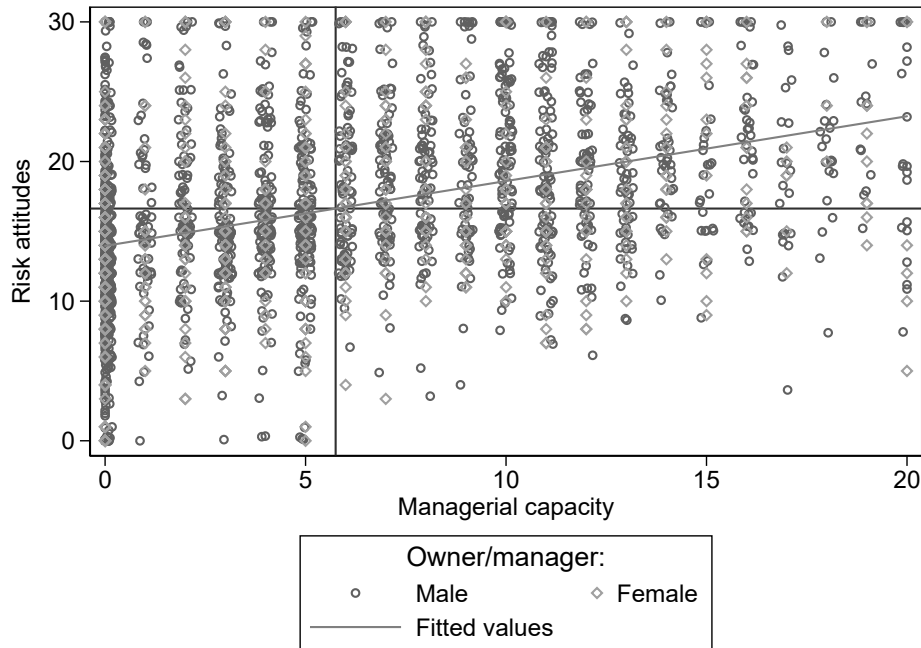
The overall result is that owners/managers with better managerial capacities have a tendency to be less risk-averse; they are more likely to invest and innovate and they have marginally higher debt demand. However, it is unclear whether they are more or less credit constrained.

### 3.4 Gender

Niederle and Vesterlund (2007) find that female managers are less inclined to compete compared to male managers, even conditional on risk attitudes. Hence, the gender of the owner/manager may be an important attribute influencing credit demand and constraints. We look into this pos-

<sup>9</sup>Kendall's tau is 0.29 and 0.20 with and without the extreme observations, respectively. The association is highly statistically significant in both cases.

Figure 3: Owner/manager's managerial capacity and risk attitude



Note: the lines indicate the estimated overall averages.

Source: authors' calculations based on MEMS.

sibility by categorizing the firms according to the gender of the survey respondent, who is the owner/manager of the firm.

Table 3 illustrates that characteristics of manufacturing firms in Myanmar differ depending on the gender of the owner/manager and, in turn, the owners/managers differ with respect to both managerial capacity and attitudes towards risk. Females are on average slightly less capable managers, with slightly (though statistically significant) lower preferences towards risk.

For the credit positions, we find a lower frequency of firms with debt demand for female-owned firms. However, this difference is not significant for the estimated population of formal firms. The difference in the prevalence of credit-constrained firms is statistically significant, though, and it is also economically significant. There is a 5 percentage points difference in the proportions for both the population of formal firms and the full sample.

In Figure 4 we try to illustrate the importance of the gender variation in managerial capacity and risk attitudes for the differences in debt demand and credit constraints. Figures 1 and 2 showed that the classification of owners/managers into 21 MCI and 31 RAI index bins may be riddled by response and measurement errors. We therefore use local polynomial regressions across the index values to smooth the results in Figure 4. While the results for debt demand remain unclear, the main new information is that differences in debt demand due to the gender of the owner, conditional on managerial capacity (or risk attitudes), are not significant. For credit constraints, we find that male-owned firms appear to be more credit constrained than female-owned firms, also conditional on managerial capacity or risk attitudes.

In the next section we formulate and estimate multivariate regression models to uncover the influences of the owner/manager characteristics on debt demand and credit constraints.

Table 3: Owner/manager and firm characteristics by gender of owner/manager

	Formal firms		All firms	
	Male	Female	Male	Female
Managerial capacity	6.1	5.7	5.9*	5.4*
Risk attitude	17.0*	15.9*	16.9*	15.9*
Invested (%)	26.5	22.4	23.1*	19.4*
Not invested (%)	73.5	77.6	76.9*	80.6*
Innovated (%)	12.8	10.5	12.1*	7.4*
Not innovated (%)	87.2	89.5	87.9*	92.6*
Debt demand (%)	61.4	55.8	59.4*	53.4*
No debt demand (%)	38.5	44.2	40.6*	46.6*
Credit constrained (%)	38.6*	33.3*	38.6*	33.3*
Not constrained (%)	61.4*	66.7*	61.4*	66.7*

Note: an asterisk indicates significant differences across the gender of the owner at the 5 per cent level.

Source: authors' calculations based on MEMS.

## 4 Empirical model of debt demand and credit constraints

### 4.1 The model

In an attempt to disentangle the impact of managerial capacity, risk attitudes, and gender on debt demand and credit constraints, we assume that the decision to apply for a formal loan is taken by the firm with no consideration as to whether the application will be rejected or not. In some situations, the firm does not apply even though it has a demand. This happens, for example, when the firm finds the collateral requirements unattainable or that the costs of external funds are considered too high. In this situation we consider the firm to have credit demand and self-select directly into being credit constrained. If the firm applies for a loan, the decision to grant the loan is taken by the financial institution after the loan application has been put forward.

