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Full length article

## Challenges to small and medium-size businesses in Myanmar: What are they and how do we know?☆



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## ABSTRACT

We conducted a field survey of owners of small and medium enterprises (SMEs) in Yangon, Myanmar to investigate obstacles to business development in the region. The analysis focuses on access to credit, public services, and electricity. We find that relaxing loan collateral requirements is considered of prime importance, while access to bank loans is seen as problematic (equivalent to a 19 percentage point increase in the interest rate). Yet despite their widespread appeal to governments and donors, SME loans are found to have no discernible impact on perceived access to credit. Access to public services is hampered by cumbersome and time consuming procedures, often necessitating daylong trips to the capital for administrative procedures. Streamlining such procedures could yield annual savings of up to US \$4700 per business. With regard to electricity, the biggest problems are installing new connections and the unreliability of supply. For benchmarking of concerns, we showed respondents vignettes describing hypothetical businesses facing a particular difficulty, and asked them to rate the gravity of the problem. Although we find some differences in response scales across socio-economic and ethnic groups, the qualitative conclusions about which problems are most important generally hold. This suggests that broad-based policy intervention aimed at easing a particular difficulty can be implemented.

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### 1. Introduction

The Myanmar private sector is still in its early developmental stage. Myanmar has 2.6 registered SMEs per 1000 people, which compares with 27.0 in developing countries and 9.0 in the least developed countries (OECD, 2013). 83% of all private enterprises are in the informal sector, a majority of which are family-owned and self-employed.<sup>1</sup> Frequently cited reasons for the weak private sector include lack of an enabling regulatory environment, inefficient financial industry, lack of regulatory incentives for firms to operate formally, lingering legacy of the centrally planned economic system, influence of crony capitalism, and continuing state and military dominance of the broader economy (OECD, 2013). As the country is

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<sup>1</sup> Nay Pyi Taw News, 2013.

experiencing unprecedented political freedom and potential for economic growth since opening up in 2011, the full development of a well-functioning private sector dominated by small and medium-size enterprises (SMEs) is crucial for Myanmar to realize its full economic potential and for achieving sustained economic growth over time. A series of sweeping legislation acts and policies aimed at strengthening the private sector and revitalizing the economy have been introduced since 2011 when a quasi-civilian government came to power.<sup>2</sup> Now that a new civilian and democratically elected government has been elected into office since March 2016, efforts to further reform the private sector are likely to intensify in the coming years.<sup>3</sup>

One major impediment to policy decision making is that official data on SMEs hardly exist in Myanmar. If they do, they are difficult to verify, or not suitable for conducting in-depth statistical analyses. Thus, policy decisions are often not informed by analyses of the underlying policy issues, and it is impossible to objectively assess the impacts of any policies that have been introduced. Academic research analyzing the performance of the Myanmar private sector has been limited, largely due to various political restrictions imposed during the previous military rules that restricted research activities and mobilizations of international academics. As a result, little is known about the characteristics of the Myanmar private sector in general and SMEs in particular. The current research aims to fill this gap.

The goal of our research is to generate a dataset to paint a picture of Myanmar SMEs, the business environment under which they operate, and the factors potentially affecting their growth. Specifically, in this paper, we report results from a study we conducted in the Yangon area of Myanmar focusing on three key areas of the business environment: (1) access to credit, (2) access to public services (PS hereafter)<sup>4</sup> and (3) access to electricity. These three areas are chosen because they are considered to present the most severe constraints (Kyaw, 2008; OECD, 2013; Abe & Dutta, 2014).<sup>5</sup> First, we describe our data, examine determinants of SME growth, and analyze the relationship between firm characteristics and the most binding constraints they face. We then ask our respondents to rate difficulties faced by hypothetical firms described in vignettes to identify what the respondents see as the key difficulties in each of the three domains of business environment considered.

Since our results are largely based on respondents' self-reports, there is a possibility that different respondents use different response scales, which would make their answers incomparable. For instance, two individuals belonging to different socioeconomic groups may differ on what it means for an obstacle to be "severe" when reporting an aspect of the business environment (for instance access to public services), which in reality equally affects both individuals.

Self-reported business environment data have been used extensively in cross-country empirical studies, as well as in generating country reports.<sup>6</sup> Given their potential for influencing policy decisions, it is important to investigate if the self-reported data are affected by biases induced by heterogeneity in reporting behavior and then to propose a statistical method to correct for such biases. For this we will use the vignettes and investigate whether respondents with different characteristics evaluate them differently. We find significant differences, but the differences are modest. Based on this finding we then use self-reports (adjusted for potential heterogeneity in reporting behavior) to assess which types of businesses may face the most severe constraints.

The remainder of this paper is organized into four sections. Section 2 describes the data used in this analysis. Section 3 presents vignette descriptions and the estimated effects of vignette characteristics on evaluations. Section 4 addresses the possibility of differences in response scales across different respondent groups and analyzes which kind of firms face the most severe constraints. The final section discusses the implications of the results, followed by suggestions for future research.

## 2. Data descriptions

Our study concentrates on SMEs in the Yangon region and focuses in particular on a number of obstacles experienced by business owners. As such it is less broad than surveys like those reported on by Soans and Masato (2015) and DEval (2015). On the other hand, our narrower focus allows us to explore more in depth the dimensions of issues affecting small and

<sup>2</sup> Key legislation and reforms included the passage of Foreign Exchange Management Law in April 2012, which officially allowed the country's currency, the kyat, to float freely, the introduction of the Myanmar Central Bank Law that supposedly granted greater autonomy to the central bank in its pursuit of the country's monetary policies, the passage of Foreign Investment Law in March 2012 aimed at facilitating inflows of foreign direct investment, and the liberalization of the telecommunications industry, one of the key sectors of the economy; The previous government issued two telecommunications licenses to Telenor Group of Norway and Ooredoo of Qatar in 20014, which allow them to build and operate nationwide wireless network for 15 years. The two private operators, alongside state-owned Myanmar Post and Telecommunication (MPT), have been providing competitive services, which has led to a sharp decrease in the price of SIM cards from US\$1500 to US\$1.50 in less than 2 years, and a ten-fold increase in the mobile penetration rate (<http://mizzima.com/business-domestic/myanmar%E2%80%99s-mobile-revolution>).

<sup>3</sup> Business environment can broadly be defined as "policy, institutional, and behavioral environment, both present and expected, that influences the returns, and risks, associated with investment" (Stern, 2002).

<sup>4</sup> Our working definition of access to public services is the amount of resources a business has to devote (i.e., money or time, or both) to acquiring essential public services; these services can involve the completion of routine administrative paperwork, applying for licenses and permits, travelling to the capital city to complete administrative paperwork, or the time interacting with government officials and agencies.

<sup>5</sup> For this research, we define SMEs based on employment size similar to the World Bank's definitions: an enterprise is considered small if it employs 5–19 employees and medium if it employs 20–99 employees.

<sup>6</sup> See <http://www.enterprisesurveys.org/> for a full list of subjective measures of business environment currently used in the literature.

**Table 1**  
Sample Summary Statistics.

	N	Mean	S.D.	Min	Max
<b>Respondent Characteristics</b>					
Married	1004	0.80	0.40	0	1
Male	1004	0.74	0.44	0	1
Low education (high school and vocational training)	1004	0.31	0.46	0	1
Medium education (bachelor degree)	1004	0.59	0.49	0	1
High education (advanced and professional degree)	1004	0.09	0.29	0	1
Age	1004	44.28	11.80	19	89
Age group (19-39)	1004	0.36	0.48	0	1
Age group (40-50)	1004	0.36	0.48	0	1
Age group (51-64)	1004	0.24	0.43	0	1
Age group (65 plus)	1004	0.05	0.21	0	1
Respondent is owner	1004	0.86	0.35	0	1
Respondent is ethnic Burmese	1003	0.61	0.49	0	1
Respondent is ethnic minority	1004	0.16	0.36	0	1
Respondent is ethnic Chinese	1004	0.12	0.32	0	1
Respondent is ethnic Indian	1004	0.08	0.27	0	1
Respondent is minority ethnic Shan	1,004	4.48%	21%	0	1
Respondent is minority ethnic Kayin	1,004	4.48%	21%	0	1
Respondent is minority ethnic Kachin	1,004	1.10%	10%	0	1
Respondent is minority ethnic Rakhine	1,004	4.28%	20%	0	1
Respondents actively involved in the business operations  owners	862	0.99	0.09	0	1
Respondent grew up in a family owning businesses	987	0.51	0.50	0	1
Father owned and managed family business	1002	0.51	0.50	0	1
Respondent owned a business prior to establishing current business	1001	0.35	0.48	0	1
Prior business produced goods and services as the current businesses	342	0.34	0.48	0	1
Respondent had prior work experience	1003	0.73	0.44	0	1
Work experience accumulated in the same industry   had prior work experience	730	0.54	0.50	0	1
Years of work experience before establishing current business	726	11.92	9.12	0	44
<b>Business Characteristics</b>					
Business is small-sized (current employees <20)	1004	0.73	0.44	0	1
Business is in construction industry	1004	0.05	0.21	0	1
Business is in service industry	1004	0.24	0.42	0	1
Business is in manufacturing industry	1004	0.24	0.43	0	1
Business is in trading industry	1004	0.36	0.48	0	1
Business is located in an industrial zone	1002	0.21	0.41	0	1
Business is exporting goods or services	993	0.09	0.29	0	1
Business sold goods or services to the government in the past two years	974	0.16	0.36	0	1
Years business has been operational	1003	14.20	10.9	0	50
Owner is ethnic Burmese  respondent is owner	862	0.59	0.49	0	1
Owner is ethnic Chinese  respondent is owner	863	0.13	0.33	0	1
Owner is ethnic Indian  respondent is owner	863	0.09	0.28	0	1
Owner is ethnic minorities  respondent is owner	863	0.15	0.36	0	1
<b>Loan Variables</b>					
Personal or family savings, or assets as startup capital	992	0.89	0.31	0	1
Pooling funds among business partners or friends as startup capital	992	0.10	0.30	0	1
Loans from friends, relatives, or business partners as startup capital	992	0.07	0.25	0	1
Loans from banks as startup capital	992	0.05	0.21	0	1
Startup capital not required because the business was inherited	992	0.08	0.28	0	1
Used retained profits and business assets to finance expansion in the past two years	989	0.69	0.46	0	1
Used personal/family saving(s) of owners and to finance expansion in the past two years	989	0.52	0.50	0	1
Submitted loan applications in the past two years	994	0.15	0.36	0	1
Number of bank loan applications submitted in the past 2 years  submitted applications	153	1.44	.65	1	4
Loans applications were approved   submitted applications	153	0.93	0.26	0	1
Number of bank loans approved   submitted applications	153	1.28	0.69	0	4
Bank loans amount (1000 US\$)	138	271	412	6	2500
Number of collateral required   received bank loans	133	1.28	0.58	1	4
Value of collateral   received bank loans (million US\$)	135	1.45	4.61	0	50
Bank loan repayment timeframe (months)	137	11.82	13.50	0	98
Annual bank loan interest (%)	137	12.83	10.76	0	98
To finance business expansion	136	0.76	0.43	0	1
To finance acquisition of new capitals/improving existing capitals	136	0.29	0.45	0	1
To finance regular business operations	136	0.21	0.41	0	1
To pay back existing debt	136	0.02	0.15	0	1
Business has ever received bank loans since establishing	974	0.17	0.38	0	1
Total bank loans received since establishing   received bank loans	158	3.16	4.01	0	22
Didn't understand or not familiar with the procedures to apply for bank loans	797	0.15	0.36	0	1
Bank loan procedures were lengthy and complicated	797	0.26	0.44	0	1
Didn't have the collateral banks required	797	0.12	0.32	0	1

