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Abstract

A pooled sample of 3,075 Micro, Small, and Medium-sized Enterprises (MSMEs) is designed as for Egypt, Morocco and Tunisia from the World Bank Enterprises Survey (WBES) as of 2013. The adjusted sample complies with international standards, although it does not remove all the biases encapsulated within the WBES. A subsample of 709 MSMEs applied for a loan on the demand side, including those that were granted a loan on the supply side and those that were rejected by financial institutions. The absence of Financial inclusion and lack of Collateral are the main reasons for this imbalance. A binary logit model including interaction variables addresses both the demand and the supply side. Salient findings on the demand side are that the characteristics of MSMEs -Size, Age, Registration and Financial inclusion influence loan demand, whereas the characteristics of managers and the Interest rate have no impact. Conversely, the characteristics of MSMEs play no role upon loan supply, whereas Financial inclusion and Collateral exert a major impact on the supply side. There is a mismatch as for loan supply from microfinance according to the microfinance industry vs. the WBES data source.

Keywords: Enterprise surveys; Loan demand; Loan supply; Logistic regression; Microfinance; Mismatch; MSMEs; North Africa; Selection bias.

JEL Classifications: G21, G32, J21, O17.

Introduction

According to Stein et al (2013) over two-thirds of all *Micro*, *Small* and *Medium-sized* enterprises (henceforth MSMEs) in emerging markets lack access to credit. They rely on internal funds or informal loans (cash from family and friends), to launch and initially run their businesses. This stylised fact takes care of the start-up stage. Beyond this stage, MSMEs experience different financing needs for working capital and fixed assets according to their life cycle; hence, age and the size of the firms should matter with respect to bank credit application. This is congruent with Beck et al (2008) who found that small firms use less external finance, especially bank credit. Hence, one main characteristic of small sized businesses, i.e. less recourse to bank credit, may be explained by conventional finance theory, (i) from the demand side of the firms by some preference for internal funds in line with the pecking order theory (Myers and Majluf, 1984); (ii) from the supply side of the financial institutions by risk aversion driving credit rationing (Stiglitz and Weiss, 1981). Investigation upon matching both sides prove difficult to achieve and most studies rely on the demand side, which is easier to investigate especially with respect to funding outside bank credit. In addition, many studies upon the capital structure of MSMEs focus upon in developed countries (Adair and Adaskou, 2018) rather than in developing ones. However, since the World Bank Enterprise Survey (henceforth WBES) was launched worldwide, data became available for some countries in North Africa, which is our concern in this paper.

We address the finance issue for MSMEs in North Africa, focusing upon three countries, namely Egypt, Tunisia and Morocco, which are resource-poor/labour abundant economies (Gatti et al, 2014). We use the WBES as a data source. To our best knowledge, no paper so far has tackled this funding issue as of these three countries.

Section 1 is devoted to the empirical literature review in order to sketch stylised facts with respect to funding for MSMEs, which help building a series of hypotheses. Section 2 points out the drawbacks and advantages of the WBES data source as for the three North African countries, such as selection biases and overweighing vs. the range of data collection on the finance issue. Section 3 presents the sampling design and the variables of interest of the study alongside descriptive statistics. Section 4 is devoted to our logit model and results as regards loan demand and loan granting. Section 5 takes advantage of selection biases in the WBES to investigate the funding provided by the microfinance industry to the three North African countries. Conclusion recapitulates main findings and sketches some research avenues.

1. Literature review and hypotheses

This brief literature review is devoted to most recent empirical papers tackling the finance issue. Hence, we do not review previous surveys as for Morocco (WBES, 2007) or other surveys as for Egypt (El-Mahdi, 2006; ERF, 2014), which do not address this issue.

Kuntchev et al (2013) using a logistic regression discuss the findings from the worldwide WBES as regards access to credit. Unfortunately, the subsample for Middle East and North Africa (MENA) region includes only Iraq (2011) and Yemen (2010), comprising 1,233 firms out of which almost three out of five operate in the manufacturing industry and nearly three out of four are small (5-19 employees). SMEs are more likely to be credit constrained than large firms, credit constraint decreasing with firm size**,** whereas age plays no role, and the perception of credit constraint proves a misleading indicator**.** SMEs rely more on trade credit and other informal sources and less on equity and formal debt than large firms; this applies both to financing fixed assets and working capital. Main distinction is made between fully

credit-constrained firms, gathering those whose loan applications were rejected and those which did not apply although they needed additional capital, and non-credit constrained firms whose current financing structure takes care of both working capital and fixed assets. A third heterogeneous category includes partially or potentially credit constrained firms that access other forms of external finance, although these may not fulfil their needs.

Reille and Bender (2014) use a sample of 1,412 Tunisian MSMEs employing from 1 to 199 people that were listed in the National Register of Enterprises as of 2011. Most of these firms are banked, a 71 percent share (100 per cent for medium enterprises over 50 employees), whereas 29 per cent have no bank account. Although 80 per cent of MSMEs that requested a loan succeeded in obtaining it, MSMEs are financing working capital with treasury funds (75 per cent), savings of the owner (40 percent), and trade credit (34 per cent). There is a mismatch between the demand for short-term financing and the loan supply that must be secured by collateral; 37 per cent of MSMEs declare a need for loans to finance their working capital. Financial institutions are reluctant to lend due to the absence of book accounts (40 per cent) and excessive reliance on cash (78 per cent of supplier payments).

Hypothesis H1 addresses the demand side for funding. MSMEs experience different needs for financing according to their life cycle: Creation is funded with internal resources and informal loans (family and friends) rather than with bank credit; working capital is financed with trade credit rather than bank credit, several sources being used altogether; fixed assets are funded with bank credit alongside other sources. On the supply side, Hypothesis H2 states that funding is provided less by financial institutions and more with trade credit as for working capital and by internal funds as for fixed assets; bank loans are granted according to the purpose of funding, the collateral required by financial institutions and the financial inclusion of the MSMEs (with a bank account). Hypothesis H3 addresses the adjustment between demand and supply for funding, which MSMEs enjoying financial inclusion do usually achieve. Hypothesis H4 states that imbalance between demand and supply for funding affects financially excluded MSMEs due to the absence of sufficient collateral and/or a bank account; hence, these do face credit rationing from financial institutions. Hypothesis H5 addresses the segmentation of the credit market: there is a mismatch between loan supply provided by financial institutions according to the WBES sample and funding to MSMEs according to the Microfinance Information eXchange (MIX), whereby the microfinance industry grants micro-credit for working capital but not for fixed assets, in as much as average loan amount is small.

