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(doi: 10.12831/77237)

Journal of Financial Management, Markets and Institutions (ISSN 2282-717X)
Fascicolo 1, gennaio-luglio 2014

Ente di afferenza:
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Why Do SMEs Use Informal Credit? A Comparison between Countries

JFMI
Journal of Financial Management Markets and Institutions

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Abstract

Informal finance refers to financial transactions that occur outside official financial institutions and that are not regulated by governmental authorities. The purpose of this paper is to investigate what are the difficulties of SMEs in accessing formal finance and therefore how the country- and firm-level factors that explain the presence of such financial constraints may incfluence the use of informal credit by the SME. We find that credit-constrained SMEs rely on informal credit of any type. In addition the size and the age of the firm and whether the firm has a payment overdue determine their use of informal credit. On the other hand, the quality of the legal system is the most significative country-level factor.

Keywords: SMEs, Informal Credit, Credit Constraints.
JEL Codes: O17; G20; G30.

1 Introduction

Informal finance refers to financial transactions that occur outside official financial institutions and that are not regulated by governmental authorities. There are various sources of informal credit, e.g., family/friends, moneylenders, rotating savings and credit organisations (ROSCAs), loan sharks, indigenous savings and credit clubs, informal credit unions, and savings collectors. However, some of the common characteristics of these sources are their primary dependence on relationships and social networks, interest rates that differ from those in formal financial markets, generally small and short-term loans, small or no collateral, and lack of regulation or registry. It is noteworthy that the definition of informal finance is not related to legality issues. Informal financial transactions can be legal, such as borrowing from family members, or can be forbidden by the law in many countries[1], such as moneylender activities. Some authors also consider trade credit as informal credit, while a substitute for the formal short-term bank credit channel (Meltzer, 1960; Mateut *et al.*, 2006). Trade credit

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[1] See Pagura and Kirsten (2006) for a discussion on the definition of informal financial organisations.

ISSN 2282-717X

is far more complicated and not related to the financing aspect only. It can be considered in advertising theory (Nadiri 1969), but also in production quality signalling theory (Lee and Stove, 1993). Another important aspect of trade credit is related to research in the field of operations (Haley and Higghins, 1973) and as a method for price discrimination (e.g., Petersen and Rajan, 1997). More recently, Shi and Zhang (2014) consider trade credit as an interaction of financing, marketing, operations, and risk behavior using a game-model approach. For these reason we decide to adopt the more common definition of informal credit in this paper, not considering the trade credit.

The number of people worldwide who have no deposit and/or loan account in formal financial institutions is estimated to be between two and three billion (Karlan and Morduch, 2009; ATISG, 2010). Together with this figure, results of enterprise surveys around the world indicate that approximately 35% of the firms have difficulty to access external finance (Demirguc-Kunt *et al.*, 2008). The informal financial sector mostly serves these people who are excluded from the formal financial sector or credit-constrained borrowers (mostly SMEs, poor households, informal businesses, borrowers in rural areas that are located far from formal creditors, and people who are not able to meet collateral requirements). As such, the existence of informal financial markets is linked to credit rationing or, in a broader sense, to credit constraint phenomena. Even though many studies do not distinguish between credit-rationed borrowers and credit-constrained borrowers, there is a slight difference between them. A credit-constrained borrower is a borrower who is not able to obtain the required amount of credit. Discouraged borrowers, i.e., borrowers who do not apply for credit expecting that the application will be rejected, are also credit-constrained borrowers[2]. Informal credit is seen as an alternative financing way for the credit rationed borrowers. Accordingly credit markets are segmented into two parts: formal and informal. The informal credit market mostly serves a marginal class of borrowers, who are not eligible for formal financial servicesand mostly consist of smaller/younger firms that have difficulties to get loans from formal financial markets.

If an agent cannot get formal loan and family/friends networks are not available for this credit-rationed borrower, the agent may borrow from moneylenders who charge unfair and higher interest rates[3]. If this borrower is an SME, its return from an investment – based on a credit from moneylenders –, will be smaller compared to their competitors who are considered creditworthy by formal financial sector. Additionally the SME may not be able to get the benefit of debt finance, which reduces tax liability – if this borrowing is not reflected in the financial accounts of the firm –. Finally these firms may not be able to accumulate money as their competitors did, and eventually they will be worse off compared to their competitors.