Table 1 (Continued)

	N	Mean	S.D.	Min	Max
Not enough collateral value	797	0.07	0.25	0	1
Didn't need a bank loan	797	0.65	0.48	0	1
Business tried to get any loans from relatives/friends in the past 2 years	990	0.23	0.42	0	1
Number of loans business trying to get from friends/relatives in the past 2 years	224	4.50	6.17	0	66
Number of loans business received from friends/relatives in the past 2 years	221	4.19	5.89	0	60
Loan amount from friends/relatives (1000 US\$)	207	84	211	0.50	2,000
Annual interest rate for loans received from friends/relatives in the past 2 years (%)	206	38.64	7.32	0	97
<b>Public Service Variables</b>					
Respondent made any business related trips to the capital city in the past 6 months	1003	0.20	0.4	0	1
Respondent made any business related trips to the capital city in the past 6 months  having sold goods or services to the government	133	0.48	0.50	0	1
Number of business trips to the capital city in the past 6 months  made any trips	201	5.84	7.45	1	60
Number of days each trip lasted   made any trips	196	2.49	1.95	1	20
Average cost per trip (US\$)   made any trips	195	189.74	100.5	100	600
Have a branch office in the capital	998	.04	.18	0	1
<b>Electricity Variables</b>					
Business applied for new electricity connection in the past 12 months	1002	0.08	0.26	0	1
Number of days it took to get new electricity connection	61	48.48	58.29	1	360
Business was required to buy a transformer with the new electricity connection	61	0.41	0.50	0	1
Cost of new electricity connection including transformer (1000 US\$)	52	21	30	0	100
Business experienced any power outage in a typical month in 2013	1003	0.97	0.17	0	1
Number of outages experienced in a typical month in 2013 (all)	904	12.85	16.36	1	100
Number of outages experienced in a typical month in 2013 (non-industrial)	716	11.30	14.1	1	99
Number of outages experienced in a typical month in 2013 (industrial)	188	19.00	22.0	1	100
Hours each outage lasted	916	3.31	5.54	1	48
Business owns a generator	999	0.70	0.46	0	1
Number of times operating generator due to outage	649	11.70	15.8	0	100
Hours operating generator each outage	651	2.90	4.8	0	48

medium size businesses. Our data are from two surveys, which we fielded in the city of Yangon from May 2014 to November 2014.<sup>7</sup> The first survey collects information on a random sample of approximately 900 SMEs in the Yangon area of Myanmar through structured interviews with business owners. For the first survey, we examined two sources for the sampling frame: (1) the DICA list, and (2) the 2014 Yangon Directory. The Directorate of Investment and Company Registration (DICA), a government agency mainly responsible for registering businesses, maintains a list of active and registered businesses. The DICA list is publicly available and can be downloaded from the DICA official web site (<http://www.dica.gov.mm/>). There are however a few limitations associated with using the DICA list as a sampling frame. First, it contains a large number of businesses that are obsolete or not operational. Second, the names of the owners provided may not be the current or functional owner. Third, it excludes businesses that were recently registered. Fourth, it has no information on size (the number of employees) and contact information. Fifth, it does not contain all eligible SMEs because some SMEs register with other authorities depending upon the industry. For instance, hotels and tourism companies are registered with the ministry of tourism, and manufacturing firms with the ministry of industry; some SMEs register with local municipalities. This suggests that various registers from various ministries and municipalities need to be combined to create a frame that covers all eligible SMEs, a task that is not feasible in the Myanmar context.

Another list we considered is the 2014 Edition of the Yangon Directory, which has been published annually by a leading market research company for many years (<http://www.yangondirectory.com/en/>). The 2014 Yangon Directory is widely used across Myanmar by households, government agencies, NGOs, INGOs, embassies, and business entities, thus all businesses have an incentive to list their names and advertise their products and services in the Directory, regardless of size, industry, location, and registration status. Most importantly, listing in the Yangon Directory is free. Thus, the 2014 Yangon Directory provides a more comprehensive and up-to-date coverage of the target population and our final sampling frame consists of businesses listed in this directory. The directory list includes information on business and owner name, contact information (including complete address and telephone numbers), industry, year of establishment, and employment size.

Selection into the study was based on three criteria: (1) small or medium size (i.e., more than 5 employees and less than 100 employees); (2) listed in the 2014 Edition of the Yangon Directory; and (3) located within the Yangon area. The choice of Yangon as our study setting is mainly dictated by the fact that over 90% of registered SMEs in Myanmar are located in Yangon (DICA), while the cost and logistics of surveying firms outside the Yangon area were prohibitive for the budget we had available. The sampling frame was stratified by size, industry, and geographical location. Independent samples were then drawn from each stratum proportional to the size of the stratum, ensuring that businesses in all sub-groups had a chance of

<sup>7</sup> Data collection periods for Soans and Masato (2015) and D'Eval (2015) were January 2014–April 2014 and December 2014–March 2015, respectively.

being included. Each sampled enterprise was contacted via telephone to schedule an appointment for an interview with the owner.

Ethnic minorities comprise approximately 40% of the population, yet little is known about the characteristics of enterprises owned and operated by ethnic minorities (minority enterprises hereafter). Due to their small number, we designed a second survey to get access to and sample minority enterprises. Specifically, the second survey collects information on a sample of approximately 100 minority enterprises (i.e. businesses which are at least 51% owned, operated and controlled on a daily basis by Myanmar citizens of one or more of the following ethnic minorities: Kachin, Kayah, Karen, Chin, Mon, Rakhine, and/or Shan ethnic minority) in the Yangon area. As no sampling frame exists for the minority populations, we employed a snowball sampling approach. The snowball sampling involved visiting communities across Yangon and contacting ethnic and religious leaders to locate and interview minority enterprises.

The questionnaires (available in both Burmese and English) for both surveys were identical to ensure data uniformity. We merge data from the two surveys to generate a unique dataset for this research.<sup>8</sup> The topics covered in the questionnaire included: (1) firm and respondent characteristics, (2) capital and access to credit, (3) access to public services, (4) access to electricity, (5) ranking of business climate domains, and (6) evaluations of vignette descriptions.

For quality control purposes, we employed Computer-Assisted Personal Interviewing (CAPI) to streamline and automate data collection activities, such as interview schedules and data management. Enumerators entered interview responses directly into the programmed CAPI database. The use of CAPI dramatically increased the ability to catch errors made in the field by informing the enumerator immediately when a section was improperly skipped, incomplete, or inconsistent with responses from previous questions. Through the CAPI system, the field team sent the encrypted interview data back to us electronically at the end of each day, allowing us to check the data in real time and provided immediate feedback such that corrections could be made the next day if there were data anomalies.

The following describes the sample statistics, which are provided in [Table 1](#).

### 2.1. Respondent characteristics

The data reveal that 51% of respondents report growing up in a family owning at least one business, indicating strong historical ties to entrepreneurship. About 35% of respondents report owning a business prior to establishing their current business. Of those who owned a prior business, 34% mention that their prior businesses produced similar goods and services as their current businesses do. Of those who had work experience prior to establishing the current business (73%), 54% mention that they accumulated the experience in the same industry as the current business. The average length of work experience prior to establishing the current business is 12 years and the average age of respondents is 44.28 years. About 36% of respondents are aged 19–39, 36% aged 40–50, 24% aged 51–64, and 5% aged 65 and above.

Unlike other enterprise surveys where a majority of respondents tend to be non-owners, we strictly required that respondents were either owners or co-owners. This is because our survey contains vignettes, subjective and qualitative questions that only owners could answer accurately. Based on our prior experience, non-owners have difficulty answering these questions. We did however accept non-owner respondents in situations where owners are no longer actively involved in businesses operations. That said, owners make up 86% of our sample. Conditional on respondents being owners, 99% mention that they are actively involved in the business operations.

As for ethnic composition, 61% of the respondents identify themselves as ethnic Burmese, 16% ethnic minorities, 12% Chinese, and 8% Indians. About 31% of respondents can be categorized into the low education group (below high school, high school, and vocational training), 59% in the medium education group (associate and bachelor degree), and 9% in the high education group (advanced and professional degree). Myanmar is a male-dominated society and our data indicate a large gender gap in entrepreneurship: about 74% of the respondents are male.

### 2.2. Business characteristics

Small businesses make up a majority (73%) of the sample. About 211 of the sample businesses (21%) are located in industrial zones. About 16% of the SMEs sold goods or services to the Myanmar government in the past two years. The average number of years a business has been operational is 14.2. 38% of sample SMEs have been operational at least 16 years, 35% between 6 and 15 years, and 27% less than 5 years. The low percentage of young enterprises might imply high entry cost and difficulty setting up a new enterprise. It may also indicate issues with the sampling frame if new businesses delay registering with the Directory.

The data suggest a racial gap in SME ownership. Conditional on respondents being owners (86% of SMEs), Chinese and Indian owners account for 21% of SMEs, which far exceeds their population share of less than 5%. The economic success of ethnic Chinese and Indians is partially due to the fact that operating family-owned enterprises was the only economic option readily available to them in the past. This is also reflected by the fact that SMEs owned and operated by ethnic Chinese and

<sup>8</sup> The dataset together with the questionnaire and technical documentations can be downloaded at the following: <https://cesr.usc.edu/research/publications>.

Indians are significantly older than those owned by majority ethnic Burmans: about 52% of SMEs owned by ethnic Chinese and Indians have been operational for at least 16 years compared to 38% for ethnic Burmans.

Ethnic minority owners account for about 15% of SMEs. Despite our efforts to include more ethnic minorities in the sample, this falls short of their population share of 40% of the Myanmar population of 51 million.<sup>9</sup> Their economic disadvantages are partially due to political constraints facing minority populations, including the ongoing civil wars in areas inhabited by ethnic minorities across the country. Ethnic minority Shans are the largest ethnic minority group with an estimated population of 4–5 million based on a population share of 8.5% of 51 million.<sup>10</sup> The sample share of ethnic Shans is 4.48%, far below their population share. The Karens are the second largest minority with a population estimated at 3–4 million, based on a population share of 6% and their sample share is 4.48%. Ethnic minorities Kachins are estimated to number 1 million based on a population share of 2%. Their sample share is 1.1%. Ethnic Rakhine owners make up 4.28% of the sample, which slightly exceeds their population share of 3.5%.

### 2.3. Capital and loan variables

A majority of SMEs in our sample rely on personal funds as startup capital. When asked what the main sources of startup capital are, 89% report personal or family savings or assets, while only 5% of respondents report using bank loans as startup capital. As for the source of finance for business operations or expansions in the past two years, about 69% of SMEs report relying on retained profits and business assets, and 52% report using personal/family savings of owners.

With regard to access to bank loans, 151 SMEs (15% of the sample) report having applied for bank loans in the past two years. Conditional on applying for bank loans in the past two years, the average number of bank loan applications is 1.4 and 93% of loan applications were approved. The average bank loan amount is US\$ 271,000, and the average collateral value per loan is US\$ 1.5 million, suggesting that on average an SME borrows 19% of the collateral value, and the average number of sources of collateral is 1.28 per loan. The average bank loan maturity is 12 months, and the average bank interest is 13%—the maximum allowed by existing banking rules and regulations.

Conditional on applying and receiving bank loans in the past two years, 76% of SMEs report using the loans to finance business expansion, 29% to acquire new capital or improve existing capital, and 21% to finance regular business operations; only 2% of SMEs report using the bank loans to pay off existing debts.