We formulate and estimate these decisions using a bivariate model with sample selection. For simplicity, we model the probabilities as outcomes of latent firm and bank decisions with normally distributed private information (errors). Thus, we estimate the probability of having debt demand and being credit constrained using a bivariate probit model. Letting  $d_i$  denote if firm  $i$  has demand for debt or not and  $c_i$  denote if firm  $i$  is credit constrained or not, there are three outcomes:

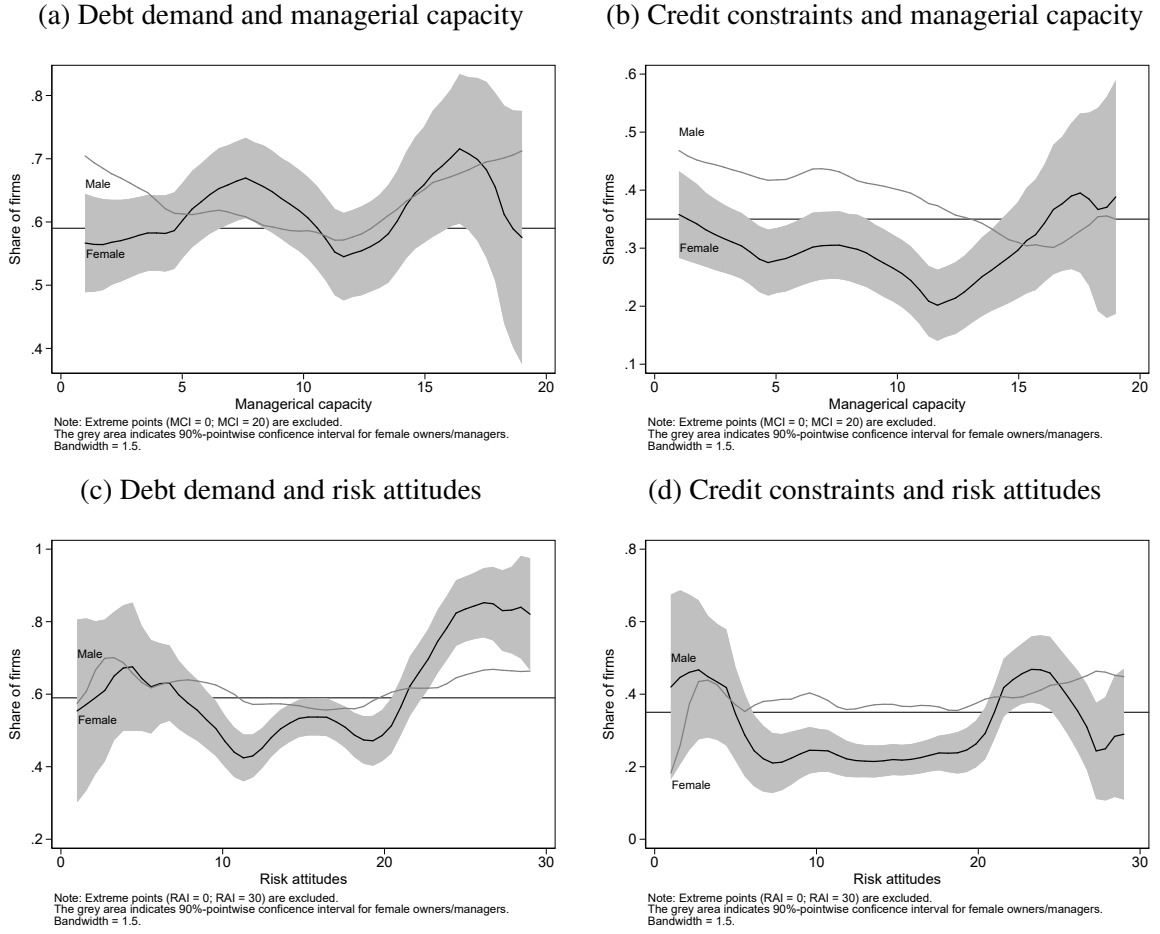
$$d_i = 0 \quad P(d_i = 0) = 1 - \Phi(z_i\alpha) \quad (1)$$

$$d_i = 1, c_i = 0 \quad P(d_i = 1, c_i = 0) = \Phi(z_i\alpha) - \Phi_2(z\alpha, x\beta, \rho) \quad (2)$$

$$d_i = 1, c_i = 1 \quad P(d_i = 1, c_i = 1) = \Phi_2(z\alpha, x\beta, \rho) \quad (3)$$

where  $\Phi(\cdot)$  and  $\Phi_2(\cdot)$  are the standard normal and the bivariate standard normal cumulative distribution functions (CDFs), respectively, and  $\rho$  is the correlation between the errors in the two latent variable regressions.

Figure 4: Central firm variables by gender of owner/manager



Note: kernel weighed local mean smoothing using the Epanechnikov kernel. The black curve is for female-owned firms; the grey curve is for male-owned firms. Population estimates are for formal firms. The vertical lines indicate the estimated overall shares.

Source: authors' calculations based on MEMS.

Equation (1) describes the outcome when a firm has no formal debt demand. In this situation it is not meaningful to ask if the firm is credit constrained. Equation (2) describes the outcome when a firm has debt demand and the application is (fully) granted. Finally, equation (3) describes the situation when a firm is credit constrained; it demands a loan which is (partially) denied.

Equation (1) describes the outcome of a decision made by the firm. The outcome of the decision made by the formal bank is not represented by the equations above as it is a conditional decision, namely to accept or reject a loan application. Thus, when a formal bank rejects a loan, this is a conditional outcome given by

$$c_i = 1 | d_i = 1, \quad P(c_i = 1 | d_i = 1) = \frac{\Phi_2(z_i \alpha, x_i \beta, \rho)}{\Phi(z_i \alpha)} \quad (4)$$

The explanatory variables,  $z_i$  and  $x_i$ , are vectors of firm-level variables including the information on the owner/manager, described in Section 3. We allow for firm heterogeneity by including controls that are standard in the literature: firm size and age; production sector indicators (Myanmar Standard Industry Classification (MSIC) at the one-digit level); and indicators of location (region/state). Moreover, as Myanmar has many rice mills, the MEMS survey under-



sampled such firms, so we also include an indicator for rice mills. Finally, when we use the full sample we include an indicator for informal firms.

We do not have experimental variation to identify the debt demand decision, hence we must resort to (economic) reasoning. We argue that firm owners/managers who answer no to the question of whether ‘shortage of capital is the main obstacle to growth’ (Beck and Demirgüç-Kunt’s constraint definition) should have a lower probability of demanding debt compared to firms with managers who answer yes to the question. At the same time, conditional on the loan application and the manager’s (observable) attributes, the manager’s perception of obstacles should not influence the bank’s decision to grant the loan. Clearly, it could be reasoned that a loan application from a manager who perceives shortage of capital as not being a major obstacle may be poorly formulated and thereby have a lower chance of being granted. Yet, we argue that the quality of the loan application depends on the capacity of the owner/manager, not on the credit obstacle perception as such. Hence, we include an indicator taking the value 1 if the manager does not perceive shortage of capital to be the main obstacle in the demand for credit equation, while we omit the indicator from the credit constraint equation. This exclusion restriction (formally) identifies the two equations.