2. The WBES data source: drawbacks and advantages

We first state caveats with respect to the WBES data source, which includes three serious drawbacks. The first drawback is the absence of representativeness due to two selection biases. One bias is magnifying the number of medium and large businesses in the sample, although Ayadi and Sessa (2017) report that *Micro* enterprises account approximately for 91 per cent of all firms, small and medium ones around 8 per cent and large firms less than one per cent. The other bias is the focus upon manufacturing businesses, which are a minor share in the distribution of industries, despite the fact that WBES uses stratified random sampling. In addition, the size of the country sample has no link with the size of the population in the country surveyed: the sample is smaller for Morocco than for Tunisia, three times smaller a country, whereas the sample for Egypt is almost seven times larger than for Morocco, three times smaller a country.

A second drawback is the underestimation of the informal sector (ILO, 2013), which is populated by *Micro*-enterprises (less than 10 employees) that are not registered in order to

escape taxes and/or social security contributions. Gatti et al (2014) report that a quarter of firms with more than 20 workers start out as informal and operate for about four years without registration. Elbadawi and Loayza (2008) point out that *Micro* and *Small* enterprises account for 97 per cent of all enterprises in Egypt, of which 81 percent are informal. Similar to Russian dolls, informal employment includes the informal sector, which stands as its largest component. Average (non-agricultural) employment in the informal economy throughout Northern Africa grows slightly over 50% in the 2000s and declines slightly below 50% since the early 2010s, suggesting it is a structural phenomenon. Countries differ in early 2010s: Morocco displays the highest level (below 70%), Egypt reaches almost 50% whereas Tunisia increases within a 35-40% range (Charmes, 2019).

The last drawback is the sampling design as regards the various thresholds used to build the categories of businesses, which do not comply neither with standards used in most countries (Egypt and Tunisia, Morocco being an exception) nor with international standards from the International Labour Office and the UN System of National Accounts. *Micro*-enterprises are defined within the range of 1-4 employees, whereas the standard definition is 1-9 employees. Small businesses comprise 5-19 employees, although the usual definition is 10-49 employees. Medium-sized enterprises encapsulate 20-99 employees, whereas it should be over 50 employees. Fortunately, the number of employees is available within the dataset, allowing to overcome this last drawback and redesign the sample according to standards. Hence, why look for keys under the lamppost, although they might be lost elsewhere? The answer is that this is where the light is, albeit issues remain into the shadows.

Nevertheless, WBES has two main advantages. In the first place, coverage is consistent in all countries: it includes the manufacturing industry and the services (trade, transportation and construction sectors), excluding agriculture, public utilities, government services, health care, and financial services sectors. In the second place, the harmonised questionnaire collects a large amount of data through face to face interviews with firm managers and owners. Among the topics addressed, the finance issue is thoroughly investigated with 26 questions. However, the reference year for funding working capital varies across countries (2013 or 2014): hence, there is a gap of one year between demand and supply, which seems inconsistent.

3. Sample design, variables of interest and descriptive statistics

3.1. Sample design

The WBES database for Egypt, Morocco and Tunisia accounts for 3,896 establishments in the three countries as of year 2013. We excluded 821 large ones (100 or more employees) and redesigned a consistent pooled sample of 3,075 MSMEs including Micro (1-9 employees), Small (10-49 employees) and Medium-sized (50-99 employees), which complies with international standards.

Table 1 reports the distribution of the sample. Egypt accounts for three quarters of the sample. Small firms account for more than half (57.85%) the pooled sample as well as in every country. Hence, caveats apply: the distribution by size and industry[4] is non representative and selection biases remain.

Table 1.Distribution by size of the pooled sample

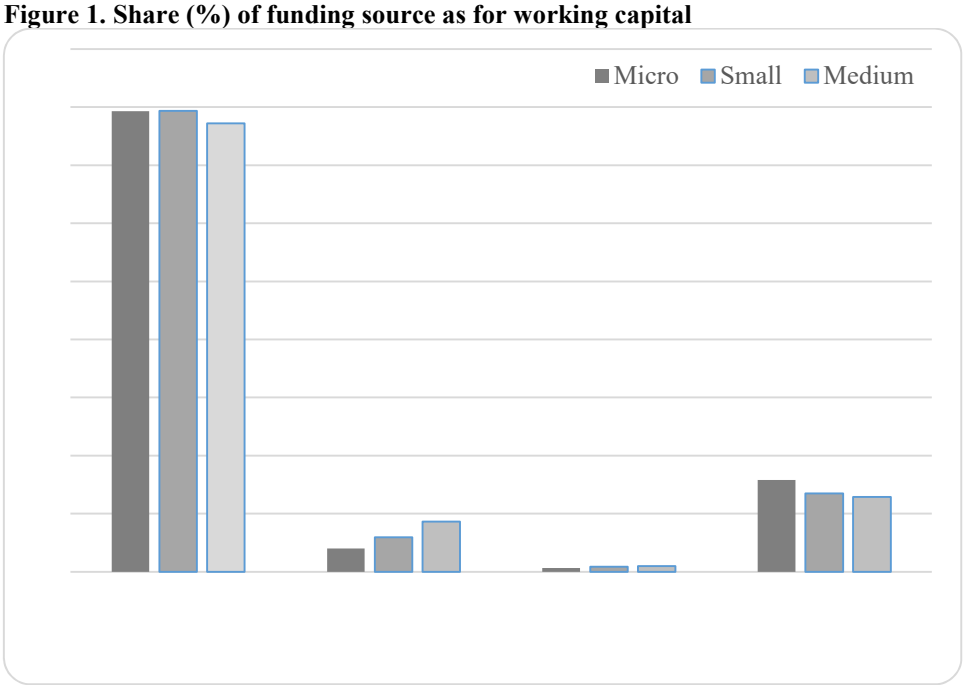
Country	Egypt		Morocco		Tunisia		Total	
Category	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Micro (1-9 employees)	675	28.97	69	22,77	110	24.89	854	27.77
Small (10-49 employees)	1,355	58.15	177	58,42	247	55.88	1,779	57.85
Medium (50-99 employees)	300	12.88	57	18,81	85	19.23	442	14.37
Total	2,330		303		442		3,075	

Source: Authors' design from WBES

Firms use several funding sources. According to Figures 1 and 2, internal funds and retained earnings are the first source, a share of 70-80 per cent, regardless the size (Micro. Small or Medium-sized) and the financing need (working capital or fixed assets) of firms. External financing, a share of 20-30 per cent, comes from three sources. As for working capital, trade credit and informal funds rank first, then bank credit and last NBFIs that provide a negligible share below 1%. The share of trade credit and informal funds declines whereas that of bank credit increases with the size of firms. As for fixed assets, bank credit ranks first, then NBFIs and last trade credit and informal funds. The share of bank credit and NBFIs rises with the increase in the size of firms whereas that of trade credit and informal funds declines. Hence, the size of firms is crucial to both the distribution and the trend of funding sources. The distribution pattern, may be explained by the pecking order theory (Myers and Majluf, 1984) or credit rationing (Stiglitz and Weiss, 1981). As for the trend, the larger the firm, the more its external funding is provided by financial institutions (banks and NBFIs).