The data reveal limited interactions between SMEs and the banking sector. On average, just 17% of SMEs report having received any bank loans since they were established. Conditional on SMEs receiving any bank loans since establishing, the average number of loans is 3.16. About 85% of SMEs did not apply for any bank loans in the past two years. Those with outstanding bank loans are also more likely to have received loans in prior years. When asked the primary reasons for not applying for SME loans, 41% mention that they did not understand or were not familiar with procedures for bank loans, or loan procedures were lengthy and complicated, or both, and 19% cited a lack of required collateral or insufficient collateral value.

While bank lending to SMEs is limited, informal lending is quite common and provides the main source of financing for most SMEs. On average, 23% of SMEs report receiving personal loans from informal sources (i.e., friends or relatives) in the past 2 years. The average number of loans is 4.2, the average loan amount is US\$ 84,000, and the average interest rate is 39% (these compare to 1.4, US\$ 271,000, and 13%, respectively, for formal lending). Thus, our data indicate that access to finance is difficult and costly for most Myanmar SMEs.

### 2.4. Public sector variables

For most Myanmar SMEs, daily business activities include interactions with various government agencies as the government still plays a dominant role in regulating key sectors of the economy. A majority of these interactions occur in the capital city, Naypyidaw, which is home to government agencies and ministries, located 200 miles north of Yangon. A trip to Naypyidaw from Yangon can take up to 6 h by private car.

Approximately 20% of the respondents report having made at least one business related trip to the capital in the past 6 months. Conditional on SMEs having sold goods or services to government agencies, the percentage of respondents having made at least one trip to the capital city in the past 6 months is 48%. The most frequently mentioned purposes of the trips are to (1) meet government officials or attend meetings (68%), (2) secure new contracts or business opportunities from the government (42%), or (3) complete administrative paperwork (26%). For the respondents who made business related trips to the capital in the past 6 months, the average number of trips is 5.8, with each trip lasting 2.5 days and costing US\$ 190 on average. One way a business can reduce the transaction costs associated with travelling to the capital from Yangon is to establish a branch office in the capital city: 4% of the SMEs in the sample have branch offices in the capital. Another way is to

<sup>9</sup> This statistic should be interpreted with caution as official statistics on minority populations are not available; the accuracy of the statistic can't be verified (Source: <https://www.cia.gov/library/publications/the-world-factbook/geos/bm.html>).

<sup>10</sup> Data on ethnic population shares are from the 1983 Census. Data on the current Myanmar population is from the 2014 Census. The 2014 Census collected household and individual information (including race and ethnicity) across the country. However, data on ethnic populations from the 2014 Census are not readily available. <http://countryoffice.unfpa.org/myanmar/census/>.

utilize the services of a third party or an agent based in the capital: 25% of respondents report utilizing these services in the past 6 months.

## 2.5. Electricity variables

According to an estimate by the [International Energy Agency \(2012\)](#), only 49% of the Myanmar population has access to electricity. In areas served by electricity, insufficient voltage and power outages are very common. About 97% of SMEs in our sample report experiencing outage in every month in the past year, and the average number of outages per month is 12.9 with each outage lasting 3.3 h on average, with SMEs located in industrial zones experiencing more outages (19 per month). About 70% of SMEs report owning a private generator. Typically, the total number of hours a private generator is operated corresponds to the number and duration of outages experienced.

Although electricity is available, it is costly, difficult to get, and inconsistent. About 8% of SMEs report applying for a new connection in the past 12 months, while 41% of these report needing to buy a transformer, which may explain the high average cost of a new connection (US\$ 21,000). The average number of days to get a new connection is 48.5 days.

## 2.6. Ranking of the three business domains

In addition to self-reports of difficulty in access to each of the three business domains considered, respondents also rank each of the three business domains from most difficult to least difficult. About 54% of the respondents rank access to credit as the most difficult, 24% access to electricity, and 22% access to public services.

To assess if the order of the ranking correlates with self-reports of difficulty and check for internal consistency, we create three dummies indicating whether a given business domain is ranked first (i.e., as most difficult), and then regress these dummies on self-reports of difficulty. [Table 2](#) reports the results, which show a significant and positive relationship between whether a business domain is ranked first and self-reports of difficulty. For instance, a one-point increase in self-reports of difficulty (remember the scale runs from 1 being “no difficulty” to 5 being “severe difficulty”) in access to credit is associated with a 9.9 percentage point increase in the likelihood that it will be ranked first. Similarly, a one-point increase in self-reports of difficulty in access to electricity and public services is positively associated with a 11.9 and 12.4 percentage point increase in the odds that they will be ranked first, respectively.

To examine how the top ranking correlates with respondent and firm characteristics, we next regress the three dummies on a set of subgroups by (1) age (19–39, 40–50, 61–64, 65+ age groups with 19–39 as the reference group), (2) education (low, medium, high education groups with low education group as the reference group), (3) ethnicity (Burmese, ethnic minorities with ethnic minorities as the reference group), (4) gender (male and female with female as the reference group), (5) ownership (owner and non-owner with non-owner respondents as the reference group), (6) size (small and medium with medium-size as the reference group), (7) interactions with government (selling or not selling any goods or services to the government with not selling as the reference group), and (8) location (industrial and non-industrial zone with businesses located in non-industrial zones as the reference group).

[Table 3](#) presents the results, which indicate that SMEs located in industrial zones are 16 percentage points more likely to rank access to electricity first and 11 percentage points less likely to rank access to credit first. This finding is consistent with the fact that SMEs located in industrial zones experience significantly more outages per month than those located outside industrial zones. In contrast, SMEs selling goods or services to government agencies are 7 percentage points more likely to rank access to public services first. This is hardly surprising given that 48% of respondents who have sold any goods or services to government agencies report making at least one business related trip to the capital city in the past 6 months. This compares with 17% for respondents who have never sold any goods or services to government agencies.

The ranking differs by industry. Compared with SMEs in manufacturing and service industries, SMEs in the trading industry are more likely to rank access to credit as the most difficult. This could be due to differences in financial resources

**Table 2**

Dependent Variable: Credit, Electricity, and Public Service Is Ranked First; Independent Variables: Self-Reports Of Difficulty on a 5-Point Scale.

	Credit	Electricity	Public Services
Self-reports of difficulty (credit)	0.099 [0.013]***	−0.054 [0.011]***	−0.045 [0.011]***
Self-reports of difficulty (electricity)	−0.069 [0.013]***	0.119 [0.011]***	−0.050 [0.011]***
Self-reports of difficulty (public services)	−0.062 [0.015]***	−0.061 [0.012]***	0.124 [0.012]***
Constant	0.641 [0.048]***	0.184 [0.040]***	0.175 [0.039]***
N	945	945	945
R-Squared	0.092	0.133	0.105

Standard errors are in brackets. \*Significant at 10% level. \*\*Significant at 5% level.

\*\*\* Significant at 1% level.

**Table 3**  
Dependent Variable: Credit, Electricity, and Public Services Is Ranked First.

	Credit	Electricity	Public Services
Age (40–50)	–0.036 [0.038]	0.069 [0.032]**	–0.033 [0.032]
Age (51–64)	–0.028 [0.043]	0.038 [0.035]	–0.009 [0.035]
Age (65+)	–0.163 [0.079]**	0.144 [0.066]**	0.019 [0.065]
Trading	0.084 [0.049]*	–0.060 [0.041]	–0.024 [0.041]
Service	–0.082 [0.054]	0.036 [0.045]	0.046 [0.044]
Manufacturing	–0.006 [0.052]	0.114 [0.043]**	–0.108 [0.043]**
Medium education	–0.055 [0.036]	–0.009 [0.030]	0.065 [0.030]**
High education	–0.127 [0.059]**	–0.012 [0.050]	0.138 [0.049]**
Ethnic Burmese	–0.008 [0.033]	–0.003 [0.027]	0.011 [0.027]
Male	–0.028 [0.037]	0.001 [0.031]	0.027 [0.031]
Small-size business	0.017 [0.038]	–0.063 [0.031]**	0.046 [0.031]
Selling goods or services to government	0.032 [0.042]	–0.098 [0.035]**	0.066 [0.035]**
If respondent is owner	0.120 [0.047]**	–0.098 [0.039]**	–0.022 [0.039]
Located in an industrial zone	–0.109 [0.042]**	0.156 [0.035]**	–0.047 [0.035]
Constant	0.532 [0.080]**	0.306 [0.067]**	0.162 [0.066]**
N	974	974	974
R-squared	0.044	0.090	0.047

Standard errors are in brackets.

\* Significant at 10% level.

\*\* Significant at 5% level.

\*\*\* Significant at 1% level.

required to operate an SME. For instance, annual sales are significantly larger among trading SMEs, compared with manufacturing and service SMEs. Due to their heavy reliance on electricity input, manufacturing SMEs are more likely than non-manufacturing SMEs to report that access to electricity is the most severe for them. Due to relatively less interactions with government agencies as measured by the number of trips made to the capital city in the past 6 months, manufacturing SMEs are less likely to rank access to public services first.

The heterogeneity in difficulty suggests the need for various government agencies to coordinate their actions and take into consideration industry-specific constraints when formulating their policy responses.

## 2.7. Determinants of SME growth

We investigate which firm characteristics are determinants of SME growth. We measure SME growth as average change in the number of employees per year since an SME was established, which is given by  $\frac{(\text{Employment size}_{2013} - \text{Employment size}_{\text{year established}})}{(2013 - \text{Year of Establishment})}$ . We regress the growth measures on a set of firm characteristics that include (1) if a respondent makes any business related trip to the capital city in the past 6 months as proxy for an SME receiving any business contracts from a government agency or ministry, (2) three dummies indicating the number of employees (0–5, 6–10, 11–20) when an SME was first established, as prior studies reveal that firms that start small tend to grow faster than those starting large (the reference group is 21–100 employees), (3) whether an SME is in trading, services, manufacturing, or construction industries (the reference group is other), and (4) if an SME is located in an industrial zone (outside an industrial zone is the reference group).

The results in Table 4 indicate that making any business related trip to the capital city in the past 6 months is associated with an additional 0.873 increase in the average number of employees per year since a firm was established, and the point estimate is significant at the 5% level. Construction firms on average experience a 2.846 increase in the average number of employees per year since establishment and the coefficient is significant at the 1% level. We observe no significant differences in the growth of the average number of employees per year among service, trading, and manufacturing firms. The three dummies for initial employees when an SME was established (0–5, 6–10, 11–20) have the expected signs and are significant at the 1% level, confirming prior findings that firms that start small tend to grow faster compared with firms with

**Table 4**  
SME Growth.

	Average change in employment size per year since establishing
Make trip to the capital city in the past 6 months	0.873 [0.380]**
Initial employee (0-5)	2.780 [0.524]***
Initial employee (6-10)	2.495 [0.550]***
Initial employee (11-20)	2.611 [0.640]***
Trading	0.078 [0.522]
Service	0.083 [0.560]
Manufacturing	-0.270 [0.536]
Construction	2.846 [0.824]***
Industrial zone	0.644 [0.390]*
Constant	-2.382 [0.658]**
N	984
R-sq	0.053

Standard errors are in brackets.

\* Significant at 10% level.

\*\* Significant at 5% level.

\*\*\* Significant at 1% level.

an initial employment size greater than 20. These findings are robust to the inclusion of respondent characteristics (results not shown).