## 4.2 Regression results

We present the main regression results by reporting the estimated average marginal effects of changes in the variables of interest on the probabilities of the different events given in the four equations above. The changes in the variables of interest on the probability of a firm demanding debt and on the formal bank rejecting the loan application, conditional on demand, are given in Table 4. The estimated log-odds ratios for the regression models are shown in Tables C and D in Appendix B.

Table 4 gives results for six regression models. Columns (1)–(3) are results from a model in which the MCI and the RAI enter linearly. In column (1) we use the sample of 2,116 formal firms in regressions with sampling weights to get estimates that are representative of the population of formal firms in Myanmar in 2017. In column (2) we have the same sample of formal firms without sampling weights in the regression. In column (3) we add the 380 informal firms and estimate the model for the full sample.

Columns (4)–(6) are results from a model in which we use a semi-parametric approach to estimate the impact of owner/manager traits. We split the range of the two indices into three equal size bins (low, middle, high) and include indicators for firms in the low and high categories, leaving the firms in the middle range as the baseline. In this way we aim to overcome non-linear impacts, reporting errors, and possible ‘protest’ responses.

Panel A in Table 4 has the results for debt demand. We find a positive association between managerial capacity and debt demand. In the first model (columns (1)–(3)) the estimated effect of half a percentage point increase in the probability of debt demand for each unit difference in the managerial capacity is constant across estimators and the two samples, although the effect is not well determined in the weighted regression of formal firms. In the semi-parametric regressions we find no difference in debt demand for firms with managers having low and middle managerial capacity. However, the effect of having high-capacity owners/managers is large, about a 10 percentage point higher probability of having debt demand, and the effect is statistically significant in the three regressions.

Table 4: Estimated average changes in the probability of having debt demand and being credit constrained, conditional on debt demand

	Formal firms		All firms	Formal firms		All firms
	Weighted	Unweighted	Unweighted	Weighted	Unweighted	Unweighted
	(1)	(2)	(3)	(4)	(5)	(6)
<i>A: Probability of debt demand</i>						
MCI	0.004 (0.003)	0.005** (0.002)	0.005** (0.002)			
MCI < 7				0.015 (0.033)	0.008 (0.021)	0.000 (0.020)
MCI > 13				0.122*** (0.033)	0.090*** (0.031)	0.070** (0.031)
RAI	0.002 (0.002)	0.005** (0.002)	0.005*** (0.002)			
RAI < 10				0.053 (0.038)	0.023 (0.035)	-0.006 (0.034)
RAI > 19				0.062* (0.036)	0.089*** (0.026)	0.084*** (0.023)
Female owner/manager	-0.055** (0.025)	-0.029 (0.022)	-0.048** (0.020)	-0.052** (0.025)	-0.032 (0.021)	-0.048** (0.020)
Firm size (ln)	-0.024* (0.013)	-0.019 (0.012)	-0.017 (0.012)	-0.021 (0.013)	-0.014 (0.011)	-0.013 (0.011)
Firm age (ln)	-0.011 (0.014)	-0.013 (0.011)	-0.001 (0.010)	-0.012 (0.014)	-0.014 (0.011)	-0.002 (0.010)
<i>B: Probability of credit constrained conditional on debt demand</i>						
MCI	-0.002 (0.003)	-0.003 (0.003)	-0.002 (0.003)			
MCI < 7				-0.018 (0.040)	-0.001 (0.034)	-0.008 (0.029)
MCI > 13				-0.105 (0.065)	-0.064 (0.051)	-0.068 (0.049)
RAI	-0.000 (0.004)	0.004 (0.002)	0.002 (0.002)			
RAI < 10				-0.087 (0.077)	-0.048 (0.055)	-0.051 (0.052)
RAI > 19				-0.015 (0.056)	0.023 (0.034)	-0.000 (0.031)
Female owner/manager	-0.103** (0.041)	-0.027 (0.031)	-0.021 (0.026)	-0.101*** (0.039)	-0.027 (0.031)	-0.021 (0.026)
Firm size (ln)	-0.054*** (0.018)	-0.052*** (0.015)	-0.048*** (0.015)	-0.054*** (0.018)	-0.049*** (0.014)	-0.046*** (0.014)
Firm age (ln)	-0.071*** (0.017)	-0.052*** (0.014)	-0.055*** (0.014)	-0.073*** (0.017)	-0.052*** (0.014)	-0.055*** (0.014)

Note: the estimated probabilities are based on the regressions given in Tables C and D in Appendix B. Design-based robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Source: authors' calculations based on MEMS.

The results for owners'/managers' attitudes towards risk show the same pattern. In regressions (1)–(3) a one unit difference in the RAI index is associated with a half percentage point difference in the probability of debt demand. The effect is again poorly determined in the weighted regression for formal firms. Also here, we find a non-linear impact in regressions (4)–(6). The firms with very risk-averse owners/managers appear to have the same probability of debt demand as the firms with risk-neutral owners/managers, while the probability of demand is clearly higher (7–8 percentage points) for firms with owners/managers with preferences for risk-taking.

Conditional on managerial capacity and attitudes towards risk, we find that firms with female owners/managers have a lower probability of demanding debt. The gender difference is much larger and clearer (in a statistical sense) in this conditional setting compared to the partial comparison in Section 3.4.

Finally, it is of interest that firm size and age have small negative and statistically insignificant associations with the probability of debt demand. This is not surprising as we are not measuring the size of the debt demand, only the probability of having demand. Nevertheless, this illustrates that also many large firms in Myanmar use retained earnings rather than formal credit for their investments and working capital.