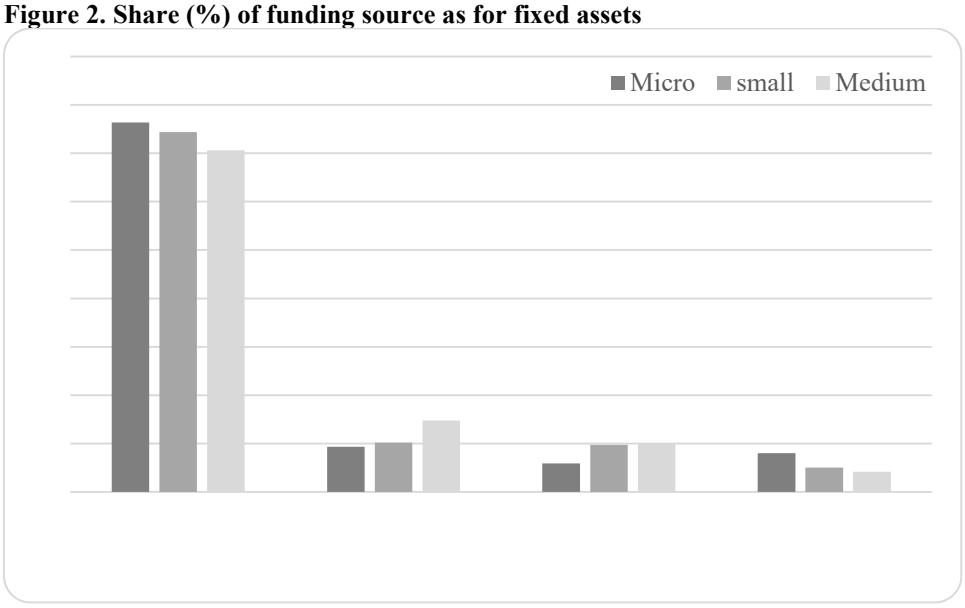
[4] Over three out of five MSMEs operate in the manufacturing industry, which is obviously overweighed.

Figure 1. Share (%) of funding source as for working capital



Source: Authors. See Table A1 in the Appendix.

Figure 2. Share (%) of funding source as for fixed assets



Source: Authors. See Table A1 in the Appendix.

In order to analyse loan demand from MSMEs, we have decomposed the pooled sample into two subsamples: MSMEs that did not apply for a loan from financial institutions (banks and Non-Banking Financial Institutions –NBFIs) and those that applied in order to fulfil their need for working capital and / or fixed assets. The subsample 709 MSMEs that applied for a loan in 2013 accounts for almost one quarter of the pooled sample. Almost three out of four MSMEs (557) did get credit, while over one out of four (152) did not. Both loan demand and getting credit increases alongside the size of firms. Less than one out of five Microenterprises, whereas one out of four Small and almost one out three Medium-sized businesses did apply for a loan. Application proved successful (loan granted) respectively for almost 70 per cent (Microenterprises), 80 per cent (Small businesses) and 87 per cent (Medium-sized businesses).Table 2 records the figures.

Table 2. Loan application to financial institutions (banks and NBFIs) from MSMEs

Demand Category	No application to financial institutions	Loan application to financial institutions (loan demand)			Total[b]
		Successful application	Unsuccessful application[a]*	Total	
Micro	662	109 (70%)	47 (30%)	156 (19.07%)	818
Small	1,262	335 (80%)	88 (20%)	423 (25.1%)	1,685
Medium	286	113 (87%)	17 (13%)	130 (31.25%)	416
Total	2,210	557 (78.56%)	152 (21.43%)	709	2,919

Note: [a] 67 MSMEs are excluded because loan application is still pending. [b] N/A = 104.
Source: Authors' design from WBES

3.2. Variables of interest and correlation matrix

Variables of interest are reported in the dictionary (Table A2 in Appendix). We focus upon the two explained variables, namely *loan demand* and *loan granted* (supply). Our explanatory variables are included in five broad categories: (i) the characteristics of the firm (*Industry*, *Size*, *Age*, *Ownership*, *Registration*, *Financial inclusion*, *Turnover* and *Gender ownership*); (ii) the characteristics of the manager (*Top manager experience*, *Top manager gender* and *Top manager education*); (iii) the financing need of the firm (*Sales on credit*, *Purchase on credit* and *Loan purpose*); (iv) the characteristics of the loan (*Collateral*, *Loan duration* and *Interest rate*); and (v) Macroeconomic indicators (*Inflation* and *GNI per capita*) that are used as control variables.

The correlation matrix (Table A4 in Appendix) points out a few strong relationships. First of all, there is a linear, positive and very significant relationship between *loan demand* and *loan granted*.
On the demand side, *loan demand* is significantly and positively related to *financial inclusion* and *turnover*, and negatively to *inflation* and the required *collateral*. Correlation is non-significant between *loan demand* and the *interest rate*, *loan duration* and the *gender* of the manager. It seems that MSMEs apply for loans from financial institutions regardless the lending conditions, *collateral* being excepted.
On the supply side, the probability of getting credit from financial institutions (*loan granted*) is very significantly and positively correlated with *financial inclusion* and *loan purpose*, whereas it is negatively correlated with the *interest rate* and *inflation*. There is no meaningful linear relationship between *loan granted* and the *gender* of the *owner*, *education*al attainment of the manager and *collateral*.

3.3. Descriptive statistics

Table 2 did already take care of the significance of the *size* effect: the share of MSMEs whose application was rejected declines with size.
According to Table 3, MSMEs applying for credit are mostly mature and owners are males. *Industry* is a determinant of getting credit: over a half of MSMEs whose application for credit was rejected operate in the manufacturing industry, while almost two thirds of MSMEs whose application for credit was accepted operate in trade and services. This is consistent with the significant positive relationship between *loan demand* and *industry* in the correlation matrix (Table A4, Appendix)

Getting credit varies according to the purpose of the loan: Two out of five MSMEs, mostly Medium-sized businesses, which did get credit had the double purpose of funding both working capital and fixed assets. In contrast, over four out of five MSMEs whose application were rejected had only one loan purpose, mainly for working capital requirement.

Table 3. Characteristics of the MSMEs that applied for a loan

Demand	Category	Total	Industry		Age		Gender ownership[a]		Loan purpose[b]	
			Manuf.	Retail +Services	Young	Mature	Female	Male	WC or FA	WC +FA
Successful	**Micro**	109	33	76	21	88	23	86	**80**	**29**
	Small	335	116	219	59	276	74	261	199	**136**
	Medium	113	47	66	13	100	84	112	53	60
	Total	**557**	196	361	93	464	125	431	**332**	225
Unsuccessful	**Micro**	47	21	26	13	34	6	41	43	4
	Small	88	48	40	26	62	12	75	**75**	13
	Medium	17	8	9	2	15	3	14	13	4
	Total	**152**	77	75	41	111	21	130	**131**	21

Note: [a] N/A = 1. [b] WC: working capital; FA: fixed assets.
Source: Authors' calculations from WBES.