The purpose of this paper is to investigate what are the difficulties of SMEs in accessing formal finance. Firstly, we explore to which extent SMEs which have financial constraints choose to finance their working capital and fixed asset investments via informal credit.

[2] Credit rationing, however, is a more supply-oriented concept and occurs if a bank is able to lend at a certain interest rate but is not willing to do so due to risk concerns. As such, credit-rationed borrowers can be considered a subset of credit-constrained borrowers. See Liu and Spanjers (2009) for further explanations.

[3] Higher interest rates in case of borrowing from moneylenders and due to altruism concerns lower interest rates in case of borrowing from family/friends.

Successively, we examine how the country- and firm-level factors (e.g., the financial development level and size of a country, gender of the owners, and location of firms) may influence the use of informal credit by the SME. Our primary data sources are the Business Environment and Enterprise Performance Surveys (BEEPS). We use the 2005 version of these surveys as our main sample because it provides detailed information on different types of informal credit. In addition to the 2005 set of the BEEPS, we also use a standardised (by EBRD) sample of the 2002-09 sets of BEEPS. To our knowledge, with the exception of Beck *et al.* (2008) who investigated how financial and institutional development affects financing of enterprises, our is the first paper that propose to carry-out and in depth analysis of the impact of informal credit on financial development[4]. Unlike Beck *et al.* (2008), who employ only moneylenders as source of informal credit without any distinction of its use, our paper distinguishes between moneylenders and family/friends as the possible informal credit sources, and between working capital purchases and fixed assets investments as the possible use. Finally, our analysis is based on specific explanatory variables which are more relevant to the investigation of informal credit compared to those used by Beck *et al.* (2008).

The rest of the paper is organised as follows. In the second Section we present the literature review, whereas the third Section explains the methodology and describes the empirical model. Data are presented in the fourth Section. After the presentation of the empirical results in the fifth Section, the final Section provides concluding remarks.

2 Literature Review

Many studies consider informal credit as a last resort for credit-rationed borrowers (Bell, 1990; Ghosh *et al.*, 2000). In contrast, informal credit can also be used by firms that have easy access to formal financial services (Kochar, 1997; Azam *et al.*, 2001). Lower or no interest on loans from family/friends due to altruistic concerns makes this type of loans attractive to borrowers. For example, results of interviews with villagers in Egypt show that although households have access to formal financial services, informal financial services can be preferred by borrowers due to the complex structure of formal financial contracts, which makes them difficult to understand (Baydas *et al.*, 1995). In particular, less educated and «finance literate» women participate more in informal financial transactions compared with men, especially with regard to savings.

If a credit-rationed borrower cannot obtain a formal loan and family/friend networks are not available, he/she may borrow from moneylenders who charge unfair and higher interest rates. If this borrower is an SME, its return from investment, based on credit from moneylenders, will be smaller than the return from investment of competitors who are considered creditworthy by the formal financial sector. Additionally, the SME will possibly not be able to realise the benefits of debt finance, which reduces tax liability,

[4] In the credit literaure Brown *et al.* (2009) use the BEEPS data set to investigate the influence of information sharing to the access of formal credit by SMEs. Yaldiz *et al.* (2014) use the data set to explore the collateral requirements of SMEs by banks.

if its borrowing is not reflected in the financial accounts of the firm. Eventually, these SMEs may not be able to grow out of being small and depending on moneylenders. Using data from India, Bell (1990) shows that interest rates are set higher in informal credit markets due to the higher risk levels of borrowers, higher costs of entry for new informal creditors, and, thus, lower competition on the supply side of the informal credit market, which increases the price of informal credit. Using the Investment Climate Survey of the World Bank, Ayyagari *et al.* (2010) show that the positive effect of informal credit on firm growth is limited. As such, perceptions on informal finance can be negative at first glance[5]. However, there are also studies on the positive effects of informal finance, i.e., alleviating credit constraints. Manig (1996) addresses informal finance as a source of rural development in Pakistan. Huck *et al.* (1999) emphasise the importance of informal credits to funding new businesses in a small village in Chicago. Despite its inefficient banking system and poor legal infrastructure and institutional quality, China is one of the fastest growing economies in the world. Allen *et al.* (2005) and Molnar and Tanaka (2007) explain this anomaly by the existence of alternative informal financing channels in the private sector, which are based on reputation and relationships.