Panel B in Table 4 has the results for credit supply in the form of the average marginal change in the probability of a firm being credit constrained conditional on having debt demand. Thus, this mainly reflects the decision made by the formal banks as specified in Equation (4). It comes across clearly that size and age are the main statistically significant predictors of differences in the probability of being credit constrained, and both variables have sizeable impacts on the probabilities. A 50 per cent increase in firm size (number of employees) is associated with a 2 percentage point decrease in the probability of being credit constrained. Thus, a firm with six employees has a roughly 2 percentage points larger probability of getting a loan than a firm with four employees (the median firm size in our sample) conditional on both firms having applied for a loan, and everything else being equal. Illustrating this using a broader size range, the estimated probability of being credit constrained is just above 70 per cent for a firm with one employee; a firm with 10 employees has a 60 per cent risk while a firm with 100 employees has about a 50 per cent risk of being constrained, conditional on applying for a loan. For firm age the comparison could be for a 15- and a 10-year-old firm (the median age). This results in the same difference of 2 percentage points in the probability of getting a loan/being credit constrained, conditional on demand and everything else being equal. These results lend strong support to the claims that collateral requirements are plausibly too strict and that banks are (probably) too conservative in their lending policies.

The latter claim is also supported by our finding that the probability of being credit constrained, conditional on demand, does not vary systematically with managerial capacity (or attitudes towards risk), once firm size, firm age, and differences across regions are taken into account. This result is all the more surprising as the MCI is based on questions giving information about business practices, including financial planning.<sup>10</sup>

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<sup>10</sup>We claim that the formal banks ignore managerial capacities in their lending decisions. There is a statistically significant positive (conditional) correlation between firm size and managerial capacity. Hence, larger firms are on average run by owners/managers with higher capacity. Yet, firm size is a very noisy measure of managerial capacity. Interestingly, the (conditional) correlation between firm age and managerial capacity is negative (and statistically significant). Accordingly, to the extent that banks rely on information such as firm age, they are not following a policy of lending to the more capable managers, on average.

Table 5: Estimated average changes in the joint probability of having debt demand and being credit constrained

	Formal firms		All firms	Formal firms		All firms
	Weighted	Unweighted	Unweighted	Weighted	Unweighted	Unweighted
	(1)	(2)	(3)	(4)	(5)	(6)
<i>A: Probability of debt demand and credit</i>						
MCI	0.003 (0.002)	0.003* (0.002)	0.003* (0.002)			
MCI < 7				0.017 (0.027)	0.004 (0.020)	0.005 (0.018)
MCI > 13				0.114*** (0.043)	0.073** (0.030)	0.065** (0.027)
RAI	0.001 (0.003)	-0.000 (0.002)	0.001 (0.002)			
RAI < 10				0.075 (0.049)	0.037 (0.033)	0.027 (0.032)
RAI > 19				0.035 (0.036)	0.023 (0.022)	0.032 (0.020)
Female owner/manager	0.039 (0.026)	0.003 (0.019)	-0.006 (0.017)	0.039 (0.025)	0.002 (0.019)	-0.007 (0.016)
Firm size (ln)	0.023* (0.012)	0.021** (0.010)	0.021** (0.010)	0.024* (0.012)	0.022** (0.009)	0.021** (0.009)
Firm age (ln)	0.038*** (0.013)	0.024** (0.010)	0.031*** (0.009)	0.039*** (0.013)	0.024** (0.010)	0.030*** (0.009)
<i>B: Probability of debt demand and credit constrained</i>						
MCI	0.001 (0.003)	0.001 (0.002)	0.002 (0.002)			
MCI < 7				-0.002 (0.032)	0.004 (0.023)	-0.004 (0.022)
MCI > 13				0.008 (0.043)	0.017 (0.037)	0.005 (0.037)
RAI	0.001 (0.003)	0.005*** (0.002)	0.004** (0.002)			
RAI < 10				-0.022 (0.051)	-0.013 (0.038)	-0.032 (0.035)
RAI > 19				0.027 (0.041)	0.065*** (0.024)	0.051** (0.022)
Female owner/manager	-0.094*** (0.031)	-0.032 (0.023)	-0.041** (0.020)	-0.091*** (0.029)	-0.034 (0.022)	-0.042** (0.019)
Firm size (ln)	-0.046*** (0.013)	-0.040*** (0.010)	-0.037*** (0.011)	-0.045*** (0.013)	-0.036*** (0.010)	-0.034*** (0.011)
Firm age (ln)	-0.049*** (0.012)	-0.037*** (0.010)	-0.031*** (0.010)	-0.051*** (0.012)	-0.038*** (0.010)	-0.032*** (0.010)

Note: the estimated probabilities are based on the regressions given in Tables C and D in Appendix B. Design-based robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Source: authors' calculations based on MEMS.

In Table 5 we look into the characteristics of firms with unconstrained formal credit and those that are credit constrained. That is, we illustrate the outcome of the demand and supply decisions of firms and banks. We show results of the same six regressions as in Table 4. In Panel A of Table 5 we give the characteristics of firms that have unconstrained formal credit (the probability given by Equation (2)), while Panel B has the estimated characteristics for constrained firms (the probability given by Equation (3)).

While the results for firm size and firm age are straightforward, the table also shows some interesting ‘cross-overs’ in firm attributes that are not obvious from the results in Table 4. For the owners’/managers’ attitudes towards risk we find no association with firms that get formal credit but a negative association with credit-constrained firms. Conversely, for managerial capacity we find a positive association with firms that have unconstrained credit but no association with credit-constrained firms. Finally, for firms with female owners/managers we find no association with firms that have unconstrained credit but a negative association with credit-constrained firms. Thus, lack of knowledge of the underlying demand and supply factors could lead to wrong conclusions and policy recommendations.

Specifically, from Panel A in Table 5 one might conclude that banks take account of managerial capacity when they make loan decisions. However, this is not supported by the analysis of the conditional credit supply. The positive association between managerial capacity and the probability of having unconstrained credit is caused by the higher probability that firms with high-capacity owners/managers will actually demand credit, not a higher probability of getting credit, conditional on the demand.

Likewise for firms with female owners/managers, we find a negative association with the probability of being credit constrained. However, this is not caused by bank decisions to provide credit to female-owned/managed firms. Instead it is caused by a relatively lower probability of credit demand from firms with female owners/managers. This has important implications for the kind of policies that are best suited for (gender-) inclusive growth of the manufacturing sector.

## 5 Conclusion

Despite the period of reforms following the general election in 2010, Myanmar struggles with one of the world’s most underdeveloped financial sectors. The insufficiency of credit is depressing the growth of the manufacturing sector. Accordingly, it is important to both expand and improve the allocation of loanable funds for manufacturing firms.

Using data from a new, nationally representative survey of SMEs in Myanmar, we confirm the perceived scarcity of funds in the manufacturing sector. We estimate that only 11 per cent of registered SMEs had formal debt in 2017 and the same low fraction of firms (11 per cent) applied for a formal loan in 2015–16.