One may observe from the pooled sample that *size* matters, in as much as *financial inclusion* and *registration* (though understated) increase with size (Table A3 in Appendix). As for the sub-sample of 709 MSMEs, Table 4 shows that financial inclusion is a strong albeit not sufficient condition to enjoy a successful loan application, whereas registration plays no role. Over nine out of ten MSMEs that were granted a loan are financially included, albeit over half of unsuccessful MSMEs applicants are also financially included.
It is worth mentioning that one out of five loan application proved unsuccessful. Hence, we challenge the fairy tale whereby loan applications are rarely rejected, contending that rejections would remain within a range of one to four per cent in Morocco, Egypt and Tunisia. (de Lima et al, 2016).

Table 4. Financial inclusion, registration and outcome for loan application in the subsample of MSMEs

	Unsuccessful loan application			Successful application ***(loan granted)***			Applications[a]
MSMEs	**Financially excluded**	**Financially included**	**Total**	**Financially excluded**	**Financially included**	**Total**	**Total**
Non registered	3	4	7	8	22	30	37
Registered	67	75	142	35	490	525	667
Total	70	79 (53%)	149 (100%)	43	512 (92.25%)	555 (100%)	704

Note: [a] N/A = 5.
Source: Authors' calculations from WBES.

According to Table 5, over nine out of ten MSMEs that were granted a loan from banking or non-banking financial institutions (including microfinance institutions) also use other funding sources (including internal funds and informal loans). Micro and Small enterprises are those that apply respectively the least and the most for loans. Only 6.3% of MSMEs are financed exclusively by a loan from financial institutions (banks or/and NBFIs).

Loan duration is below two years (very short and short term) rather than over a longer term, suggesting that funding may be devoted to working capital in the first place. At least one collateral (property, plant, equipment, inventory or/and personal ownership) is requested from almost six out of seven MSMEs, without any clear pattern according to size.

Table 5. Characteristics of the loan for MSMEs that enjoyed a successful application

	Funding sources			Loan duration[a]				Requested collateral[b]			
	Bank	**NBFI[c]**	**Others sources[d]**	**Total**	**Very ST**	**ST**	**MLT**	**Total**	**None**	**One**	**Two or more**	**Total**
Micro	58	18	104	58	20	31	49	100	21	24	44	89
Small	202	61	316	335	65	97	141	303	27	87	151	266
Medium	68	21	105	113	21	37	44	102	14	15	57	86
Total	328	100	525	**557**	106	165	234	505	62	126	252	441

Note: [a] N/A = 52. [b] N/A = 116. [c] including microfinance. ST: short term; MLT: mid-long term. [d] moneylenders, friends, relatives, etc.
Source: Authors' calculations from WBES.

Table 6 reports the reasons for unsuccessful loan application. The main reason is the lack of collateral for three out of four MSMEs, mostly Micro and Small enterprises, whose application was rejected. The other reason is the absence of a bank or savings account: almost

half the MSMEs whose application proved unsuccessful were financially excluded, without any clear pattern according to size. Almost all MSMEs had recourse to other sources of funding.

Table 6. Main reasons for unsuccessful loan application from MSMEs

	Funding sources				Financial inclusion			Lack of collateral[a]		
	Bank	**NBFI[b]**	**Other sources[c]**	**Total**	**Excluded**	**Included**	**Total**	**Yes**	**No**	**Total**
Micro	1	4	47	47	29	18	47	34	6	40
Small	9	2	86	88	36	52	88	45	20	65
Medium	2	2	16	17	7	10	17	5	5	10
Total	12	8	149	**152**	72	80	**152**	84	31	**115**

Note: [a] N/A = 37. [b] including microfinance. [c] moneylenders, friends, relatives, etc.
Source: Authors' calculations from WBES.

4. Logit model and results: loan demand vs. loan granted

4.1. Model design

We design two cross-section models with interaction variables addressing the sub-sample of 709 MSMEs that applied for a loan in 2012 and 2013.
The first model analyses the demand for credit by these MSMEs according to supply from the financial institutions (banks and NBFIs). Loan demand is the explained variable, which is measured by two binary outcomes (Box 1). The model estimates the probability of applying for and obtaining credit in 2013, highlighting the determinants of the demand for credit from these MSMEs.
The second model addresses the loan granted by financial institutions to these MSMEs according to their demand. *Loan granted* is the explained variable, which is again measured by two binary outcomes (Box 1). The model estimates the probability of access to various funding sources in 2013 based on 2012 sources and highlights the determinants of access for these MSMEs.
Noteworthy is that the loan supply is an endogenous subset of loan demand, in as much as overall loan demand minus unfilled demand equals loan granted.

Box 1: Models

Both models apply to every business *i* located in country *k* = [1 (Egypt), 2 (Morocco) or 3 (Tunisia)].
The model for loan demand is the following:

$$Loan\ demand_{ik} = \begin{cases} 1\ if\ credit\ was\ applied\ for\ and\ granted\ in\ 2013 \\ \\ 0\ if\ credit\ applied\ for\ was\ not\ granted\ in\ 2013 \end{cases}$$

The model for funding supply is the following:

$$Loang\ granted_{ik} = \begin{cases} 1\ if\ the\ company\ enjoyed\ getting\ credit \\ \\ 0\ if\ the\ company\ enjoyed\ access\ to\ other\ funding\ sources \end{cases}$$

Both models are estimated according to the general equation for the explained variable *Y*:

$$E(Y = 1/X_{ikj}) = P_{ikj} = \sum_j \alpha_j X_{ikj} + \sum_j \beta_j V_{ikj} + \sum_j б_j W_{ikj} + \sum_j \varphi_j Z_{ikj} + \gamma_j S_{jk} + \varepsilon_j$$

Wherein explanatory variables are the following (Table A2 in Appendix):
X_j = characteristics of the companies;
V_j = characteristics of the managers;
W_j = financing need;
Z_j = characteristics of the loan;
S_{jk} = macroeconomic indicators (control variables);
and ε_j is the error term.

4.2. Results from the model for loan demand

We estimated the model (1) for loan demand according to the characteristics of the enterprise the manager and the loan, the funding purpose and the macroeconomic environment. *Size* was also used as an interaction variable respectively with *Financially included* (model 2), *Collateral* (model 3), and both *Financially included* and *Collateral* (model 4). The interaction of *Size* (Micro and Small enterprises) with these variables enables us to observe their impact on the demand for credit, Medium-sized enterprises standing as the category of reference. Table 7 displays the estimation for loan demand.