Previous empirical studies show that despite financial liberalisation efforts and regulations, informal credits still constitute a large share of credits, especially of those provided to poor households and SMEs. Tsai (2004) notes that the limited supply of bank credits, limits in the governmental capacity to implement its policies, the political and economic segmentation of local markets, and the institutional weaknesses of many microfinance programs are factors that contribute to the persistence of the informal financial sector in China and India.

Because there is no formal registration of transactions in informal financial markets, it is difficult to obtain data on these activities. Some researchers individually collect household or enterprise survey data on countries. These surveys may be well designed to meet the requirements of researchers and be suitable for answering their research questions; however, they generally suffer from small sample sizes. In contrast, there are only a few studies that use available larger surveys that have been conducted mostly by the World Bank[6]. Previous empirical literature concentrates on the use of informal credits by households, whereas only a few studies focus on the informal credit use of firms. Most literature concentrates on the individual characteristics of subjects and/or on the institutional environment as determinants of informal finance in individual developing countries, whereas only a few studies use cross-country data. Despite the importance of firms for economic growth and development, a gap exists regarding the role of formal financial development and, in particular, the role of banking concentration in the informal credit use of firms, and there are only a few studies on informal finance in transition

[5] This perception is due to the higher interest rates charged to borrowers by moneylenders (informal creditors). For further discussions on the exploitation of borrowers by informal lenders, see Bolnick (1992), Aliber (2002), and Mati and Sen (2009).

[6] For instance, Azam *et al.* (2001) surveyed 140 firms, Steel *et al.* (1997) surveyed 280, Zhang (2008) surveyed 172, and Guirkinger (2008) surveyed approximately 500 households. In contrast, the studies by Straub (2005), Safavian and Wimpey (2007), and Beck *et al.* (2008) are examples of studies that used the World Bank Enterprise Surveys. For example, Safavian and Wimpey (2007) used a sample of 3,564 enterprises from 29 countries in the WBES in 2005. Beck *et al.* (2008) used a sample of 2,754 enterprises from 48 countries.

economies and Eastern European and Central Asian countries. To our knowledge, there are no studies on informal finance in developed economies.

Empirical studies on informal finance focus mostly on single developing countries, rather than on several countries, because informal finance is more prevalent in developing countries[7]. These studies on informal finance are based on survey data of households or enterprises and mostly investigate individual characteristics of subjects and/or the institutional and legal environment of the country. Although rare, some studies use interviews to identify the characteristics of informal financial markets[8].

3 Methodology

The dependent variables of this study (Y) are drawn from the responses of enterprises that participated in the BEEPS. The percentage of working capital purchases and fixed asset investments financed by different informal credit sources are used as the key measures of informal credit use of SMEs. In the 2005 set of the BEEPS, the question posed to enterprises was: «What proportion of your firm's working capital and new fixed investments has been financed from each of the following sources over the last 12 months?»[9]. BEEPS provide information on three different types of informal finance: family/friends, moneylenders, and trade credit. Because we decide to use the common definition of informal finance used in the literature, we use only the first two types in the analysis, obtaining the 7 dependent variables as in Table 1.

Our dependent variables are expressed in percentages, i.e., fractions of working capital/fixed assets, where $0 \leq Y \leq 1$. This bounded nature of our dependent variables leads to some predicted values exceeding these boundaries when using OLS, which is analogous to the drawbacks of the linear probability model for binary data as discussed by Papke and Wooldridge (1996). We use a model that is suitable for dependent variables that contain a large number of zeroes, namely, a generalised linear model (GLM) with a logit link and the binomial family, as suggested by Papke and Wooldridge (1996). This model is applicable for dependent variables in the interval [0,1] and assumes that $E(YX) = G(X\beta)$, where $G()$ is a known non-linear function that satisfies the following constraint: $0 < G() < 1$. Typically, $G()$ is chosen to be $G(X\beta) = e^{X\beta}/(1 + e^{X\beta})$, a logistic cumulative distribution function, where β can be consistently estimated by the non-linear least squares method. Assuming a Bernoulli

[7] China is one of the countries that is examined extensively due to the importance of informal finance in the financing of the private sector (see Park *et al.*, 2003; Tsai, 2004; Zhang, 2008; Turvey and Kong, 2010; Ayyagari *et al.*, 2010). Ghosh *et al.* (2000) and Pagura and Kirsten (2006) are examples of other studies based on developing economies.