The lack of financial mediation is causing firms to self-select out of the credit market. Some firms do not apply for loans even if they have external financing needs, and the ones who do apply often have problems getting the loan. Moreover, many firms are rationed, either by outright loan rejection, or because of overly complicated application procedures. Even the relatively few firms that got a loan without problems report that they were rationed as they could not get the funds they applied for.

Given the scarceness of formal credit, we analyse whether the existing funds are allocated towards firms with high growth potential, as measured by the owner/manager's managerial capacity. We find that this is *not* the case. As in many other developing countries with thin credit markets, bank funds are allocated to large and old firms. Managers' capacities and attitudes towards risk are positively associated with their probability of demanding credit (applying for a loan). Yet, we find no discernible association with the probability of obtaining a loan, conditional on the demand.

The gender dimension in Myanmar's manufacturing SME sector is informative as well. Around 30 per cent of the formal firms have female owners/managers. Female-run firms are significantly larger and slightly older and, even conditional on size and age, female-run formal firms appear to have a significantly lower probability of being credit constrained. This is not linked to (observable) personality traits such as managerial capacity or attitudes towards risk. Instead, the lower probability of being credit constrained can be traced to a lower probability for credit demand, not a higher probability of getting credit, conditional on demand. Thus, policies aimed at improving the conditions for female owned/managed firms should focus on encouraging such firms to apply for loans, not (necessarily) asking banks to bias credit provisions more towards the female-owned/managed firms that actually apply.

Our findings have another, more obvious, policy implication. Manufacturing sector growth can in all likelihood be enhanced—even with no or modest capital deepening—if the formal financial sector would reallocate the available funds more towards companies with higher growth potential in the form of firms owned or managed by more capable people. Along with general financial sector reforms, it would be beneficial if the private (and foreign) banks get incentives to look for and fund (young) firms with good business and investment proposals that are run by capable managers.

## References

- Annamalai, N. (2017). *Banking on Myanmar's Financial Sector: The Road Ahead*. Washington, DC: World Bank Group.
- Aterido, R., T. Beck, and L. Iacovone (2013). 'Access to Finance in Sub-Saharan Africa: Is there a Gender Gap?'. *World Development*, 47: 102–20.
- Bandiera, O., S. Hansen, A. Prat, and R. Sadun (2017). 'CEO Behavior and Firm Performance'. Working Paper 23248. Cambridge, MA: National Bureau of Economic Research.
- Beck, T., and A. Demirgüç-Kunt (2006). 'Small and Medium-Size Enterprises: Access to Finance as a Growth Constraint'. *Journal of Banking & Finance*, 30(11): 2931–43.
- Bernhardt, T., G. Dickenson-Jones, and S.K. De (2017). 'New Kids on the ASEAN Block: Myanmar SMEs and Regional Economic Integration'. *Journal of Southeast Asian Economies*, 34(1): 34–38.
- Bigsten, A., P. Collier, S. Dercon, M. Fafchamps, B. Gauthier, J.W. Gunning, A. Oduro, R. Oostendorp, C. Patillo, M. Söderbom, F. Teal, and A. Zeufack (2003). 'Credit Constraints in Manufacturing Enterprises in Africa'. *Journal of African Economies*, 12(1): 104–25.
- Boulier, B.L. and R.S. Goldfarb (1998). On the Use and Nonuse of Surveys in Economics. *Journal of Economic Methodology*, 5(1): 1–21.
- Bruhn, M., D. Karlan, and A. Schoar (2018). 'The Impact of Consulting Services on Small and Medium Enterprises: Evidence from a Randomized Trial in Mexico'. *Journal of Political Economy*, 126(2): 635–87.

- Byiers, B., J. Rand, F. Tarp, and J. Bentzen (2010). 'Credit Demand in Mozambican Manufacturing'. *Journal of International Development*, 22(1): 37–55.
- CDSMED (Central Department of Small and Medium Enterprises Development) (2018). 'SMEs Loan and Interest Rate'. Available at: [www.smedevelopmentcenter.gov.mm](http://www.smedevelopmentcenter.gov.mm) (accessed 18 July 2018).
- Chan Mya Htwe (2017). 'Agricultural Sector and SMEs to Receive Private Bank Loans'. *Myanmar Times*. Available at: [www.mmmtimes.com/business/25141-agricultural-sector-and-smes-to-receive-private-bank-loans.html](http://www.mmmtimes.com/business/25141-agricultural-sector-and-smes-to-receive-private-bank-loans.html) (accessed 18 July 2018).
- Chassat, P., and F. Foerster (2016). *Myanmar Banking Sector 2025: The Way Forward*. Munich: Roland Berger GmbH.
- Chaudhuri, K., S. Sasidharan, and R.S.N. Raj (2018). 'Gender, Small Firm Ownership, and Credit Access: Some Insights from India'. *Small Business Economics*. DOI: 10.1007/s11187-018-0124-3.
- Cramer, J., J. Hartog, N. Jonker, and C.V. Praag (2002). 'Low Risk Aversion Encourages the Choice for Entrepreneurship: An Empirical Test of a Truism'. *Journal of Economic Behavior & Organization*, 48(1): 29–36.
- Dohmen, T., A. Falk, D. Huffman, U. Sunde, J. Schupp, and G.G. Wagner (2011). 'Individual Risk Attitudes: Measurement, Determinants, and Behavioral Consequences'. *Journal of the European Economic Association*, 9(3): 522–50.
- Ei Shwe Sin Tun (2016). 'Implementation of SME Development Law in Myanmar'. In O. Ki and S. Thein (eds), *Collection of Papers on Myanmar's Financial Sector*. Bonn: GIZ.
- Hansen, H., and J. Rand (2014a). 'Estimates of Gender Differences in Firm's Access to Credit in Sub-Saharan Africa'. *Economics Letters*, 123(3): 374–77.
- Hansen, H., and J. Rand (2014b). 'The Myth of Female Credit Discrimination in African Manufacturing'. *The Journal of Development Studies*, 50(1): 81–96.
- Htin Lynn Aung (2017a). 'Banks to Convert Overdrafts to Term Loans to Reduce Lending Risk'. *Myanmar Times*. Available at: [www.mmmtimes.com/news/banks-convert-overdrafts-term-loans-reduce-lending-risk.html](http://www.mmmtimes.com/news/banks-convert-overdrafts-term-loans-reduce-lending-risk.html) (accessed 18 July 2018).
- Htin Lynn Aung (2018a). 'Accounts Must Be in Order for SMEs to Qualify for Loans'. *Myanmar Times*. Available at: [www.mmmtimes.com/news/accounts-must-be-order-smes-qualify-loans.html](http://www.mmmtimes.com/news/accounts-must-be-order-smes-qualify-loans.html) (accessed 18 July 2018).
- Htin Lynn Aung (2018b). 'Myanmar Takes Small Steps Towards Providing Greater Liquidity for SMEs'. *Myanmar Times*. Available at: [www.mmmtimes.com/news/myanmar-takes-small-steps-towards-providing-greater-liquidity-smes.html](http://www.mmmtimes.com/news/myanmar-takes-small-steps-towards-providing-greater-liquidity-smes.html) (accessed 18 July 2018).
- Kapteyn, A. and S.H. Wah (2016). 'Challenges to Small and Medium-Size Businesses in Myanmar: What are They and How Do We Know?'. *Journal of Asian Economics*, 47: 1–22.
- Klapper, L.F. and S.C. Parker (2011). 'Gender and the Business Environment for New Firm Creation'. *World Bank Research Observer*, 26(2): 237–57.
- McKenzie, D., and C. Woodruff (2017). 'Business Practices in Small Firms in Developing Countries'. *Management Science*, 63(9): 2967–81.
- Myint Kyaw (2016). 'Paradigm Shift of Microfinance in Myanmar'. In O. Ki and S. Thein (eds), *Collection of Papers on Myanmar's Financial Sector*. Bonn: GIZ.
- MOPF (2018). *Myanmar Micro, Small and Medium Enterprise Survey 2017*. Descriptive Report. Helsinki: UNU-WIDER. Available at: [www.wider.unu.edu/sites/default/files/Publications/Report/PDF/Myanmar-MSME-survey-2017.pdf](http://www.wider.unu.edu/sites/default/files/Publications/Report/PDF/Myanmar-MSME-survey-2017.pdf) (accessed 18 July 2018)
- Niederle, M., and L. Vesterlund (2007). 'Do Women Shy away from Competition? Do Men Compete Too Much?'. *The Quarterly Journal of Economics*, 122(3): 1067–101.