Table 7. Estimation of the model for loan demand

Model Variables	(1) Demand	(2) *Financial inclusion*	(3) *Collateral*	(4) *Financial inclusion + Collateral*
Size				
Micro	-1.5075**	0.6701	-11.3002***	-8.5115***
Small	-0.9333	0.9103	-13.1088***	-10.7104***
Industry				
Manufacturing	0.4891	0.4846	0.5530	0.5488
Age				
Mature	0.8705*	0.9121*	0.9712*	1.0191*
Ownership				
Shareholding and partnership	0.0840	0.0275	0.1437	0.0855
Registration				
Registered	-1.8960*	-1.7482*	-1.9463*	-1.7859*
Financial inclusion				
Financially included	1.7973***	4.3424***	1.8553***	4.3651***
*Financially included *Micro*		-3.0278**		-3.0436**
*Financially included *Small*		-2.4476*		-2.3858*
Gender ownership				
Female	0.4677	0.4663	0.4322	0.4283
Turnover	-0.0330	-0.0395	-0.0172	-0.0227
Manager gender				
Female	0.0253	0.1073	-0.0705	0.0158
Manager experience				
Young	-0.1360	-0.1888	0.0727	0.0291
Mature	-0.4792	-0.5533	-0.5109	-0.5860
Manager education				
University degree	-1.3967	-1.1385	-1.4906	-1.2017
Secondary school	-1.2961	-1.0524	-1.3241	-1.0476
Purchase on credit	-0.5490	-0.4868	-0.6357*	-0.5778
Loan Purpose				
Working capital or Fixed Assets	-0.8037	-0.7443	-0.8049*	-0.7472
Loan granted	2.9429***	2.9420***	2.9531***	2.9510***
Collateral				
Collateral	-1.2585	-1.2238	-11.9477***	-11.2988***
*Collateral*Micro*			9.7575***	9.1680***
*Collateral*Small*			12.2332***	11.6510***
Inflation	-26.5926**	-27.0352***	-26.8858***	-27.4337***
GNI per capita	0.0021**	0.0021**	0.0022***	0.0022**
Constant	0.9946	-1.2196	11.2035***	8.3289*
Observations	542	542	542	542
Log Likelihood	-101,0244	-99,8001	-100,0776	-98,8521
LR statistic	94,24	98,19	708,15	648,34
Mc Fadden R2	0,5156	0,5214	0,5201	0,5260
Prediction evaluation	92,62%	92,80%	92,62%	92,80%

Note: Robust t-statistics omitted. *** p<0.01, ** p<0.05, * p<0.1
Source: Authors

With respect to model 1, *Size*, *Age*, *Registration* and *Financial inclusion*, *Loan granted* by financial institutions and macroeconomic indicators (*inflation* and *GNI per capita*) are the variables that influence the demand for credit. Conversely, *Industry*, *Ownership*, *Collateral*, *Purchase on credit* and *Loan purpose* (mostly working capital), as well as none of the

characteristics of managers (*gender*, *experience* or *education*) prove significant and exert any influence upon the decision to apply for funding[5].
As for *Size*, the coefficient for *Micro* enterprises is negative and significant. Such businesses may rely more on their internal funds or trade credit and/or do expect barriers to access finance. This is consistent with Kuntchev et al (2013) pointing out that credit constraint declines with the size of the firms.
As for *Age*, being mature influences weakly but positively the decision of the business to apply for a loan. This is not consistent with Kuntchev et al (2013), who conclude that age plays no role. Indeed, the need for funding may increase over the life cycle of MSMEs. However, mature MSMEs may have self-financing capacity and therefore need less external funding.

Financial inclusion proves positive and very significant, whereas the *Registration* of the business is negative and weakly significant. This is in line with Reille and Bender (2014).
Unsurprisingly, *Loan granted* is positive and very significant; it closely associates with loan application compared with other sources of financing. *Loan granted* is fulfilled demand for funding from financial institutions.
Economic environment has a significant influence upon the demand for credit. *Inflation* is negative, deterring loan demand, whereas *GNI per capita* is positive and may signal business opportunities, although its value is weak.

The results of models 2 to 4 with the interaction variables remain the same as for the explanatory variables of demand and their significance in model 1 (Table 7), while other variables become significant.
Small, alongside *Micro* enterprises, proves very significant and negative as for *Collateral* (model 3 and 4) and *Financial inclusion* (model 3 and 4), which is consistent with classical finance theory (Brealey et al, 2017).
Purchase on credit is weakly significant and negative, lessening the probability of loan application. This suggests that MSMEs may already benefit from trade credit as a substitute for another loan.
Loan purpose is weakly significant and negative as regards the demand to fulfil one purpose, usually for working capital, rather than for both working capital and fixed assets. MSMEs finance their working capital with treasury funds, savings of the owner and trade credit rather than with bank loans. This is consistent with Kuntchev et al (2013), Reille and Bender (2014) as well as with pecking order theory (Myers and Majluf, 1984).
We can corroborate hypothesis H1 as for the creation stage of the life cycle. *Age* is positively associated with loan demand as for both working capital and fixed assets, whereby MSMEs do combine several funding sources.

4.3. Results from the model for loan supply (*loan granted*)

We estimated the model for loan supply (*Loan granted*), step by step, adding gradually the variables of the loan characteristics: *Collateral*, *Loan duration* and the *Interest rate* (model 1 to 3). Next, the model was re-estimated according to *Size* with the variables *Financially included* (model 4), *Collateral* (model 5), and both *Financially included* and *Collateral* (model 6). The interaction of *Size* with these variables compares their effect upon Micro and Small enterprises as for the probability of access to financial institutions, Medium-sized enterprises standing as the category of reference. Table 8 displays the estimation for loan supply (*Loan granted*).

Table 8. Estimation of the model for loan supply

[5] The interest rate is not included in the demand equation because values are known only for MSMEs that were granted a loan (Loan demand =1).