Our data do not permit an explanation as to why making trips to the capital would be associated with stronger SME growth. It could well be the case that respondents frequently travelling to the capital city are fundamentally different in observed and unobserved characteristics from those who have not made any business related trips to the capital. For instance, they might possess broader and better skills, in particular managerial, or could be more efficient at navigating their way through and take advantage of complex and opaque bureaucracies, including the ability to bribe government officials in exchange for securing lucrative government contracts.<sup>11</sup>

### 3. Vignette descriptions

We employ vignettes to identify and evaluate barriers to access. Briefly, vignettes are short descriptions of hypothetical business owners facing varying degrees of difficulty with access to services in the three business domains. We wrote three series of vignettes covering access to (1) credit, (2) public services, and (3) electricity. The credit series consist of 12 vignettes, the public service series 9 vignettes, and the electricity series 9 vignettes. The complete text of each vignette description is provided in [Appendix A](#). All vignettes were assigned neutral sounding names to eliminate any effects associated with names, and were presented in random order so that it is possible to control for possible order effects by which earlier vignettes may affect the evaluations of subsequent vignettes. Each respondent was presented with 3 randomly chosen vignettes in each of the three domains, answering 9 vignettes in total, and asked to evaluate the difficulties faced by vignette persons on the same scale as they evaluate themselves: (1) no difficulty; (2) mild difficulty; (3) moderate difficulty; (4) major difficulty; (5) severe difficulty.

#### 3.1. Variations in vignettes

[Tables 5–7](#) present summaries of variations of vignette characteristics across credit, public services, and electricity domains.

There are six potential ways a credit vignette can vary ([Table 5](#)): (1) loan amount (US\$ 30,000 or US\$ 100,000); (2) annual interest (13%, 18%, 24%, 36%, or 48%); (3) source of loan (friends/relatives, commercial bank, or SME bank); (4) collateral

<sup>11</sup> The perceived corruption level in Myanmar is still high. According to the Transparency International's 2015 Corruption Perceptions Index, Myanmar ranks 147 out of 168 countries. The new civilian government has made it clear that the fight against corruption will be one of its top priorities.

**Table 5**  
Variations in Credit Vignettes.

Vignette	Loan amount (US \$)	Annual interest rate (%)	Source of loan	If loan requires collateral	Type of collateral required	Collateral value (US\$)
1	30,000	18	friends/relatives	no	na	na
2	30,000	24	friends/relatives	no	na	na
3	30,000	24	friends/relatives	yes	apartment	unspecified
4	30,000	36	friends/relatives	no	na	na
5	30,000	36	friends/relatives	yes	apartment	unspecified
6	30,000	48	friends/relatives	no	na	na
7	100,000	13	bank	yes	estate	100,000
8	100,000	13	bank	yes	estate	200,000
9	100,000	13	bank	yes	apartment	200,000
10	100,000	13	bank	yes	estate	300,000
11	100,000	13	SME bank	no	na	na
12	not qualified for any loans					

**Table 6**  
Variations in PS Vignettes.

Vignette	Cost (1000 US\$)	Number of days	Number of official procedures	Can complete paperwork in Yangon	Paperwork involves trip to the capital	Can complete paperwork online	Days to clear invoice	Number of official signatures required
1	1.20	60	11	No	No	No	0	0
2	1.20	3	2	No	No	No	0	0
3	0	0	0	Yes	No	No	0	0
4	0	0	0	No	Yes	No	0	0
5	0	0	0	No	No	Yes	0	0
6	0	14	0	No	No	No	14	3
7	0	14	0	No	No	No	14	1
8	0	2	0	No	No	No	2	1
9	4.50	150	0	No	No	No	0	0

requirement (whether a loan requires collateral or not); (5) type of collateral if collateral is required (land, house, or apartment); and (6) collateral value<sup>12</sup> if collateral is required (100%, 200%, or 300% of the loan amount). If a loan is from a bank, the interest is fixed at 13%—the maximum allowable interest a bank can charge under prevailing banking rules and regulations. If a loan is from friends/relatives, the interest ranges from 18% to 48%. Currently, Myanmar banks only accept empty land or houses, or both, as collateral. To be considered as valid collateral, borrowers must be the registered and sole owners of the collateralized assets. Apartments or luxury apartments such as condominiums are cheaper and easier to own than land or houses, but they are not accepted as collateral by banks.

Although we wrote the vignettes before we could learn about the SMEs, the characteristics included in the vignettes are approximate characterizations of difficulties facing SMEs. For instance, credit vignette 12 describes a business owner who has no access to credit—a situation faced by a majority of SMEs, particularly among small-size businesses. Existing banking regulations only allow land or houses, or both, to be used as collateral and borrowers must be the sole and registered owners. This strict collateral requirement is reflected in vignettes 7, 8, 9, and 10. Some vignettes describe new policies or a relaxation of existing policies, or policies under consideration. For instance, there is an ongoing discussion among policy makers and the donor community about the creation of SME banks that will exclusively cater to the credit needs of the Myanmar SME population.<sup>13</sup> Vignette 11 represents this scenario where the business owner is granted a collateral-free loan from a newly-created SME bank at 13% interest; vignette 9 exemplifies a relaxation of existing stringent collateral requirements by allowing the business owner to place his/her apartment as collateral, which will in turn enable us to evaluate the impact of allowing apartments as collateral, relative to land and houses.

<sup>12</sup> Collateral values are usually forced-sales values, meaning the value one will receive if one needs to sell the collateral tomorrow. Forced-sales values are significantly lower than market values.

<sup>13</sup> The Small and Medium Industrial Development Bank (SMIDB), a state-owned bank, is the only bank currently making credit available to a small and very specific group of SMEs. Commercial banks don't offer financial products that exclusively serve the SME population, citing prohibitive and strict regulations.

**Table 7**  
Variations in Electricity Vignettes.

Vignette	New connection	Business located in an industrial zone	Hours operating generator each day	Complete lack of electricity	Generator to power air conditioning only	Application pending	Without electricity one hour each day	Rare power outage and voltage is sufficient
1	Yes	No	0	No	No	No	No	No
2	No	Yes	6	No	No	No	No	No
3	No	No	4	No	No	No	No	No
4	No	No	0	Yes	No	No	No	No
5	No	No	0	No	Yes	No	No	No
6	No	No	8	No	No	No	No	No
7	No	No	0	No	No	Yes	No	No
8	No	No	0	No	No	No	Yes	No
9	No	No	0	No	No	No	No	Yes

Construction of our public services vignettes is mainly informed by consultations with business owners and individuals who are knowledgeable about the functioning of government bureaucracy.<sup>14</sup> Given Myanmar's current status as one of the most difficult places to start a business, it is not feasible to include all bureaucratic constraints in our vignettes. Having said that, the variations present in the 9 public service vignettes we developed for this research provide a reasonable characterization of the present regulatory and bureaucratic environment. Specifically, there are 8 potential ways a public service vignette can vary (Table 6): (1) costs to acquire a public service; (2) number of days it takes to receive a public service; (3) number of official procedures involved to complete administrative paperwork; (4) whether the administrative paperwork can be completed in Yangon; (5) whether the administrative paperwork can be completed online; (6) whether a trip to the capital city is required to complete the administrative paperwork; (7) number of days it takes to get invoices approved; and (8) number of official signatures required to get invoices approved.

About half of the Myanmar population lacks access to electricity (International Energy Agency, 2012). In communities currently receiving electricity, insufficient voltage and power outages are very common. Given these facts, construction of our electricity vignettes is guided by two factors: ease of access and reliability conditional on having access. Specifically, there are 9 potential ways an electricity vignette can vary (Table 7): (1) costs to secure a new electricity connection, (2) number of days it takes to secure a new connection, (3) if a business is located in an industrial zone, (4) total hours a business has to operate a generator due to power outage or insufficient voltage, (5) whether a business has no access to electricity at all, (6) whether a generator is used to mainly power air conditioning due to insufficient voltage, (7) whether an application for new electricity connection is pending, (8) whether a business has to operate without electricity for an hour each day, and (9) whether a business rarely experiences power outage and insufficient power voltage.

Table 8 presents summary statistics of vignette evaluations, distinguished by domain. The last column shows the percentage of respondents answering either "major" or "severe" difficulty.

### 3.2. Vignette regressions

To understand how owners of SMEs evaluate various difficulties in the business environment, we analyze the effects of vignette characteristics on respondent ratings. The following describes the variables entering vignette regressions.

#### 3.2.1. Credit vignettes

(1) interest rate, (2) a dummy indicating whether a loan is from a bank, (3) a dummy indicating whether a loan is from a newly-established SME bank, (4) value of collateralized asset expressed as percentage of loan amount, (5) a dummy indicating whether a collateralized asset is an apartment, (6) a dummy interacting bank loan dummy with apartment dummy, and (7) a dummy for vignette 12, which describes an owner who has no access to any credit.

#### 3.2.2. Public services vignettes

(1) costs to acquire a public service (in 1000 US\$), (2) days it takes to have a public service delivered, (3) number of official procedures involved to complete an administrative paperwork, (4) a dummy for vignette 3 describing an owner who can complete administrative paperwork in Yangon, (5) a dummy for vignette 4 describing an owner who is required to make a trip to the capital to complete administrative paperwork, (6) a dummy for vignette 5 describing an owner who can complete administrative paperwork online, (7) number of days it takes to have an invoice approved, and (8) number of official signatures required to have an invoice approved.

<sup>14</sup> Since this study was conducted in 2014, this mainly refers to the bureaucracy that prevailed during the previous government. However, we do not expect the bureaucracy to undergo dramatic changes in a short period from 2014 to the current year.

**Table 8**  
Summary Statistics of Vignette Evaluations.

Domain	Vignette	N	Mean	Ranking	SD	% "major" or "severe"
Credit	1	258	2.53	1	1.19	20
	2	258	2.57	2	1.19	22
	3	241	2.78	3	1.15	24
	4	248	3.09	9	1.14	37
	5	254	3.21	10	1.16	42
	6	242	3.29	11	1.25	47
	7	227	2.92	6	1.19	33
	8	244	2.95	7	1.05	31
	9	222	2.82	4	1.15	23
	10	254	3.00	8	1.14	30
	11	269	2.84	5	1.20	29
	12	271	3.39	12	1.16	52
Public Services	1	315	3.94	8	0.93	70
	2	365	2.99	4	1.11	32
	3	365	1.45	2	0.76	2
	4	363	3.37	6	0.89	43
	5	273	1.44	1	0.74	2
	6	342	3.42	7	0.96	48
	7	297	3.35	5	0.99	42
	8	325	2.68	3	1.02	20
	9	314	3.99	9	0.87	72
Electricity	1	341	3.69	5	1.08	61
	2	360	4.16	7	0.74	87
	3	332	3.86	6	0.76	72
	4	359	4.33	8	0.80	90
	5	296	2.58	1	0.98	17
	6	346	4.47	9	0.71	93
	7	326	3.47	4	1.03	51
	8	320	2.83	3	1.20	30
	9	311	2.58	2	1.37	30

### 3.2.3. Electricity vignettes

(1) a dummy for vignette 1 describing a business that just received a new connection under existing administrative procedures, (2) a dummy indicating if a business is located in an industrial zone, (3) total hours a business operates a generator each day due to power outage or insufficient voltage, (4) a dummy indicating if a business has no access to electricity, (5) a dummy indicating if a business operates generator to mainly power air conditioning due to insufficient voltage, (6) a dummy indicating if application for a new connection is still pending, (7) a dummy indicating if a business experiences outage for an hour each day and operates without electricity during outages, and (8) a dummy indicating if a business rarely experiences power outages and insufficient voltage.