[8] As an example of the interview studies, Bolnick (1992) directly interviews moneylenders in Malawi. The survey results show that moneylenders charge much higher interest rates compared with the costs of conducting business, i.e., although there is no strict entry restriction on the informal market, moneylenders obtain monopoly rents. Bolnick (1992) suggests promoting competition among informal financial organisations to increase social wealth. He also emphasises the importance of social networks in the lending decisions of informal creditors.

[9] Other alternatives to informal credit sources include internal funds/retained earnings, equity (i.e., issue new shares), borrowing from local private commercial banks, borrowing from foreign banks, borrowing from state-owned banks (including state development banks), credit cards, leasing arrangements, and the government (other than state-owned banks). Interviewers are asked to verify whether the total is 100%.

Table 1: Variable Definitions and Sources of the BEEPS 2005 Data

Variable	Definition	Source
Dependent variables		
IC1_FA	Percentage of fixed asset investments financed by family/friends over the previous 12 months.	BEEPS
IC1_WC	Percentage of working capital purchases financed by family/friends over the previous 12 months.	BEEPS
IC2_FA	Percentage of fixed asset investments financed by moneylenders over the previous 12 months.	BEEPS
IC2_WC	Percentage of working capital purchases financed by moneylenders over the previous 12 months.	BEEPS
IC_FA	Percentage of fixed asset investments financed by informal credit over the previous 12 months (*IC_FA* = *IC1_FA* + *IC2_FA*).	BEEPS
IC_WC	Percentage of working capital purchases financed by informal credit over the previous 12 months (*IC_WC* = *IC1_WC* + *IC2_WC*).	BEEPS
ICP	Average percentage of fixed asset and working capital purchases financed by informal credit over the previous 12 months (*ICP* = *IC_WC* + *IC_FA*)/2).	BEEPS
ICD	Dummy variable that equals one if the firm has ever used informal credit to finance its working capital/fixed asset investments over the previous 12 months and zero otherwise.	BEEPS
Firm-level independent variables		
ACCESS	An ordinal variable that ranges from 1 to 4. This variable becomes 1 if the firm responds that access to finance (e.g., collateral required or financing not available from banks) is «no obstacle» for the operation and growth of the business. This variable becomes 2, 3, and 4 if the firm responds that it is a «minor obstacle», «moderate obstacle», and «major obstacle», respectively.	BEEPS
FEMALE	Dummy = 1 if at least one of the principal owners is female and is zero otherwise.	BEEPS
CITY	An ordinal variable that ranges from 1 to 4. This variable becomes 4 if the firm is located in the capital and/or in a city with a population of over 1 million, 3 if the firm is located in a city that has a population between 250,000 and 1,000,000, 2 if the firm is located in a city that has a population between 50,000 and 250,000, and 1 if the firm is located in a city/town that has population under 50,000.	BEEPS
SIZE	Number of full-time employees.	BEEPS
AGE	The number of years for which the firm has been operating.	BEEPS
MACRO	An ordinal variable that ranges from 1 to 4. This variable becomes 1 if the firm reported that macroeconomic instability (in terms of inflation or exchange rate) is «no obstacle» for the operation and growth of the SME, 2 if it is a «minor obstacle», 3 if it is a «moderate obstacle» and 4 if it is a «major obstacle».	BEEPS
OVERDUE	Dummy = 1 if the firm has any utility payments overdue (by more than 90 days) at the time of the survey and is zero otherwise.	BEEPS
Country-level independent variables		
STTRADED	Total shares traded on the stock exchange market to GDP.	Beck *et al.* (2010)
CR	Asset share of the three largest banks among the commercial banks (%).	Beck *et al.* (2010)
PRVTCRE	Private credit by formal banks/GDP.	Beck *et al.* (2010)
TIME	Average number of years from the filing for insolvency in court until the resolution of distressed assets.	World Bank

This table includes all the variables used in the study with their definition and the source of the data. The independent variables are divided between firm-level variables and country-level variables.

distribution for Y conditional on X, Papke and Wooldridge (1996) show that it is more efficient to estimate β by maximising this Bernoulli log-likelihood $L(\beta) = y\log[G(X\beta)]+(1 + y)\log[1 - G(X\beta)]$, which is a member of the linear exponential family. The quasi-maximum likelihood estimator of β is obtained by maximising this function. We model our firm-level dependent variables as functions of firm- and country-level variables.