Variables	(1) *Loan granted*	(2) *Loan duration*	(3) *Interest rate*	(4) *Financial inclusion*	(5) *Collateral*	(6) *Financial inclusion + Collateral*
Size						
Micro	0.1965	0.3106	0.4671	-13.0506***	-0.0652	-13.7160***
Small	0.2519	0.3213	0.5321	-13.0600***	0.3405	-13.3469***
Industry						
Manufacturing	0.4404*	0.4108	0.2242	0.2327	0.2323	0.2415
Age						
Mature	0.0687	-0.0664	-0.0938	-0.1188	-0.1160	-0.1428
Ownership						
Sharehold. & partnership	-0.1463	-0.2837	-0.4369	-0.4431	-0.4439	-0.4502
Registration						
Registered	-0.3287	0.1272	0.0529	0.0413	0.0620	0.0494
Financially included						
Financially included	0.8791**	0.2387	0.3006	-13.2539***	0.3029	-13.3200***
*Financ. included*Micro*				13.5543***		13.6438***
*Financ. included*Small*				13.6298***		13.6872***
Turnover	0.0787	0.0950	0.1036	0.1034	0.1027	0.1017
Manager experience						
Young	-1.2704**	-1.4461**	-1.5525*	-1.3753	-1.5538*	-1.3701
Mature	-0.2400	-0.4821	-0.9320	-0.7458	-0.9142	-0.7197
Manager gender						
Female	0.2032	0.3568	0.3347	0.3393	0.3471	0.3517
Manager education						
University degree	0.7153	0.6972	0.9638	0.9640	0.9653	0.9631
Secondary school	0.7669	0.7930	0.9846	0.9725	0.9807	0.9651
Sales on credit	0.7152***	0.7521**	0.8536**	0.8354**	0.8557**	0.8373**
Loan purpose	-1.0506***	-1.0218***	-1.0475***	-1.0558***	-1.0579***	-1.0672***
Collateral						
Collateral	0.4127	0.6851**	0.4942	0.4965	0.1817	0.1475
*Collateral*Micro*					0.6138	0.6669
*Collateral*Small*					0.2168	0.2582
Loan duration						
Very Short term		-0.7225**	-0.2756	-0.2595	-0.2761	-0.2612
Short term		0.2830	0.2223	0.2313	0.2211	0.2309
Interest rate			-0.4227	-0.2079	-0.5573	-0.3652
Inflation	-11.7205**	-5.5141	-3.5363	-3.7759	-3.5066	-3.7501
GNI per capita	0.0011***	0.0007**	0.0007*	0.0007*	0.0007*	0.0007*
Constant	-5.1568***	-3.8482*	-3.9963	9.3316***	-3.6593	9.7917***
Observations	545	446	389	389	389	389
Log Likelihood	-297.73986	-237.59965	-205.3979	-204.8856	-205.23209	-204.69634
LR statistic	105.11	66.07	51.16	209.02	52.03	227.44
Mc Fadden R2	0.1891	0.1363	0.1204	0.1226	0.1211	0.1234
Predicted cases	73.58%	74.44%	75.06%	75.06%%	74.55%	74.29%

Note: Robust t-statistics omitted. *** p<0.01, ** p<0.05, * p<0.1
Source: Authors

According to estimates (model 1 to 3), *Size*, *Age*, *Registration*, *Ownership*, *Turnover* and *Interest rate* prove insignificant; among the characteristics of the manager, only the *manager experience* has a significant negative impact upon the decision to grant credit. This result suggests that financial institutions are prone to risk aversion.

Industry, Financial inclusion, *Sales on credit*, *Loan purpose*, *Collateral* and macroeconomic indicators (*Inflation* and *GNI per capita*) are the variables that exert a significant influence upon the decision to grant a loan.

Financial inclusion exerts a positive and significant effect on the probability of getting credit. The more financially included the business, the higher the chance for the loan to be granted. This result can be understood as a major requirement from financial institutions to monitor transactions. It is consistent with the reluctance to grant credit to businesses lacking book accounts and making an excessive use of cash (Reille and Bender, 2014).

Access to credit is all the more favourable for MSMEs using *Sales on credit*, which proves positive and very significant. This may signal a good customer relationship and a promising turnover.
Loan purpose is negative and very significant. A single financing requirement, mainly for working capital, reduces the probability of granting credit.
Collateral is positive and significant, closely associated to the probability of granting credit. It is indeed a mandatory condition for most loans, in as much as it becomes the main source of repayment in the event of default. This is consistent with the assumption of risk aversion from financial institutions in classical finance theory (Brealey et al, 2017). It is worth mentioning that the ratio of collateral upon loan amount stands above 250 per cent in Egypt and Tunisia and above 150 per cent in Morocco (de Lima et al, 2016).
Loan duration has a negative and significant effect on the decision to grant credit. The more the MSMEs choose a very short-term loan, the lower the likelihood of getting credit compared to those borrowing for a longer term. Consistent with the maximising assumption in classical finance theory (Brealey et al, 2017), this result can be explained by the preference of financial institutions to grant loans over a longer schedule in order to take advantage from lower costs and higher returns.
Interest rate is not significant, neither being a determinant nor an obstacle to grant credit[6].
Macroeconomic indicators have a significant impact on the lending decision. *Inflation* is negative, potentially affecting the real interest rate, hence the returns of financial institutions. Conversely, *GNI per capita* is weakly positive.

As for interaction variables, models 4 to 6 display the same results: *Size* for both Micro and Small becomes negative, and prove significant alongside *Manager experience*, *Sales on credit*, *Loan purpose* and *Loan duration*, whereas *Collateral* becomes insignificant

Hypothesis H2 is validated as for fixed assets; bank loans are granted by financial institutions according to loan duration, requested collateral and the financial inclusion of MSMEs.

It is worth mentioning that pseudo R^2 and predicted cases prove weaker as for the loan supply model in comparison as that of the loan demand model.

4.4. Results from the models of interactions between loan demand and loan granted

On the demand side (models 2 to 4), the interaction of *Size* for both Micro and Small enterprises with *Financially included* and *Collateral* is significant, being respectively negative and positive. The impact of financial inclusion on demand vary according to *Size*: The more Micro and Small businesses are financially included, the less they apply for credit compared to medium-sized enterprises. The impact of *Collateral* depends on *Size*: it becomes positive for Micro and Small enterprises in contrast with Medium-sized ones.

On the supply side (models 4 to 6), the interaction of *Size* for both Micro and Small enterprises with *Financially included* and *Collateral* is respectively significant and non-significant. The impact of financial inclusion on supply is not the same for all MSMEs: it becomes positive for Micro and Small enterprises in contrast with Medium-sized ones.

Hypothesis H3 addresses the adjustment between demand and supply for funding, which is usually achieved for MSMEs enjoying financial inclusion. It is validated alongside Hypothesis H4 stating that imbalance between demand and supply for funding affects MSMEs that experience the absence of sufficient collateral and/or a bank account.

5. A wider picture of the supply side: Funding from the microfinance industry

[6] As for 2013, the prime lending rate of commercial banks reached 12% Egypt (World Bank), 6.3% in Morocco (Bank Al Maghrib) and 7.31% in Tunisia (Banque Centrale de Tunisie).

So far, we observed there is an imbalance between loan demand and supply; in addition, the role of NBFIs (including microfinance) proved difficult to capture due to underrepresentation of Microenterprises, a major sampling bias in the WBES[7]. This is a puzzling result, because the *raison d'être* of the microfinance industry is to provide funding to Micro and Small enterprises, most of which are informal. Hence, we focus on the microfinance industry in order to get the full picture of loan supply to MSMEs in North Africa.