- Rand, J. (2007). 'Credit Constraints and Determinants of the Cost of Capital in Vietnamese Manufacturing'. *Small Business Economics*, 29(1/2): 1–13.
- Schellhase, J., and L. Sun (2017). 'The Banking Sector in Myanmar: An Assessment of Recent Progress'. Technical Report. Santa Monica, CA: Milken Institute.
- SMIDB (Small and Medium Industrial Development Bank, Myanmar) (2018). 'SMID Bank'. Available at: <http://smidb.com.mm/page/about-smid/3> (accessed 18 July 2018).
- Thiha Ko Ko (2018). 'JICA SME Loans K60b in 2015–17'. *Myanmar Times*. Available at: [www.mmtimes.com/news/jica-sme-loans-k60b-2015-17.html](http://www.mmtimes.com/news/jica-sme-loans-k60b-2015-17.html) (accessed 18 July 2018).
- Waldschmidt, S. and M. Scheck (2016). 'The Views of Myanmar Bankers on the Progress of Domestic SME Finance'. In Ki, O. and Thein, S. (eds), *Collection of Papers on Myanmar's Financial Sector*. Bonn: GIZ.
- Win, S. (2018). 'Banks' Lending Behaviour Under Repressed Financial Regulatory Environment: In the Context of Myanmar'. *Pacific Accounting Review*, 30(1): 20–34.
- World Bank (2015). *Myanmar Economic Monitor: Staying the Course on Economic Reforms*. Washington, DC: World Bank Group.
- World Bank (2018). *Doing Business 2018: Reforming to Create Jobs*. Washington, DC: World Bank Group.



## **A The Myanmar Enterprise Monitoring System (MEMS)**

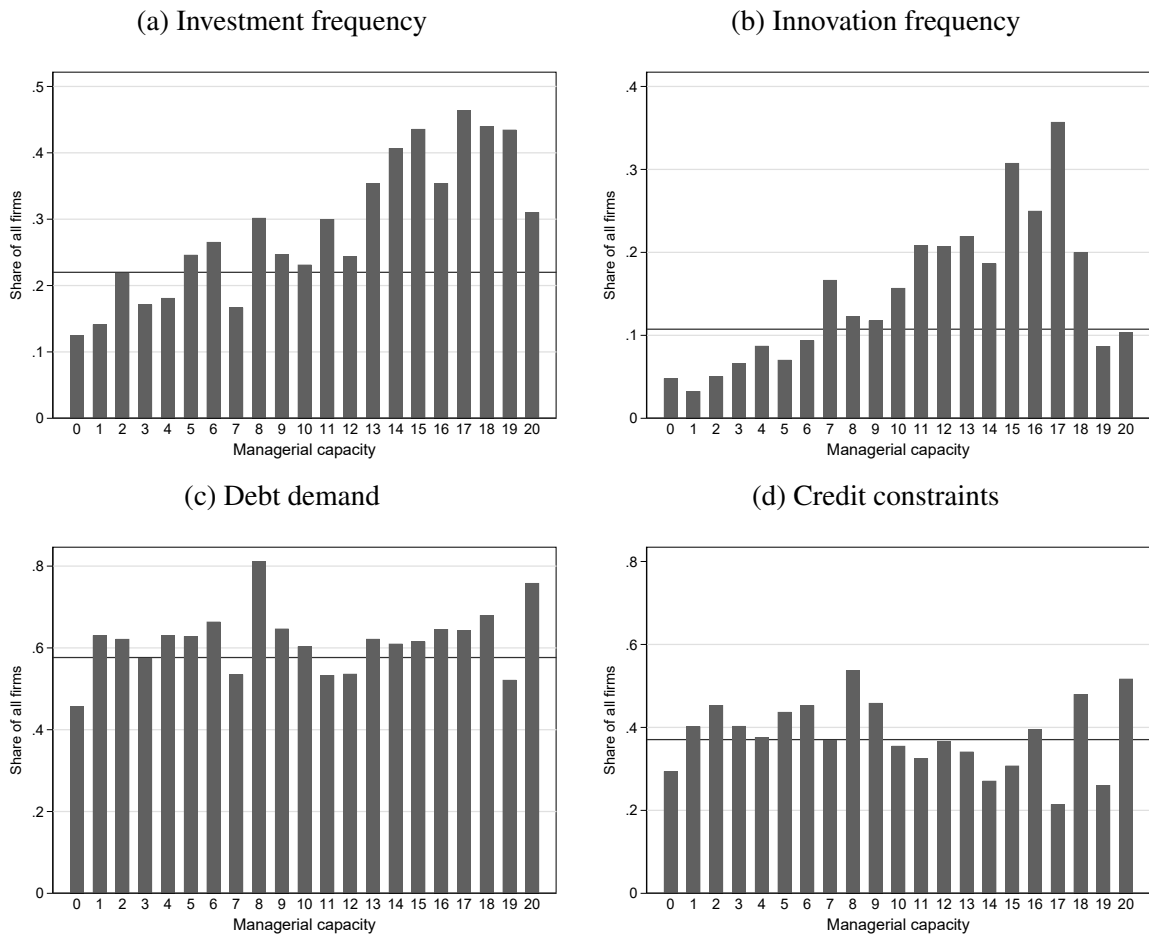
Our data come from the Myanmar Enterprise Monitoring System (MEMS), an enterprise survey conducted in 2017 in all states and regions of Myanmar (MOPF et al. 2018). To ensure representativeness at state/region level, manufacturing enterprise population data were established through collection of nationwide local municipal office data. Municipal office data include information from city development committees (CDCs) and development affairs organizations (DAOs), which provide business-operating licences and construction permits, and ensure water, sewerage, and trash collection services for the firms. Moreover, they are often responsible for urban road maintenance and electricity, and they are the relevant tax-collection entities for property taxes. Licensing/registration at the municipal level is a legal requirement for all manufacturing businesses in Myanmar and, given that registration remains valid for only one year, municipal data lists provide an up-to-date picture of the population of registered firms in Myanmar.