We divide the independent variables in two groups: firm-level variables and country-level variables as in Table 1. To test the role of financial constraints, BEEPS provide a direct

measure based on reported difficulties in access to external finance. Specifically, firms are asked to report the extent – on a 1 («No obstacle») to 4 («Major obstacle») scale – to which financing problems are obstacles to the operation and growth of their businesses (*ACCESS*). We use this variable as the sole predictor for our dependent variables in order to avoid multicollinearity between *ACCESS* and the rest of the explanatory variables.

To investigate the role of gender in informal credit decisions of firms, a dummy variable (*FEMALE*) is employed. *FEMALE* equals to one, if there is at least one female amongst the owners of the firm, zero otherwise. Previous empirical studies examine the effect of gender on informal credit usage mostly at household level, while there are relatively few empirical studies at firm level. Studies show that women participate in informal finance, – especially in savings part of the market – more than men (Tsai, 2004). This result is generally attributed to lower education and income levels of women, and their weaker relationships with the officers in formal financial institutions (Baydas *et al.*, 1995; Marlow and Patton, 2005). To test for potential differences in financing opportunities available in larger versus smaller towns an ordinal variable (*CITY*) is employed. Physical distance to formal sources of credit matters for informal credit choices of firms as previous studies suggested. This result is linked to the existence of transaction (for the borrowers) and enforcement costs (for the bank), which promote the existence informal creditors in rural areas (Guirkinger, 2008). Moreover it can be used as a proxy for social ties, which are weaker in bigger cities. Accordingly, informal credit usage of firms is expected to be higher in smaller cities, as compared to bigger cities. The size of the SME (*SIZE*) is expressed as the number of full-time employees. Smaller businesses are less likely to have the appropriate information (e.g., financial statements and business records) when applying for formal credit, i.e., they are more likely to face financing difficulties in formal financial markets. Accordingly, small firms are expected to be more likely to finance their investments via informal credits due to financial constraints (Safavian and Wimpey, 2007; Zhang, 2008). Financial growth life cycle theory indicates that firms use different financing methods at different cycles of their lives. As the firm gains experience in the business field over time, it gains a reputation within the field, and it becomes easier for formal banks to monitor such a firm. Moreover, these types of older firms are more likely to be able to provide collaterals to obtain formal credit. Because it is much more difficult for younger firms to obtain formal external credit, they mostly rely on internal and informal finance (Berger and Udell, 1998). In line with these predictions, Huck *et al.* (1999) and Zhang (2008) identify business experience and age of the firm as important determinants of the informal credit use of firms. We constructed *AGE* by subtracting the self-reported year in which the firm began its operations from the year in which the survey was conducted. Thus, we expect higher levels of informal credit use in younger firms compared with older firms.

We use an ordinal variable (*MACRO*) that reflects the SMEs' perceptions on how the macroeconomic environment affects their operations. In instable macroeconomic environments, formal lenders are less willing to lend and people may lend only to people who they had previously known, i.e., personal relationships and networks gain higher importance. Accordingly, we expect more use of informal credit in SMEs, because the macroeconomic instability is problematic for businesses. Finally, *OVERDUE* is a proxy for financial distress, and we expect higher informal credit use by SMEs that have utility arrears.