Table 9 reports the key figures of the microfinance industry, namely 12 North African MicroFinance Institutions (henceforth MFIs) with the most complete client data that we selected from the MIX database. Among active borrowers (NAB), over nine out of ten are MSMEs. In the first place, MFIs grant micro-credit to Microenterprises, a share above eight out of ten, whereas SMEs is only one out of ten. Over two out of five businesses are granted loans according to the joint liability mechanism, suggesting they lack collateral. Average loan balance per borrower in North Africa is small ($520), Egypt and Morocco standing respectively below and above average. In contrast, the average lending rate is high, within a range of 25-36 percent, although borrowers payback. In this respect, MSMEs can afford funding working capital rather than fixed assets.

Table 9. Selected sample of MFIs in North Africa (2012)

Country	MFIs	NAB[a]	Number of applicants and share (%) of loans granted					Lending rate (%)	Average loan amount[b]
			MSMEs	MEs	SMEs	Solidarity groups	Female borrowers		
Egypt	5	593,112	586,388 (98.86)	82.06	16.8	342,196 (57.69)	384,145 (65.42)	34.3	$234
Morocco	6	702,212	669,803 (95.38)	87.86	7.52	330,149 (47.23)	394,296 (56.23)	36.35	$772
Tunisia	1	239,825	191,658 (79.92)	97,91	0.00	0.00	157,364 (67.97)	25.46	$493
Total		1,535,149	1,447,849 (91.38)	1,295,380 (84.38)	152,469 (9.93)	673,848 (46.58)	935,805 (63.2)		$520

Note: [a] Number of Active Borrowers. [b] 2014 (MIX, 2015)
Source: Authors from MIX.

Funding provided by the microfinance industry displays a better picture than that of WBES. It captures a larger sample that proves far more representative of the pattern of MSMEs. Microentreprises are prominent and include informal businesses getting credit despite the fact they lack collateral and may be financially excluded, namely the category of borrowers that financial institutions do not usually grant loans to. Hence, Hypothesis H5 is corroborated: the credit market is segmented alongside the segmentation of businesses.

Conclusion

Our results prove different from those presented in the three country reports (World Bank, 2013a, 2013b and 2014), which include large enterprises and several other sampling drawbacks. In order to comply with international standards, we designed a consistent sample of 3,075 MSMEs excluding large enterprises from the WBES as for Egypt, Morocco and Tunisia. However, a major selection bias remains in the WBES sample with respect to the weak share of Microenterprises, which make up more than 90 per cent of MSMEs.

We focused upon a subsample of 709 businesses that applied for a loan (loan demand), disentangling those that were granted a loan (loan supply) from those that were rejected (unfulfilled demand). We used a binary logit model to address both the demand side and the

[7] According to the characteristics of loans granted to MSMEs by NBFIs (*Interest rate*, *Collateral* and *Loan duration*) interest rates are low, even for long term loans. NBFIs include some microfinance institutions, alongside credit unions, cooperatives and finance companies.

supply side. Our salient findings are the following: on the demand side, the characteristics of businesses such as *Size*, *Age*, *Registration* and *Financial inclusion* are the main variables that exert an impact on loan application, whereas *interest rate* plays no role We can corroborate hypothesis H1 to the extent that age is positively associated with loan demand as for both (ii) working capital and (iii) fixed assets, whereby MSMEs do combine several funding sources. On the supply side, with the exception of *Financial inclusion*, none of these characteristics of businesses has any influence upon loan granted from financial institutions, whereas *collateral* plays a major role. On both sides, macroeconomic indicators (*Inflation* and *GNI per capita*) prove influential. Hypothesis H2 is validated as for (iii) fixed assets; bank loans are granted by financial institutions according to loan duration, requested collateral and the financial inclusion of MSMEs.

We validate Hypothesis H3 regarding the adjustment between demand and supply for funding, which is achieved for MSMEs enjoying financial inclusion.

We corroborate Hypothesis H4 as for the imbalance arising from the unfulfilled demand, whereby loan demand exceeds loan granted, which affects financially excluded MSMEs lacking collateral that face credit rationing from financial institutions.

Last, we validate Hypothesis H5 with respect to the credit market segmentation. There is, an obvious mismatch between demand from MSMEs addressing NBFIs (including microfinance), which proves quite small in the WBES sample, and the large loan supply provided by MFIs to Microenterprises according to the MIX.

Admittedly, there are shortcomings in our study, which leave room enough for extended research. In so far we used a cross-section analysis, we could not discern a trend that would require panel data. Adjustment of the supply and demand for funding calls for a better sampling including both Microenterprises and microfinance institutions. On the demand side, self-selection from MSMEs that refrain from applying for bank credit calls for an in-depth analysis of the role of the microfinance industry. At last, the issue of informality should be addressed, in as much as many Micro and Small enterprises are informal business entities without registration or/social protection.

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Appendix

Table A1. Share (%) of funding source as for working capital and fixed assets by Size

	Working capital				Fixed assets			
Size	**Internal funds / retained earnings**	**Banks ** **	**NBFI* **	**Trade credit + other informal credit*** **	**Internal funds / retained earnings**** **	**Banks ** **	**NBFI * **	**Trade credit + other informal credit*** **
Micro	79.27	4.04	0.68	15.83	76.32	9.35	5.89	8.06
Small	79.36	5.94	0.88	13.5	74.35	10.2	9.72	5.08
Medium	77.21	8.65	0.96	12.9	70.59	14.8	9.96	4.2

Note: * Including microfinance. ** State owned + private. ***Including money menders, friends, relatives, etc.
**** Including owners contribution or issued new equity.
Source: Authors