**Table 9**  
Effects of Credit Vignette Descriptions on Evaluations.

	OLS	Ordered logit	Logit
Interest	0.029 [0.003]***	0.047 [0.005]***	0.048 [0.006]***
Bank loan	0.537 [0.132]***	0.908 [0.206]***	1.084 [0.255]***
SME bank loan	-0.032 [0.133]	-0.096 [0.206]	-0.238 [0.246]
Value of collateralized real estate	0.040 [0.050]	0.043 [0.077]	-0.072 [0.096]
Apartment	0.170 [0.063]***	0.265 [0.098]***	0.215 [0.120]*
Bank loan x apartment	-0.301 [0.103]***	-0.502 [0.156]***	-0.591 [0.204]***
Vignette 12	1.429 [0.124]***	2.330 [0.202]***	2.441 [0.235]***
Constant	1.966 [0.106]***		-2.345 [0.209]***
N	2988	2988	2988
R-squared	0.046	NA	NA
Controls	N	N	N

Robust standard errors (clustered at respondent level) are in brackets. \*Significant at 10% level. \*\*Significant at 5% level. \*\*\*Significant at 1% level.

**Table 10**  
Effects of PS Vignette Descriptions on Evaluations.

	OLS	Ordered logit	Logit
Fees (1000 US\$)	0.229 [0.064]***	0.434 [0.119]***	0.452 [0.143]***
Days to receive a service	0.003 [0.002] <sup>†</sup>	0.005 [0.003] <sup>†</sup>	0.004 [0.004]
Number of official procedures involved	0.088 [0.008]***	0.167 [0.016]***	0.156 [0.019]***
Vignette 3	-1.078 [0.080]***	-2.252 [0.174]***	-2.318 [0.410]***
Vignette 4	0.845 [0.081]***	1.527 [0.153]***	1.367 [0.196]***
Vignette 5	-1.086 [0.082]***	-2.263 [0.184]***	-2.365 [0.484]***
Days to clear invoice	0.053 [0.007]***	0.095 [0.013]***	0.083 [0.016]***
Number of official signatures required	0.036 [0.036]	0.072 [0.068]	0.094 [0.075]
Constant	2.530 [0.072]***		-1.616 [0.171]***
N	2959	2959	2959
R-squared	0.475	NA	NA
Controls	No	No	No

Robust standard errors (clustered at respondent level) are in brackets. <sup>†</sup>Significant at 10% level. \*\*Significant at 5% level. \*\*\*Significant at 1% level.

Table 9 presents results from 3 credit vignette regressions: (1) OLS, (2) Ordered logit, and (3) Logit, where we group “severe difficulty” and “major difficulty” into one category, and “moderate difficulty”, “mild difficulty”, and “no difficulty” into another category.<sup>15</sup> One can see that the results across the 3 models are qualitatively similar. We will limit the discussions of the results to the OLS estimates in column 1 due to their easy interpretation.

The bank loan dummy is highly significant ( $p$ -value = 0.000) and its effect size is large. Bank loans are on average rated 0.537 point higher on a 5-point scale (recall the scale runs from 1 being “no difficulty” to 5 being “severe difficulty”), relative to equivalent loans from friends/relatives. Interest rates are positively associated with evaluations and a one-point increase in interest rate is associated with an increase in evaluation by 0.029 point. Based on this point estimate, the effect of a bank loan is comparable to raising the interest rate by 19 percentage points. Respondents who did not apply for any bank loans in the past two years are asked the reasons for not applying. About 41% mention that they didn’t understand or were not familiar with procedures for bank loans, or loan procedures were lengthy and complicated as primary reasons for not applying any bank loans, which could partially explain the large bank effect. Since the reference group for the bank dummy is an equivalent loan from friends/relatives, another interpretation of the bank effect is that respondents are on average willing to compensate friends/relatives up to an additional 19% in interest (on top of the 13% banks charge, so the total interest will be 32%) if the same bank loan can be obtained from friends/relatives, keeping other loan characteristics constant.

Despite its widespread appeal to a wide audience including government officials, donor and business community,<sup>16</sup> SME bank loan has no significant effect on evaluations ( $p$ -value = 0.814) and its effect is negligible ( $\beta$  = -0.032). Likewise, the value of collateralized asset has no effect on evaluations ( $p$ -value = 0.453). In contrast, the type of collateral has significant impact ( $p$ -value = 0.006), as suggested by the coefficient of the dummy interacting apartment dummy with bank dummy – a relaxation of collateral requirement (i.e. from land or house to apartment) is associated with a 0.301-point decrease in evaluations and its effect size is equivalent to reducing the interest by about 10 percentage points. Given that a high percentage of the population lives in apartment buildings, a relaxation of collateral requirement has the potential for improving access to credit and reducing borrowing cost significantly.

The coefficient for vignette 12 uniquely identifies the situation of vignette owner 12 who has no access to credit. Thus, its coefficient represents the overall evaluation of that person. Its effect size is the largest ( $\beta$  = 1.429), equivalent to raising the interest by 49 percentage points, and highly significant ( $p$ -value = 0.000). This large effect size suggests that any policy aimed at improving access among this sub-population group offers substantial welfare and output gains.

Turning to public service vignette evaluations, the results in Table 10 indicate that every thousand dollars a vignette owner spends on acquiring a public service is associated with an increase in evaluations by 0.229 points on a 5-point scale ( $p$ -value = 0.000). Improving bureaucratic efficiency is also found to have large and significant impacts on vignette evaluations: being able to complete administrative paperwork either in Yangon (vignette 3) or online (vignette 5) is associated with a

<sup>15</sup> The results are similar qualitatively if we instead group “severe difficulty”, “major difficulty”, and “moderate difficulty” into one group, and “mild difficulty” and “no difficulty” into another group.

<sup>16</sup> See the following for extensive news coverage about SME banks. 1. <http://www.wsj.com/articles/myanmars-small-businesses-targeted-by-world-bank-loan-1410861135>. 2. <http://www.irrawaddy.org/business/burma-boost-sme-access-capital-50mln-loan-singapore-vietnam.html>. 3. <http://ifcext-tapps.ifc.org/ifcext/Pressroom/IFCPressRoom.nsf/0/DA68A4369A7ED58185257D55002561CE?opendocument>.

**Table 11**  
Effects of Electricity Vignette Descriptions on Evaluations.

	OLS	Ordered logit	Logit
New connection (vignette 1)	0.449 [0.104]***	1.318 [0.211]***	1.124 [0.319]***
If business located in industrial zone (vignette 2)	-0.001 [0.046]	-0.084 [0.098]	0.201 [0.196]
Hours of outage each day	0.153 [0.013]***	0.371 [0.031]***	0.395 [0.057]***
Complete lack of electricity (vignette 4)	1.086 [0.094]***	2.629 [0.206]***	2.786 [0.350]***
Generator mainly to power air conditioning (vignette 5)	-0.665 [0.104]***	-0.603 [0.198]***	-0.965 [0.340]***
Application for connection pending (vignette 7)	0.224 [0.102]**	0.846 [0.201]***	0.701 [0.325]**
Without electricity one hour each day (vignette 8)	-0.415 [0.109]***	-0.248 [0.211]	-0.210 [0.327]
Rare outage and sufficient voltage (vignette 9)	-0.667 [0.114]***	-0.705 [0.231]***	-0.184 [0.320]
Constant	3.243 [0.087]***		-0.652 [0.301]**
N	2991	2991	2991
R-squared	0.332	NA	NA
Controls	No	No	No

Robust standard errors (clustered at respondent level) are in brackets. \*Significant at 10% level. \*\*Significant at 5% level. \*\*\*Significant at 1% level.

1.078 and 1.086 point (p-value = 0.000 for both) decrease in evaluations respectively, relative to having to travel to the capital city to complete the same administrative paperwork. These effects are roughly equivalent to a reduction in acquisition costs to each SME by approximately US\$ 4700. Other measures of bureaucratic efficiency have expected signs and are significant as well: a reduction in one official procedure to complete administrative paperwork is associated with a US\$ 384 decrease in acquisition costs, and a one-day delay to approve an invoice is associated with a US\$ 231 increase in acquisition costs. Number of days it takes to receive a service has marginal impacts on evaluations and its effect size is negligible. This implies that after acquisition costs and bureaucratic complexities are controlled for, the time one needs to wait until one receives a public service has limited impacts, which could have implications for the design and delivery of public services to Myanmar SMEs.

Table 11 lists the effects of electricity vignette characteristics. The results indicate that an additional hour of outage is associated with an increase in evaluation by 0.153 points. Vignette 9, whose coefficient uniquely identifies the evaluation of a business that rarely experiences outage and receives sufficient electrical voltage in a typical day, is rated on average 0.667 point lower. Vignette 5 describing a business that has to operate a generator daily mainly to power air conditioners due to insufficient voltage is rated 0.665 point lower on average. That the effect size of vignette 5 is comparable to that of vignette 9 implies that if one could receive uninterrupted electricity each day, this is interpreted as no difficulty with electricity supply, regardless of whether the voltage is sufficient or not. All in all, unreliable and insufficient electricity supply has a strong impact on our respondents' evaluations of the vignettes.

About 49% of the Myanmar population lacks access to electricity and the coefficient of vignette 4 represents the overall evaluation of businesses that have no access to electricity—vignette 4 is rated on average 1.086 points higher on a 5-point scale, which is equivalent to cutting daily electricity supply by 7 h. The coefficient of vignette 1, which uniquely identifies the overall evaluation of an owner who receives a new connection under the current policy environment and paid a total of \$37,000 to get connected, is positive and highly significant (p-value < 0.01). Similarly, the coefficient of vignette 7 describing an owner sharing electricity with a neighboring office while his application is still pending is on average rated 0.224 point higher on a 5-point scale (p-value < 0.01).

It is well known that electricity supply to industrial zones located in the Yangon areas is less stable and reliable, which is also supported by the data.<sup>17,18</sup> To assess if mere mentioning of industrial zone has any significant impacts on respondents' evaluations of vignettes, we include a dummy for industrial zone. The coefficient for industrial zone is insignificant (p-value = 0.988), suggesting that the general perceptions of electricity supply in industrial zones is not systematically different from that of non-industrial areas, after controlling for outage hours.

The estimated effects of vignette characteristics presented in Tables 9–11 are robust to the inclusion of respondent characteristics as well as interactions between respondent and vignette characteristics (results not shown).

<sup>17</sup> There are 20 industrial zones spread across Yangon. See <http://myanmarindustries.org/index.php/home-2/38-myanmar-industries/industrial-zones/239-industrial-zones-yangon> for a complete list.

<sup>18</sup> For industrial zones, the average number of outages in a month is 19, compared with 11 for non-industrial areas.