Borrowers are less likely to rely on informal credit in countries where the financial system is more developed (Straub, 2005; Madestam, 2008). This situation is attributed to the high number of available financing opportunities and easiness of access to these services in countries with developed financial structures. Regarding the country-level independent variables, four measures of financial development[10] are employed in this study. As an approximation for the equity market development level we use the value of the total shares traded on the stock exchange market to GDP, expressed in percentage (*STTRADED*). The concentration in banking sector (*CR*) is employed as an inverse measure of financial development in banking market. To approximate for the concentration in banking sector the value of assets of three largest banks as a share of total assets within the commercial banks is used. Finally in order to account for the loan market development, the percentage of private credit by formal banks over GDP (*PRVTCRE*) is employed. To test for the effect of the quality of the legal system, we use a country-specific variable (*TIME*), namely the average number of years from the filing for insolvency in court until the resolution of distressed assets. Because this variable approximates the inefficiency of the legal system, we expect a positive association with the dependent variables.

4 Data

The main data sources of our study are the BEEPS. BEEPS are joint projects of the European Bank for Reconstruction and Development (EBRD) and the World Bank (WB). These surveys are designed to assess the business environment and development of private enterprises in EBRD countries[11]. To date, these surveys have been conducted every three years in each country from 1999 to 2009. Our analysis is primarily based on 2005 BEEPS data because this version of the survey contains the most detailed information on firms' informal credit use. In this third wave of the BEEPS, 14,107 firms from 34 countries were surveyed. Approximately 9,000 of the firms are located in 27 countries: 17 in the CEE (Albania, Bulgaria, Turkey, Croatia, Poland, Romania, Bosnia and Herzegovina, Serbia, Moldova, Estonia, Hungary, Latvia, Lithuania, FYR Macedonia, Czech Republic, Slovak Republic, and Slovenia) and 10 in the CIS (Belarus, Georgia, Tajikistan, Ukraine, Uzbekistan, Russia, Kazakhstan, Azerbaijan, Armenia, and Kyrgyz Republic). The same survey is also implemented in 6 advanced economies (Greece, Germany, Spain, Portugal, Ireland and South Korea) and one developing Asian country (Vietnam) to set a benchmark and enable comparisons to be made with these economies. For our final sample of SMEs to be in line with the definition of the BEEPS and OECD conventions, we define SMEs as firms with a maximum of 250 full-time employees, resulting in a sample of 12,833 SMEs for the 2005 BEEPS data[12].

[10] Source: Beck *et al.* (2010).

[11] See the BEEPS Reports at http://www.ebrd.com/pages/research/analysis/surveys/beeps.shtml for more detailed information on the study methodology and sampling.

[12] The definition of SMEs in the 2005 wave of the BEEPS was the following: small = 2-49 employees, medium = 50-249 employees, and large = 250-9,999 employees.

We argue that this sample has advantages compared with previous studies. First, to our knowledge, it is the largest data set compared with previous studies. Second, the data set includes firms in both rural areas and large cities; thus, it enables us to analyse diverse firms in a large number of countries. The BEEPS also enable us to extract valuable information on firm characteristics and business environments for our empirical analysis. Last, the sample provides a direct measure of informal credit use by asking about the finance sources of the firm's working capital and new fixed investments.

The EBRD also provides a standardised data set of the 2002-09 BEEPS waves. In addition to the estimation results from the BEEPS 2005 data, we provide regression results from this standardised data set. Data from previous years are standardised to fit with the 2009 wave of the BEEPS and contain information from 27 CEE and CIS countries[13]. In the 2002-09 BEEPS, firms were asked to report the percentages of fixed assets financed by trade credit and other credit sources, which include moneylenders, family/friends and non-bank financial sources.

5 Results and Discussion

5.1 Descriptive Statistics

Table 2 provides the summary statistics of the variables used in the empirical part of the study. We find that the 12.5% of the SMEs in the sample used informal credit to finance part of their fixed asset investments and/or working capital purchases, as indicated by the variable *ICD*. If we look in detail, only an average of 3.5% of the working capital (*IC_WC*) and 3.1% of fixed assets (*IC_FA*) are financed via informal sources. This information reveals that SMEs use informal credit to meet their smaller financing needs.

Table 2 reveals a large variation of *AGE* and *SIZE* across the SME sample set, while there is also a large variation in the country-level variables. For example, as an indicator of financial development, the ratio of shares traded in the stock exchange market to the GDP (*STTRADED*) ranges from 0.023% in Armenia to 152% in South Korea. Similarly, the percentage of the private credit traded by formal banks to the GDP (*PRVTCRE*) ranges from 6.91% in Armenia to 142% in Ireland. The approximation of the quality of the legal system in the corresponding countries (*TIME*) also shows a large variation from 0.4 to 9.2 years.