Table A2. Dictionary of variables

	Name	Type	Definition	Units	Source
Characteristics of the firm	*Industry*	Discrete	*Manufacturing = 1* *Retail and services = 2*	Binary (1, 2)	WBES *Calculated*
	Size	Discrete	Full-time permanent staff *Micro: 1-9 employees = 1* *Small:10-49employees= 2* *Medium: 50-99 employees = 3*	Ordinal (1, 2, 3)	*WBES* *Calculated*
	Age	Discrete	Number of years *Start-up + young <8 years = 1* *Mature >=8 years = 2*	Binary (1, 2)	WBES *Calculated*
	Ownership	Discrete	*Shareholding + Partnership = 1* *Sole proprietorship = 2*	Binary (1, 2)	WBES *Calculated*
	Registration	Discrete	*Non registered (informal) = 0* *Registered (formal) = 1*	Dummy (0,1)	WBES
	Financial inclusion	Discrete	*Excluded* (no bank account) = *0* *Included* (bank account) = *1*	Dummy (0,1)	WBES
	Turnover	Continuous	*Ln(Sales turnover)* as of 2012	Currency unit	WBES *Calculated*
Characteristics of the manager	*Gender ownership*	Discrete	*Female = 0* *Male = 1*	Dummy (0, 1)	WBES *Calculated*
	Top manager experience	Discrete	*Beginner:<2 years = 1* *Young: 2-7 years = 2* *mature: >= 8 years = 3*	Ordinal (1, 2, 3)	WBES *Calculated*
	Top manager gender	Discrete	*Male = 1* *Female = 2*	Binary (1, 2)	WBES
	Top manager education	Discrete	*Tertiary (university) = 1* *Secondary school (at most) = 2* *Primary school (at most) = 3*	Ordinal (1, 2, 3)	WBES *Calculated*
Financing need of the firm	*Sales on credit*	Discrete	*No sales on credit =0* *Sales on credit =1*	Dummy (0, 1)	WBES
	Purchase on credit	Discrete	*No purchase on credit =0* *Purchase on credit =1t*	Dummy (0, 1)	WBES *Calculated*
	Loan purpose	Discrete	*Working capital or fixed assets = 1* *Working capital + fixed assets = 2*	Binary (1,2)	WBES *Calculated*
Characteristics of the loan	*Collateral*	Discrete	*No collateral requested = 0* *Collateral requested = 1*	Dummy (0, 1)	WBES
	Loan duration	Continuous	Duration of the loan in months *Very short term:< 6 months = 1* *Short term:6 -24 months = 2* *Mid-long term: >24 months= 3*	Ordinal (1, 2, 3)	WBES *Calculated*
	Interest rate	Continuous	Nominal interest rate (loan or credit)	Percentage	WBES
Macroeconomic indicators	*Inflation*	Continuous	Rate of inflation	Percentage	WDI
	GNI per capita	Continuous	GDP per capita	$ billion	WDI

Source: Authors calculations, WBES (World Bank Enterprises Surveys, 2013) and WDI (World Development Indicators).

Table A3. Country distribution of the pooled sample by size of MSMEs, financial inclusion and registration

Category / Country	Micro (1-9 employees)				Small (10-49 employees)				Medium (50-99 employees)				Micro (1-9 employees)				Small (10-49 employees)				Medium (50-99 employees)				Sample	% sample
	Excl.	Incl.	Total	%	Excl.	Incl.	Total	%	Excl.	Incl.	Total	%	Regis.	N-r[a]	Total	%	Regis.	N-r	Total	%	Regis.	N-r	Total	%		
Egypt	411	264	675	28.97	468	887	1,355	58.15	50	250	300	12.88	592	77	606	25.97	1213	105	128	5.49	273	18	291	12.48	2,330	75.77
Morocco	2	67	69	22.77	6	171	177	58.42	2	55	57	18.81	68	1	67	22.11	168	9	177	58.41	55	2	57	18.81	303	9.85
Tunisia	5	105	110	24.89	8	239	247	55.88	2	83	85	19.23	105	5	110	24.88	242	5	247	55.88	82	3	85	19.23	442	14.37
Total	418	436	854	27.77	482	1,297	1,779	57.85	54	388	442	14.37	765	83	848	27.57	1623	119	1,742	0.55	410	23	433	14.08	3,075	100.00
%	48.95	51.05	100.00		27.09	72.91	100.00		12.22	87.78	100.00		90.2	9.8	100.00		93.2	9.8	100.00		94.7	5.3	100.00			

Note: [a] Non-registered

Source: Authors' design from WBES.

Table A4. Correlation matrix

	Loan demand	*Loan granted*	*Size*	*Industry*	*Age*	*Owner-Ship*	*Regis-tered.*	*Gender owners*	*Manag. gender*	*Manag. exper.*	*Manag. educ.*	*Financ. included*	*Purchase ./ credit*	*Turn-over*	*Sales / credit*	*Loan purpose*	*Colla-teral*	*Interest rate*	*Loan duration*	*Inflation*	*GNI per capita*
Loan demand	1																				
Loan granted	0.43*	1																			
Size	0.13*	0.1*	1	1																	
Industry	0.13*	0.13*	-0.05	1																	
Age	0.10*	0.07	0.08	0.18*	1																
Ownership	-0.10	-0.10	-0.10*	-0.08	-0.03	1															
Registered	-0.01	0.00	0.04	0.11*	0.03	0.003	1														
Gender ownership	-0.09	-0.03	-0.04	0.101*	-0.04	0.06	-0.04	1													
Manager gender	0.01	0.04	0.01	0.03	-0.05	0.00	-0.02	-0.26*	1												
Manager experience	0.08	0.13*	0.04	0.13*	0.22*	0.01	0.13*	-0.03	-0.09	1											
Manager education	-0.09*	-0.05	-0.10*	-0.03	0.03	-0.06	-0.01	0.09	-0.09	0.06	1										
Financially included	0.44*	0.30*	0.19*	0.24*	0.08	-0.01	0.09	-0.14*	-0.04	0.23*	-0.14*	1									
Purchase on credit	0.15*	0.24*	0.04	0.07	0.07	-0.16*	0.07	-0.10*	-0.04	0.07	0.10	0.159*	1								
Turnover	0.28*	0.17*	0.44*	0.13*	0.08	-0.08	0.02	-0.08	-0.07	0.08	-0.14*	0.29*	0.11*	1							
Sales on credit	0.22*	0.27*	0.14*	0.05	-0.01	0.13*	0.04	-0.03	0.00	0.08	0.03	0.03	0.51*	0.13*	1						
Loan purpose	0.23*	0.32*	0.18*	0.09	-0.01	-0.06	0.04	-0.07	0.03	0.08	-0.03	0.22*	0.18*	0.19*	0.14*	1					

Collateral	0.104*	0.03	0.04	-0.08	-0.05	-0.08	-0.06	0.02	0.00	-0.04	0.05	-0.10	-0.04	-0.02	-0.03	-0.02	1				
Interest rate[a]		-0.15*	0.01	-0.25*	-0.05	0.23*	-0.06	0.07	-0.08	-0.12	0.00	0.22*	0.20*	-0.08	0.15*	-0.12*	0.03*	1			
Loan duration[b]		. 0.16*	-0.02	0.00	-0.02	0.02	-0.01	-0.01	0.01	0.03	0.03*	0.04	0.12*	-0.17*	0.15*	-0.07	0.11*	-0.09	1		
Inflation	0.32*	-0.29*	0.11*	0.45*	-0.10*	0.05	-0.05	0.15*	0.00	-0.20*	-0.03	-0.40*	-0.23*	-0.46*	-0.25*	-0.20*	0.17*	0.35*	0.11	1	
GNI per capita	0.15*	0.27*	0.05	0.25*	0.05	0.21*	0.08	-0.08	0.08	0.15*	0.00	0.28*	0.27*	0.22*	0.31*	-0.22*	-0.01	-0.46*	0.31*	-0.08	1

Note: * significant at 1% threshold. [a], [b] There is no correlation between *Interest rate* and *Loan duration* with *Loan demand* because data are only available for MSMEs that successfully applied for a loan.
Source: Authors.