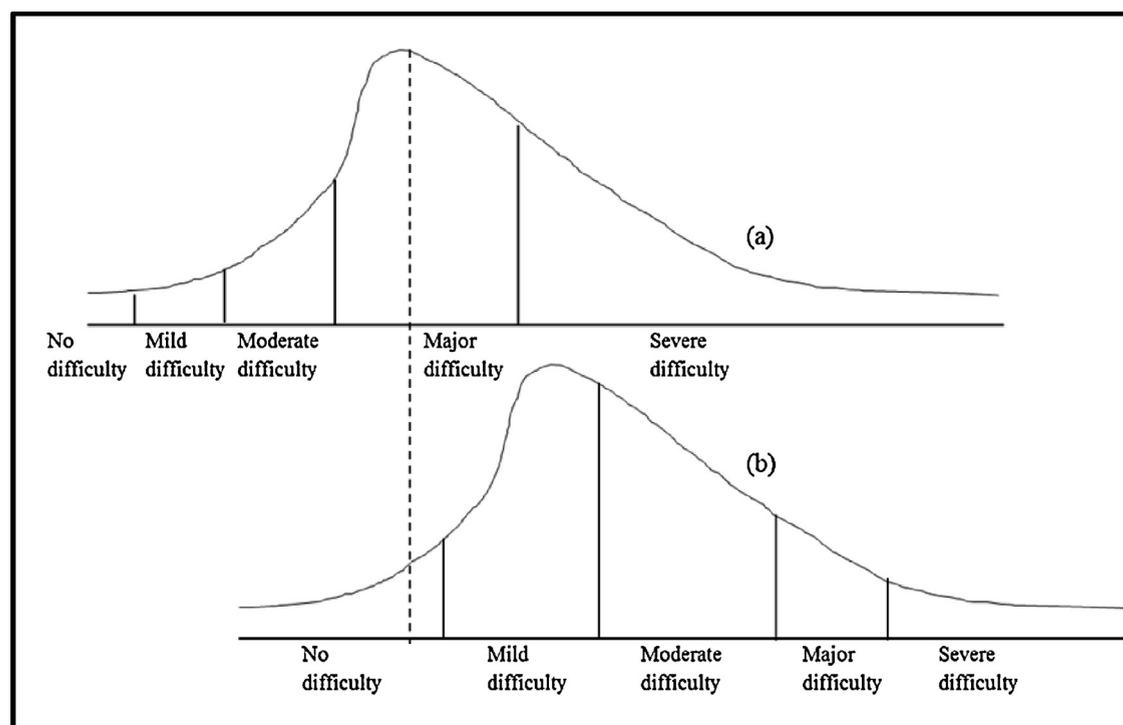


Fig. 1. Comparing Self-Reports of Business Climate in Two Sub-Groups in The Case of DIF: (A) Group a; (B) Group b.

#### 4. Response scale differences

Since our analysis utilizes subjective and categorical responses, it is important to investigate whether different respondents may use different response scales. We employ anchoring vignettes to correct for the fact that different respondents might use different response scales when self-reporting their difficulty.<sup>19</sup>

Fig. 1 provides a graphical illustration behind the use of anchoring vignettes to address the identification issue. Suppose we have two groups of business owners with different socioeconomic characteristics (say groups A and B) whose distribution of true but unobserved level of difficulty is presented in Fig. 1. The distribution of unobserved difficulty with level of access to any given business environment for group A is situated to the left of group B. This suggests that, on average, individuals in group B face more difficulty with access than those in group A.

Suppose individuals in these two groups also use different response scales if they are asked to rate their own difficulty on a 5-point scale (1 = no difficulty, 2 = mild, 3 = moderate, 4 = major, 5 = severe). In this particular example, those in group B are less likely to say “major” or “severe”, relative to a comparable person in group A. As a result, the frequency distribution of subjective responses in the two groups would lead us to the incorrect conclusion that respondents in group A face more difficulty than those in group B—the exact opposite holds true in this hypothetical example. Correcting for such differences in reporting behavior (“differential item functioning” (DIF), in the terminology of King et al. (2004)) is essential for comparing the actual barrier to access in the two groups.

<sup>19</sup> Anchoring vignettes have been used to document within and across country differences in response scales in prior studies. Kapteyn, Smith, and Van Soest (2009), Kapteyn, Smith, and Van Soest (2013) find systematic differences in what it means to be happy about one’s life in general and with respect to one’s income across individuals within the US and the Netherlands, as well as across individuals between the two countries. Vonkova, Gema, Vera, and Collin (2015) find students across countries use different reporting styles when evaluating their teachers’ classroom performance. Banks, Michael, Zoe, and James (2009) find that Americans are more likely to self-report better health, compared with their British counterparts, while more objective health measures suggest the exact opposite. Similarly, Grol-Prokopczyk, Jeremy and Robert (2011) find that women tend to be more health-optimistic compared with men. Molina (forthcoming), Bago d’Uva, Eddy, Maarten, and Owen (2008) and SV Subramanian et al. (2009) report systematic differences in what “good health” means across countries. When using self-reports of alcoholic drinks among students enrolled at an Irish University, Van Soest et al. (2011) find no difference in drinking behavior between Irish and international students, while the more objective measures of drinking indicate that Irish students have a more tolerant attitude toward drinking and thus are less likely to report that drinking is a major issue for them. Observing a large difference in the percentage of the population claiming to be work disabled between the US and the Netherlands, Kapteyn, James, and Van Soest (2007) find that a large part of observed differences in reported work disability between the two countries is due to different response scales. Specifically, Dutch respondents have a lower response threshold for reporting a work disability than Americans do. Similarly, Kristensen and Johansson (2008) find systematic differences in response scales individuals from seven EU countries use when self-reporting their job satisfaction.

**Table 12**  
Self-Reported Difficulties Adjusted for DIF.

	Access to credit	Access to electricity	Access to public services
Age (40–50)	0.158 [0.091] <sup>*</sup>	0.067 [0.097]	–0.085 [0.095]
Age (51–64)	–0.167 [0.109]	–0.082 [0.108]	–0.123 [0.109]
Age (65+)	–0.344 [0.221]	–0.059 [0.206]	–0.334 [0.219]
Medium education	0.105 [0.090]	0.069 [0.092]	0.343 [0.093] <sup>***</sup>
High education	–0.06 [0.155]	0.138 [0.151]	0.837 [0.158] <sup>***</sup>
Ethnic Myanmar (Burman)	–0.043 [0.081]	–0.007 [0.082]	–0.07 [0.083]
Male	–0.022 [0.092]	0.122 [0.094]	0.294 [0.097] <sup>***</sup>
Small-sized business	0.21 [0.093] <sup>**</sup>	–0.195 [0.094] <sup>**</sup>	–0.068 [0.095]
Selling goods or services to government	0.182 [0.098] <sup>*</sup>	–0.182 [0.106] <sup>*</sup>	0.29 [0.104] <sup>***</sup>
If respondent is owner	0.168 [0.129]	0.108 [0.116]	0.043 [0.133]
Located in an industrial zone	0.025 [0.101]	0.555 [0.099] <sup>***</sup>	0.17 [0.103] <sup>*</sup>
Constant	–1.137 [0.191] <sup>***</sup>	–1.202 [0.191] <sup>***</sup>	0.362 [0.196] <sup>*</sup>
N	980	1000	988

The use of anchoring vignettes can help achieve this correction. By construction, the vignette owners presented to both groups face the same level of difficulty. For instance, we can ask respondents to evaluate the difficulty with access of a vignette owner whose actual difficulty is represented by the broken line in Fig. 1. Respondents in group A will answer “major”, whereas those in group B will answer “no difficulty.” Since the actual difficulty of the vignette owner is the same for both groups, the difference in the vignette evaluations represents the effect of DIF. Thus, the use of anchoring vignettes can help identify and account for differences in response scales. Using the scales in one of the groups as the benchmark, the distribution of evaluations in the other group can be adjusted using that benchmark. The adjusted distribution can then be compared correctly and the correction brings the two groups on the same scale.

The formal model for achieving such corrections is presented in Appendix B. Estimation results for the effects of respondent characteristics on their perceived difficulties are presented in Appendix C for two different specifications (Tables C1–C3): (1) an ordered probit assuming no response scale differences and (2) estimates based on the econometric model spelled out in Appendix B, allowing for DIF. It turns out that the assumption of no DIF gets rejected for the domains of access to credit and for access to public services. It also turns out however that the correction for DIF makes very little difference for the estimates of the effect of personal and business characteristics on the difficulties business owners are facing. Table 12 presents estimates of these effects for the three domains with DIF correction (the non-DIF corrected results are given in Appendix C).

The results in Column 1 in Table 12 indicate that the 40–50 age group, small businesses and businesses selling goods or services to the government, are more likely to report that access to credit is more difficult for them than for others. Their coefficients are significant at the 5% and 10%, respectively. In contrast, small businesses and businesses selling goods or services to the government are less likely to mention that access to electricity is difficult (Column 2 Table 12). More educated individuals, males, and SMEs selling goods/services to the government are more likely to report that access to public services is difficult, and their differences are highly significant (Column 3 Table 12). Altogether, the differences across groups appear modest. In other words businesses all appear to face similar difficulties without large variation across businesses in how severe these difficulties are. It is reassuring perhaps that the dummy for Ethnic Burmans is never significant (although slightly negative in all three domains) so that at least our data do not point to a substantial discrimination between ethnic Burmans and others.

## 5. Conclusion and discussion

In this analysis, we use a unique dataset generated from field work we conducted in the city of Yangon, Myanmar to investigate difficulties faced by SMEs in the Yangon region.

By relating vignette ratings to a number of characteristics described in the vignettes we are able to elicit opinions on which difficulties have the most negative effect on the ease of doing business. We find for instance that, despite their widespread appeal to government officials, donors and the business community, SME loans have no discernible impact on

evaluations. The policy implication is that potential barriers to implementation and take-up of the SME loan program need to be identified and addressed if the program is to fully achieve its intended effects. Our results also imply that a policy option of allowing apartments or condominiums to be used as collateral has the potential for improving access to bank loans. Specifically, this relaxation of collateral requirement has the same effect as lowering the interest rate by 10 percentage points. Access to bank credit is found to be limited and difficult, and has an effect equivalent to increasing the interest rate by 19 percentage points. When asked the primary reason for not applying for bank loans, 41% of respondents mentioned they did not understand or were not familiar with procedures for bank loans, or loan procedures were lengthy and complicated. These findings suggest that improving access to loan information, enhancing transparency in the banking system, and simplifying loan procedures offer another area of policy intervention for improving access. Lack of access to credit is found to be associated with an increase in interest by 49 percentage points. This large effect size (coupled with the fact that a majority of SMEs lack access to credit) suggests that any policy aimed at easing access offers substantial welfare and output gain.

In terms of access to public services, our data reveal that about 20% of respondents report making business-related trips to the capital in the past 6 months, the average number of trips is 5.8, and the most mentioned purposes of making the trips are to meet with government officials or attend meetings. If we condition on SMEs selling goods or services to the government, 48% of respondents report making at least a trip to the capital in the past 6 months. About 25% of respondents also report utilizing the services of a third party or agent based in the capital in order to reduce the transaction costs associated with travelling to the capital from Yangon. Given these statistics, our estimates suggest that streamlining routine administrative paperwork to be completed online or in Yangon (compared to the need to travel to the capital city) results in a cost saving to each SME of US\$ 4700 on average. Similarly, we find that a reduction in one official procedure to complete administrative paperwork and a one day decrease to approve an invoice result in a cost saving to each SME of US\$ 384 and US\$ 231 on average, respectively. In sum, our findings point to an urgent need for improving bureaucratic efficiency to reduce business cost.

Only about 49% of the Myanmar population has access to electricity. In areas served by electricity, insufficient voltage and outages are very common. About 97% of respondents report experiencing an outage in every month. Consistent with these statistics, results from the vignette analysis indicate that getting a new electricity connection and unreliable electricity supply are perceived to be the biggest problems in access to electricity.

Our data also allow us to relate firm characteristics to SME growth. We find that growth is more concentrated among construction firms and firms that have a business relationship with the government. Further research is needed to better understand this relationship.

We also observe the rank order of difficulty to differ by industry. Trading SMEs are more like to rank access to credit first, while access to electricity is considered a top constraint for manufacturing SMEs. SMEs selling any goods or services to the government are more likely to rank access to public services as the most difficult. This heterogeneity suggests the need for various government agencies to coordinate their actions and take into considerations industry-specific constraints when formulating their policy responses.