The municipal lists provided the following information about the firms: name, address, township, region/state, and sector (MSIC four-digit codes). The sampling frame is restricted to the manufacturing sector (MSIC two-digit 10–33). Since 28 per cent of registered firms were listed as rice mills (MSIC sector 1063), we stratified the population of firms into (1) rice mills and (2) other manufacturing. To ensure representativeness at the state/region level for ‘other manufacturing’ firms, we used the sample-to-population ratio for the state with the smallest number of registered enterprises, and for budgetary reasons applied a square root rule to scale the other states/regions to calculate the number of firms needed in each state/region. Moreover, for reasons of implementation, the survey had to be limited to a selected number of townships within each state/region. Firm selection was therefore done in a two-step sampling procedure. In the first step, townships within each state/region were selected using probability proportional to size (PPS) sampling. The number of selected townships in each state/region was determined proportionally to the number of townships in each state/region. As some townships in Rakhine and Shan are listed as so-called ‘black’ townships these were given a selection probability of zero. In the second step, firms within the selected townships were randomly selected from the population list.

The data also contain information on a selected number of (1) rice mills and (2) non-registered manufacturing firms. Rice mills were sampled using the same sample-to-population ratio and square root rule within the selected townships (as described above) and appropriate sampling weights have been calculated. As all data were gathered by face-to-face interviews with owners or managers of the firms, enumerators were asked to on-site identify firms not represented in the sampling frame but visually identifiable within the township. As such the non-registered firms in the data were obtained through on-site ‘block’ identification of informal firms operating alongside the formal entities. Thus, while the group of listed firms represents the formal manufacturing sector, our sample of informal businesses is not representative of ‘non-listed’ manufacturing firms in Myanmar. They represent the more established and productive informal entities.

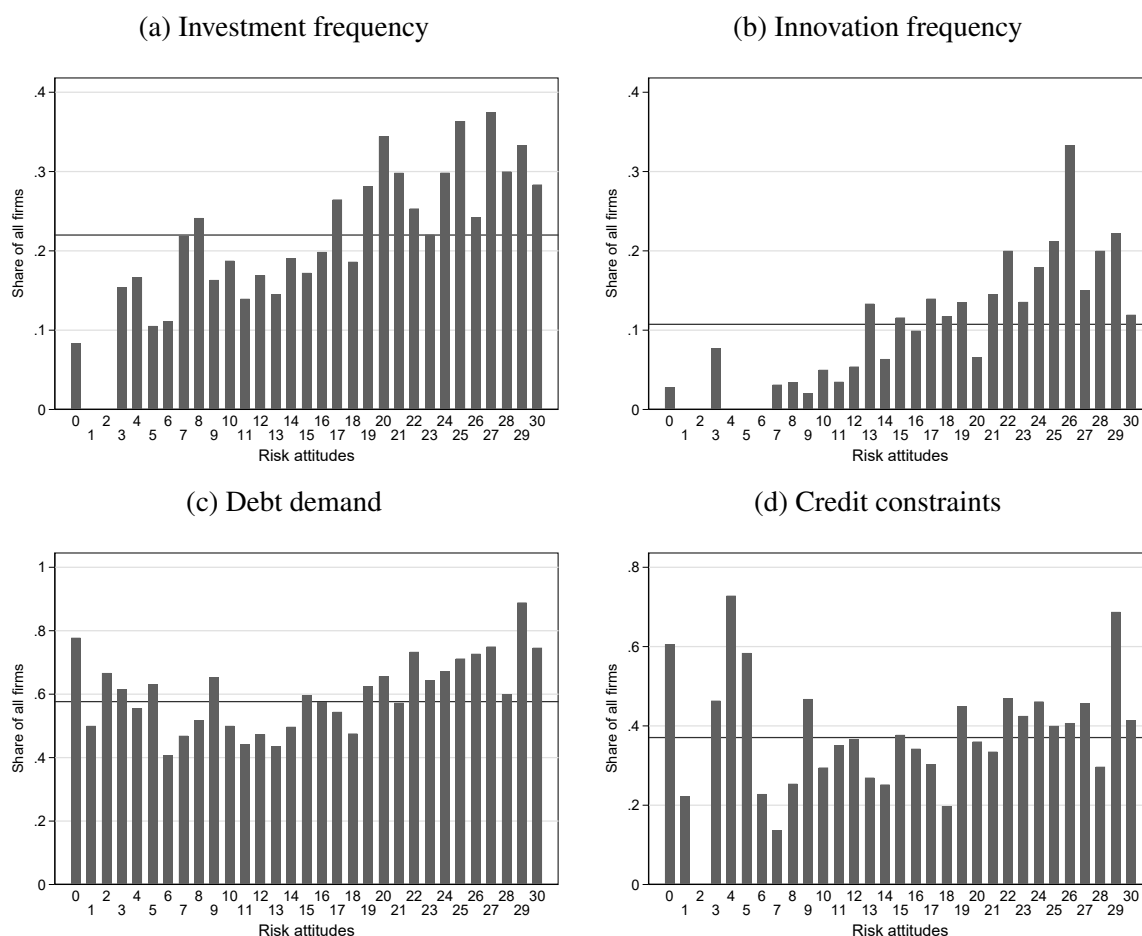
## B Additional tables and figures

Figure A: Central firm variables by owner/manager's managerial capacity: all firms