Although our results show evidence of response scale differences in self-reported business environment data, the differences are minor, meaning that our respondents by and large use the same response scale when reporting the difficulties they are facing. When considering self-reported difficulties corrected for possible scale differences we find very few differences by type of business or personal characteristics of business owners. In other words the difficulties faced by SMEs in Yangon appear to be judged similarly.

In this paper we have concentrated on three major obstacles faced by Myanmar SMEs. Obviously, these do not exhaust all issues faced by these firms. Other dimensions that merit further study would include the availability and cost of land and shortage of skilled labor in certain sectors.

Reliable data hardly exist in Myanmar. We hope that the findings we report from the field research we conducted will help policy makers prioritize their reform efforts, better inform their policy decisions, and encourage further research and discussions. But obviously more data are needed as a foundation of effective policies to improve the economy.

## Appendix A. Text of vignettes

### Credit vignettes

*Vignette 1:* U Ko Ko owns a service business. To expand his business, he has received a loan worth US\$ 30,000 from a relative at 18% APR (1.5% per month) without collateral. Repayment timeframe is flexible. He is not qualified for any bank loans.

*Vignette 2:* U Soe Aung owns a logging business. To expand his business, he has received a loan worth US\$ 30,000 from a friend at 24% APR (2% per month) without collateral. Repayment timeframe is flexible. He is not qualified for any bank loans.

*Vignette 3:* U Win Naing owns a trading business. To expand his business, he has received a loan worth US\$ 30,000 from a friend at 24% APR (2% per month) with his apartment as collateral. Repayment timeframe is flexible. He is not qualified for any bank loans.

*Vignette 4:* U Lwin Aung owns a factory. To expand his business, he has received a loan worth US\$ 30,000 from a friend at 36% APR (3% per month) without collateral. Repayment timeframe is flexible. He is not qualified for any bank loans.

*Vignette 5:* U Chit Tun owns a service business. To expand his business, he has received a loan worth US\$ 30,000 from a friend at 36% APR (3% per month) with his apartment as collateral. Repayment timeframe is flexible. He is not qualified for any bank loans.

*Vignette 6:* U Moe Gyi owns a factory. To expand his business, he has received a loan worth US\$ 30,000 from a friend at 48% APR (4% per month) without collateral. Repayment timeframe is flexible. He is not qualified for any bank loans.

*Vignette 7:* U Myo Win owns a construction company and wants to build a new apartment building. He has received a bank loan worth US\$ 100,000 at 13% APR to finance the construction with his real estate worth US\$ 100,000 as collateral. The loan needs to be repaid one year after it is issued. He can't borrow that amount from friends or relatives.

*Vignette 8:* Ko Zaw Zaw owns a service business. To expand his business, he has received a bank loan worth US\$ 100,000 at 13% APR with his real estate worth US\$ 200,000 as collateral. The loan needs to be fully repaid within 1 year after it is issued. He can't borrow that amount from friends or relatives.

*Vignette 9:* U Aung Aung owns a wholesale business. To expand his business, he has received a bank loan worth US\$ 100,000 at 13% APR with his apartment worth US\$ 200,000 as collateral. The loan needs to be fully repaid one year after it is issued. He can't borrow that amount from friends or relatives.

*Vignette 10:* Ko Oo owns a crane rental business. To finance acquisition of a new crane, he has received a bank loan worth US\$ 100,000 at 13% APR with his real estate worth US\$ 300,000 as collateral. The loan needs to be fully repaid within 1 year after it is issued. He can't borrow that amount from friends or relatives.

*Vignette 11:* Ko Naing Kyaw Win operates a travel business. To finance acquisition of 3 new tour buses, she has received a loan worth US\$100,000 at 13% APR from the recently created SME Bank without collateral. The loan needs to be repaid one year after it is issued. He can't borrow from friends or relatives.

*Vignette 12:* Ko Zaw Thet owns a service business. To expand his business, he has to use retained profits and personal savings. He is not qualified for a bank loan, and can't borrow from friends or relatives either.

#### *Public services vignettes*

*Vignette 1:* It cost Daw Nu US\$ 1200 in registration fees, took her 2 months, and involved 11 official procedures to formally register her business.

*Vignette 2:* It cost Ma Kay Thi US\$ 1200 in registration fees, took her 3 days, and involved 2 official procedures to formally register her business.

*Vignette 3:* Ko Tony can complete all the administrative and paper work for his business operations in Yangon, no longer needs to travel to Nay Pyi Taw as he did before, and can pay the applications fees at any private banks.

*Vignette 4:* Ko Gyi has to make trips to Nay Pyi Taw to complete administrative and paper work for his business operations, because of the unavailability of these public services in Yangon.

*Vignette 5:* Khaing Khaing can now complete all administrative and paper work online for her business operations, and no longer needs to travel to Nay Pyi Taw as she did before.

*Vignette 6:* U Win Oo submits invoices to a government agency every month that require 3 officials' signatures for approval. It takes 2 weeks to get the invoices approved.

*Vignette 7:* U Toe submits invoices every month to a government agency which requires one official's signature for approval. It takes 2 weeks to get the invoices approved.

*Vignette 8:* U Ko Ko submits invoices every month to a government agency which requires one official's signature for approval. It takes 2 days to get the invoices approved.

*Vignette 9:* It has taken Ko Sunny 5 months to get a permit for the construction of his new business warehouse building, costing him US\$ 4500 in application fees.

#### *Electricity vignettes*

*Vignette 1:* It took U Min Min 3 months to get a new connection to electricity for his new warehouse. He paid US\$ 25,000 in connection fees, and US\$ 12,000 for a transformer.

*Vignette 2:* Ko Naing owns a factory located in an industrial zone. Due to power outages or insufficient electrical voltage, his factory has to operate a generator 6 h a day to power the factory operations.

*Vignette 3:* U Kyi owns a printing business. Due to low electricity voltage, his business has to operate a generator 4 h a day to power the printing machine.

*Vignette 4:* U Yin Aung owns a brick factory. Due to the lack of electricity supply, he has to use a power generator to fully power his factory operations.

*Vignette 5:* U Aung Aung owns an export/import business. Due to low electricity voltage, his office sometimes has to operate generator mainly to power air conditioners.

*Vignette 6:* Ko Htoo is the owner of a factory. Due to low electricity voltage, he has to operate a generator for 8 h a day to power the machine tools for almost every day.

*Vignette 7:* Ko Zaw Thet is the owner of a newly established service business. Since his application for a connection to new electricity is still pending, his office has been sharing electricity with a neighboring office temporarily until the application is approved.

*Vignette 8:* Ko Win owns a trading business. His office experiences power outage lasting an hour on average every day. His office doesn't own a power generator and has to operate the business without electricity during outage.

*Vignette 9:* U Hlaing owns a garment factory. His factory seldom experiences power outage and the electrical voltage is sufficient for the factory to operate.

**Appendix B. Econometric model**

Self-reports are modelled as a function of an underlying latent index reflecting actual difficulty, as well as of individual-specific thresholds. Vignette evaluations are reported on the same categorical scale as the self-evaluations. The vignette approach rests on two critical assumptions: Vignette Equivalence (VE) and Response Consistency (RC). VE stipulates that respondents' characteristics have no influence on how they interpret vignettes. That is, every respondent interprets a vignette in the same way. This assumption would be violated in situations where respondents rely on their personal experiences to infer missing information in the vignettes. RC means respondents use the same categorical scales when evaluating themselves as when evaluating the vignette person. For the purpose of this analysis, we take these two assumptions as given. The detailed econometric specifications are given by the following:

(1) B.1. Self-evaluations

The subjective measure of each of the three business domains ( $t = 1, 2, 3$ )  $Y_{sti}$  for respondent  $i$  has a subjective response scale from 1 being "no difficulty" to 5 being "severely difficult". The self-reports  $Y_{sti}$  are assumed to be driven by an underlying and unobserved continuous latent index  $Y_{sti}^*$  reflecting actual difficulties with access in business domain  $t$  for individual  $i$ . The latent index is modelled as

$$Y_{sit}^* = X_i \beta_{st} + \xi_{sit} \tag{1}$$

$$Y_{sit} = j \quad \tau_{it}^{j-1} < Y_{sit}^* \leq \tau_{it}^j, j = 1, 2, 3, 4, 5 \tag{2}$$

Hence  $X_i$  is a set of observed respondent and business characteristics. Specifically,  $X_i$  includes (1) age (19–39, 40–50, 61–4, 65+), (2) education (low, medium, high education) (3) ethnicity (ethnic minorities, Burmese), (4) gender (male, female), (5) if a respondent is owner, (6) if a business is small-size, (7) if a business is selling goods/service to the government, and (8) if a business is located in an industrial zone.  $\xi_{sit}$  may be interpreted as unobserved heterogeneity combined with idiosyncratic noise affecting the subjective evaluations. We will assume  $\xi_{sit}$  to be normally distributed with mean zero and variance normalized to  $\tau_{\xi_{st}}^2 = 1$ , independent of  $X_i$ .

The thresholds  $\tau_{it}^j$  are given by

$$\tau_{sit}^0 = -\infty, \tau_{sit}^5 = \infty, \tau_{sit}^1 = \gamma_{st}^1 X_i + \mu_{it}, \tau_{sit}^j = \tau_{sit}^{j-1} + \exp(\gamma^j X_i), j = 2, 3, 4$$

$$\mu_{it} \sim N(0, \sigma_{it}^2), \mu_{it} \text{ is independent of } X_{it} \text{ and } \xi_{sit}$$

The fact that the thresholds vary across respondents represents the fact that different respondents use different response scales, i.e. DIF. The covariates entering  $X_{it}$  in Eq. (3) are assumed to be the same as those entering Eq. (1) explaining self-reports. The term  $\mu_{it}$  introduces an unobserved heterogeneity term (modeled as a random individual effect) in the response scale. Using subjective self-reports alone, the parameters  $\beta_{st}$  and  $\gamma_{st}^1$  are not separately identified, instead their difference is identified ( $\gamma_{st}^j$  for  $j > 1$  will still be identified). Hence, using only self-assessments, we are not able to disentangle the self-reports into the systematic part that is due to differences in true difficulties with access (represented by  $\beta_{st}$ ) in business domain  $t$  and a part that is due to heterogeneity in reporting behavior ( $\gamma_{st}^j, j = 1, 2, 3, 4$ ). For instance, business owners with different socioeconomic characteristics can simultaneously differ in actual level of access as well as in the scales on which they report their difficulties. Hence, self-reports of level of access are not sufficient to identify actual difficulties across socioeconomic groups.

(4) B.2. Vignette evaluations

Vignette evaluations have the same response scale categories as the subjective measure. The evaluations  $Y_{vit}$  of vignette  $v = 1, \dots, L; t = 1, 2, 3$  are modelled using similar ordered response equations:

$$Y_{vit}^* = \omega_{vt} + \varepsilon_{vit}$$

$$Y_{vit}^* = \text{jif } \tau_{it}^{j-1} < Y_{vit}^* \leq \tau_{it}^j, j = 1, 2, 3, 4, 5$$

$$\varepsilon_{vit} \sim N(0, \sigma_{\varepsilon}^2); \varepsilon_{vit} \text{ is independent of } \xi_{sit} \text{ and } X_{it}$$

Respondent characteristics  $X_i$  are not included in Eq. (4) – this is the maintained assumption of vignette equivalence (VE). If respondents are given the same vignette descriptions and there is no ambiguity in interpreting the information presented, there is no reason why different respondents should give us systematically different responses except for DIF. The thresholds are modeled in a similar way as those in the self-report equation.

$$\tau_{vit}^0 = -\infty, \tau_{vit}^5 = +\infty, \tau_{vit}^1 = \gamma_{vt}^1 X_{it} + u_{it}, \tau_{vit}^j = \tau_{vit}^{j-1} + \exp(\gamma_{vt}^j X_{it}), j = 2, \dots, 4; t = 1, 2, 3 \quad (5)$$

The standard Hopit model (see, e.g., King et al., 2004) assumes response consistency:  $\tau_{sit}^1 = \tau_{vit}^1, j = 1, \dots, 4; i = 1, \dots, N$ . With this assumption, it is clear how vignette evaluations can be used to separately identify  $\beta_s$  and  $\gamma_{st}^j = \gamma_{vt}^j$  ( $j = 1, 2, 3, 4; t = 1, 2, 3$ ). From the vignette evaluations alone,  $\gamma_{vt}$  can be identified (up to the usual normalization of scale and location), and  $\beta_s$  can then be identified from the self-assessments. Thus, the vignettes can be used to solve the identification problem due to DIF under the assumption of response consistency (RC) and vignette equivalence (VE).

The model can be estimated by maximum likelihood. We maximize the following likelihood function consisting of a self-evaluation part (first part) and a vignette evaluation part (second part):

$$L(\beta, \gamma, \omega, \alpha | Y_s, Y_v) = L(\beta, \gamma | Y_s) * L(\omega, \alpha | Y_v) \quad (6), \text{ which is specified as}$$

$$\int \prod_{k=1}^{k=5} p(y_{sit} = k | \phi, \mu_{it})^{I(y_{sit}=k)} \prod_{v=1}^{v=3} \prod_{m=1}^{m=5} p(y_{vit} = m | \phi, \mu_{it})^{I(y_{vit}=m)} f(u_{it}) du_{it} \quad (7)$$

where  $\phi$  is a vector of parameters to be estimated and  $I(\cdot)$  is an indicator function. The unconditional likelihood contribution of respondent  $i$  can be computed numerically as an expectation over  $u_i$ .

## Appendix C. Estimation results

Tables C1–C3 .

**Table C1**

Estimates of CHOPIT Models with and without DIF. (Dependent variable: Self-reported difficulty in access to credit)

	no DIF	DIF (CHOPIT)				
	$\beta$	$\beta$	$\tau_1$	$\text{Ln}(\tau_2 - \tau_1)$	$\text{Ln}(\tau_3 - \tau_2)$	$\text{Ln}(\tau_4 - \tau_3)$
Age (40-50)	0.165 [0.088]*	0.158 [0.091]*	-0.013 [0.063]	0.022 [0.088]	0.042 [0.059]	-0.101 [0.076]
Age(51-64)	-0.174 [0.103]*	-0.167 [0.109]	0.016 [0.069]	-0.028 [0.098]	0.062 [0.066]	-0.063 [0.090]
Age(65+)	-0.455 [0.209]**	-0.344 [0.221]	0.197 [0.144]	0.105 [0.170]	0.014 [0.146]	0.033 [0.193]
Medium education	0.050 [0.086]	0.105 [0.090]	0.114 [0.058]*	-0.032 [0.083]	0.013 [0.056]	-0.036 [0.072]
High education	-0.009 [0.142]	-0.060 [0.155]	-0.096 [0.105]	-0.060 [0.146]	0.145 [0.092]	0.161 [0.114]
Ethnic Myanmar	-0.071 [0.078]	-0.043 [0.081]	0.082 [0.055]	-0.164 [0.076]**	-0.039 [0.050]	-0.007 [0.067]
Male	0.033 [0.088]	-0.022 [0.092]	-0.088 [0.057]	0.011 [0.083]	-0.073 [0.055]	-0.014 [0.085]
Small-sized business	0.224 [0.087]**	0.210 [0.093]**	-0.050 [0.062]	0.110 [0.089]	0.110 [0.059]*	-0.024 [0.076]
Selling goods or services to government	0.162 [0.095]*	0.182 [0.098]*	0.028 [0.067]	0.011 [0.099]	0.080 [0.063]	0.009 [0.085]
If respondent is owner	0.203 [0.119]*	0.168 [0.129]	-0.035 [0.080]	-0.150 [0.101]	-0.132 [0.076]*	0.131 [0.115]
Located in an industrial zone	0.094 [0.094]	0.025 [0.101]	-0.109 [0.067]	-0.038 [0.100]	-0.099 [0.063]	-0.011 [0.077]
Constant	-0.893	-1.137	-1.076	-0.599	-0.019	-0.243

**Table C1** (Continued)

	no DIF	DIF (CHOPIT)				
	$\beta$	$\beta$	$\tau_1$	$\ln(\tau_2 - \tau_1)$	$\ln(\tau_3 - \tau_2)$	$\ln(\tau_4 - \tau_3)$
Likelihood Ratio Test:	[0.180]***	[0.191]***	[0.137]**	[0.152]***	[0.116]	[0.163]
LR $\chi^2(44) = 70.73$						
H <sub>0</sub> : No DIF model is correct model (Restricted model)	Prob. > $\chi^2 = 0.006$					
H <sub>1</sub> : DIF model is correct model (Unrestricted model)						
N	980					

Standard errors are in brackets.

\* Significant at 10% level.

\*\* Significant at 5% level.

\*\*\* Significant at 1% level.

**Table C2**

Estimates of CHOPIT Models with and without DIF. (Dependent variable: Self-reported difficulty in access to electricity)

	no DIF	DIF (CHOPIT)				
	$\beta$	$\beta$	$\tau_1$	$\ln(\tau_2 - \tau_1)$	$\ln(\tau_3 - \tau_2)$	$\ln(\tau_4 - \tau_3)$
Age (40–50)	0.051 [0.087]	0.067 [0.097]	0.035 [0.075]	−0.050 [0.093]	0.024 [0.075]	−0.017 [0.055]
Age (51–64)	−0.090 [0.100]	−0.082 [0.108]	0.026 [0.078]	−0.027 [0.100]	−0.030 [0.085]	0.071 [0.061]
Age (65+)	−0.173 [0.163]	−0.059 [0.206]	0.259 [0.147]	−0.189 [0.195]	−0.151 [0.157]	−0.136 [0.119]
Medium education	0.057 [0.082]	0.069 [0.092]	−0.031 [0.068]	0.131 [0.084]	0.016 [0.070]	0.053 [0.051]
High education	0.173 [0.136]	0.138 [0.151]	−0.125 [0.111]	0.148 [0.155]	0.071 [0.117]	0.066 [0.085]
Ethnic Myanmar	0.025 [0.074]	−0.007 [0.082]	0.002 [0.064]	−0.147 [0.077]	−0.031 [0.063]	0.051 [0.047]
Male	0.058 [0.085]	0.122 [0.094]	0.136 [0.072]	−0.046 [0.088]	−0.054 [0.073]	−0.081 [0.052]
Small-sized business	−0.245 [0.085]***	−0.195 [0.094]**	0.060 [0.075]	0.109 [0.096]	−0.020 [0.078]	−0.005 [0.053]
Selling goods or services to government	−0.135 [0.093]	−0.182 [0.106]	−0.084 [0.081]	0.047 [0.100]	−0.014 [0.079]	0.019 [0.060]
If respondent is owner	0.057 [0.104]	0.108 [0.116]	0.127 [0.101]	−0.074 [0.119]	−0.044 [0.095]	−0.024 [0.068]
Located in an industrial zone	0.522 [0.091]***	0.555 [0.099]***	0.068 [0.079]	−0.041 [0.106]	0.012 [0.080]	0.046 [0.056]
Constant	−1.072 [0.175]***	−1.202 [0.191]***	−1.994 [0.175]***	−0.491 [0.166]***	−0.241 [0.139]	0.025 [0.105]
Likelihood Ratio Test:	LR $\chi^2(44) = 41.33$					
H <sub>0</sub> : No DIF model is correct model (Restricted model)	Prob. > $\chi^2 = 0.587$					
H <sub>1</sub> : DIF model is correct model (Unrestricted model)						
N	1000					

Standard errors are in brackets.

\* Significant at 10% level.

\*\* Significant at 5% level.

\*\*\* Significant at 1% level.

**Table C3**

Estimates of CHOPIT Models with and without DIF. (Dependent variable: Self-reported difficulty in access to public services).

	no DIF	DIF (CHOPIT)				
	$\beta$	$\beta$	$\tau_1$	$\ln(\tau_2 - \tau_1)$	$\ln(\tau_3 - \tau_2)$	$\ln(\tau_4 - \tau_3)$
Age (40–50)	−0.095 [0.089]	−0.085 [0.095]	−0.019 [0.075]	0.012 [0.085]	−0.017 [0.056]	−0.150 [0.069]**
Age (51–64)	−0.159 [0.101]	−0.123 [0.109]	0.052 [0.082]	0.005 [0.093]	0.023 [0.062]	−0.017 [0.079]
Age (65+)	−0.365 [0.181]**	−0.334 [0.219]	−0.025 [0.206]	0.313 [0.204]	−0.237 [0.126]	−0.311 [0.152]**
Medium education	0.342 [0.085]***	0.343 [0.093]***	−0.037 [0.070]	0.097 [0.079]	−0.002 [0.055]	−0.136 [0.066]**
High education	0.775 [0.139]***	0.837 [0.158]***	0.109 [0.112]	0.017 [0.142]	−0.027 [0.089]	−0.120 [0.102]
Ethnic Myanmar	−0.013 [0.076]	−0.070 [0.083]	−0.095 [0.065]	−0.014 [0.071]	−0.003 [0.049]	0.146 [0.063]**

Table C3 (Continued)

	no DIF	DIF (CHOPIT)				
	$\beta$	$\beta$	$\tau_1$	$\text{Ln}(\tau_2 - \tau_1)$	$\text{Ln}(\tau_3 - \tau_2)$	$\text{Ln}(\tau_4 - \tau_3)$
Male	0.244 [0.092]***	0.294 [0.097]***	0.146 [0.073]**	-0.243 [0.074]***	-0.023 [0.054]	-0.165 [0.071]**
Small-sized business	-0.104 [0.089]	-0.068 [0.095]	0.053 [0.073]	0.010 [0.087]	0.043 [0.056]	-0.071 [0.069]
Selling goods or services to government	0.307 [0.097]***	0.290 [0.104]***	-0.017 [0.082]	-0.085 [0.095]	0.180 [0.055]***	0.151 [0.077]**
If respondent is owner	0.084 [0.123]	0.043 [0.133]	-0.077 [0.092]	-0.026 [0.105]	-0.111 [0.067] <sup>†</sup>	-0.171 [0.094] <sup>†</sup>
Located in an industrial zone	0.150 [0.097]	0.170 [0.103] <sup>†</sup>	-0.018 [0.076]	0.163 [0.087] <sup>†</sup>	0.011 [0.061]	0.127 [0.071] <sup>†</sup>
Constant	0.363 [0.183]**	0.362 [0.196] <sup>†</sup>	0.372 [0.146]**	-0.355 [0.151]**	0.119 [0.111]	0.282 [0.147] <sup>†</sup>
Likelihood Ratio Test:	LR $\chi^2(44) = 94.85$					
H <sub>0</sub> : No DIF model is correct model (Restricted model)	Prob. > $\chi^2 = 0.000$					
H <sub>1</sub> : DIF model is correct model (Unrestricted model)						
N	988					

Standard errors are in brackets.

<sup>\*</sup> Significant at 10% level.

<sup>\*\*</sup> Significant at 5% level.

<sup>\*\*\*</sup> Significant at 1% level.

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