Note: sample averages for all firms. The vertical lines indicate the overall average frequencies.  
 Source: authors' calculations based on MEMS.

Figure B: Central firm variables by owner/manager's risk attitude: all firms



Note: sample averages for all firms. The vertical lines indicate the overall average frequencies.  
 Source: authors' calculations based on MEMS.

Table A: Formal and informal loans

Firm has formal debt	Firm has informal debt					
	No		Yes		Total	
	<i>N</i>	Col %	<i>N</i>	Col %	<i>N</i>	Col %
No	2,175	92.8	138	90.8	2,313	92.7
Yes	169	7.2	14	9.2	183	7.3
Total	2,344	100.0	152	100.0	2,496	100.0

Note: unweighted estimates

Source: authors' calculations based on MEMS.

Table B: Current formal and informal loan specifics

	Formal loan			Informal loan		
	Mean	Median	SD	Mean	Median	SD
Loan size (mill. Kyat)	179.1	50.0	921.1	9.1	3.0	23.1
Maturity (months)	24.5	21.0	16.4	18.9	12.0	16.4
Interest rate (5 per month)	1.181	1.083	0.276	2.847	2.500	2.868
Collateral required (Yes = 1)	0.891	1.0	0.313	–	–	–
Guarantor required (Yes = 1)	0.319	0.0	0.468	–	–	–
<i>N</i>	119			110		

Note: only 119 out of the 183 firms (65 per cent) with formal loans and 110 out of 152 firms (72 per cent) with informal loans provided specifics. Unweighted estimates.

Source: authors' calculations based on MEMS.

Table C: Probit selection models for debt demand and credit constraints (log-odds ratios)

	Formal firms				All firms	
	Weighted		Unweighted		(3a) Constraint	(3b) Demand
	(1a) Constraint	(1b) Demand	(2a) Constraint	(2b) Demand		
MCI	–0.006 (0.010)	0.013 (0.009)	–0.011 (0.009)	0.015** (0.007)	–0.010 (0.008)	0.014** (0.007)
RAI	–0.000 (0.011)	0.005 (0.007)	0.006 (0.007)	0.015** (0.006)	0.001 (0.007)	0.014** (0.005)
Female owner/manager	–0.299** (0.128)	–0.167** (0.077)	–0.046 (0.085)	–0.090 (0.066)	–0.009 (0.074)	–0.144** (0.062)
Firm size (ln employment)	–0.157*** (0.053)	–0.072* (0.039)	–0.120*** (0.041)	–0.058 (0.036)	–0.110*** (0.042)	–0.050 (0.035)
Firm age (ln)	–0.205*** (0.050)	–0.034 (0.042)	–0.127*** (0.040)	–0.040 (0.034)	–0.143*** (0.039)	–0.002 (0.030)
Rice mill	–0.170 (0.165)	0.410** (0.170)	–0.135 (0.157)	0.301* (0.155)	–0.153 (0.149)	0.264* (0.159)
Credit not the main constraint		–0.571*** (0.106)		–0.551*** (0.089)		–0.542*** (0.081)
Informal firm					0.156 (0.106)	0.013 (0.088)
Observations	2,116	2,116	2,116	2,116	2,496	2,496

Note: region/state fixed factors and sector fixed factors are included. Design-based robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Source: Authors' calculations based on MEMS.

Table D: Probit selection models for debt demand and credit constraints with alternative specification of the owner/manager attributes (log-odds ratios)

	Formal firms				All firms	
	Weighted		Unweighted		(3a) Constraint	(3b) Demand
	(1a) Constraint	(1b) Demand	(2a) Constraint	(2b) Demand		
MCI < 7	-0.052 (0.117)	0.047 (0.100)	-0.009 (0.090)	0.025 (0.064)	-0.021 (0.078)	0.001 (0.061)
MCI > 13	-0.313 (0.220)	0.372*** (0.099)	-0.245* (0.139)	0.275*** (0.095)	-0.248** (0.125)	0.211** (0.093)
RAI < 10	-0.257 (0.220)	0.162 (0.118)	-0.146 (0.145)	0.072 (0.107)	-0.128 (0.142)	-0.017 (0.103)
RAI > 19	-0.047 (0.161)	0.190* (0.112)	-0.015 (0.093)	0.270*** (0.079)	-0.083 (0.085)	0.253*** (0.072)
Female owner/manager	-0.288** (0.122)	-0.159** (0.076)	-0.044 (0.084)	-0.096 (0.065)	-0.008 (0.073)	-0.146** (0.061)
Firm size (ln employment)	-0.155*** (0.054)	-0.065 (0.039)	-0.118*** (0.040)	-0.043 (0.035)	-0.108*** (0.040)	-0.040 (0.034)
Firm age (ln)	-0.210*** (0.050)	-0.035 (0.042)	-0.126*** (0.040)	-0.042 (0.034)	-0.142*** (0.039)	-0.005 (0.030)
Rice mill	-0.164 (0.163)	0.408** (0.169)	-0.126 (0.157)	0.305** (0.152)	-0.146 (0.148)	0.262* (0.158)
Credit not the main constraint		-0.568*** (0.102)		-0.553*** (0.089)		-0.546*** (0.080)
Informal firm					0.157 (0.105)	-0.000 (0.087)
Observations	2,116	2,116	2,116	2,116	2,496	2,496

Note: region/state fixed factors and sector fixed factors are included. Design-based robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Source: authors' calculations based on MEMS.