Tables 3 and 4 present the basic summary statistics, and the *t*-test of the mean differences, respectively, of the various types of informal credit in different country groups. The results of the *t*-test in Table 4 shows a statistical difference in the use of informal credit between the advanced country group and the others groups. In particular, as expected, SMEs in countries with advanced economies use less informal credit compared with

[13] The CEE and CIS countries included in this sample are: Albania, Belarus, Georgia, Tajikistan, Turkey, Ukraine, Uzbekistan, Russia, Poland, Romania, Serbia, Kazakhstan, Moldova, Bosnia, Azerbaijan, Macedonia, Armenia, Kyrgyz, Estonia, Czech Republic, Hungary, Latvia, Lithuania, Slovakia, Slovenia, Bulgaria, Croatia, and Montenegro. Surveys were conducted in 2002, 2005, 2007, 2008, and 2009, with 6,153, 10,421, 1,952, 3,375, and 7,815 firms surveyed, respectively.

Table 2: Summary Statistics for the 2005 BEEPS

Variable		Mean	Std. Dev.	Min	Max	# obs.
Dependent variables	*IC1_FA*	2.527	12.304	0.000	100.000	9,304
	IC1_WC	2.808	12.277	0.000	100.000	12,568
	IC2_FA	0.571	5.478	0.000	100.000	9,304
	IC2_WC	0.694	5.737	0.000	100.000	12,564
	IC_FA	3.098	13.603	0.000	100.000	9,304
	IC_WC	3.503	13.751	0.000	100.000	12,564
	ICP	3.183	12.190	0.000	100.000	9,250
	ICD	0.125	0.330	0.000	1.000	9,250
Firm-level independent variables	*ACCESS*	2.208	1.125	1.000	4.000	12,318
	FEMALE	0.281	0.450	0.000	1.000	9,961
	CITY	2.531	1.231	1.000	4.000	12,833
	SIZE	32.204	48.796	2.000	250.000	12,833
	AGE	14.763	14.975	4.000	200.000	12,823
	MACRO	2.418	1.144	1.000	4.000	12,461
	OVERDUE	0.027	0.161	0.000	1.000	12,699
Country-level independent variables	*STTRADED*	29.102	42.115	0.022	152.001	28
	CR	63.865	16.787	18.484	98.333	32
	PRVTCRE	57.867	43.199	6.916	142.110	27
	TIME	2.786	1.527	0.400	9.200	34

This table includes all the variables used in the analysis.

Table 3: Summary Statistics for Informal Credit Use by SMEs across Country Groups

Country group	Statistics	*ICP*	*IC_WC*	*IC1_WC*	*IC2_WC*	*IC_FA*	*IC1_FA*	*IC2_FA*
CIS	Mean	4.37	3.75	2.87	0.88	4.58	3.61	0.97
	Std. Dev.	14.24	13.87	12.11	6.57	16.43	14.88	7.03
	# obs.	2,166	3,324	3,324	3,324	2,171	2,171	2,171
CEE	Mean	3.57	4.52	3.70	0.81	3.40	2.80	0.60
	Std. Dev.	13.09	16.00	14.45	5.98	14.32	12.97	5.46
	# obs.	3,569	4,771	4,771	4,771	3,598	3,598	3,598
Advanced	Mean	1.65	1.88	1.52	0.36	1.53	1.28	0.25
	Std. Dev.	8.82	10.12	8.92	4.76	9.84	8.78	4.20
	# obs.	3,063	4,014	4,018	4,014	3,083	3,083	3,083
Vietnam	Mean	4.86	5.41	4.38	1.03	4.27	3.65	0.62
	Std. Dev.	12.83	13.83	13.20	4.05	13.95	13.01	4.67
	# obs.	452	455	455	455	452	452	452
Total	Mean	3.18	3.50	2.81	0.69	3.10	2.53	0.57
	Std. Dev.	12.19	13.75	12.28	5.74	13.60	12.30	5.48
	# obs.	9,250	12,564	12,568	12,564	9,304	9,304	9,304

CIS countries included in the calculations are Belarus, Georgia, Tajikistan, Ukraine, Uzbekistan, Russia, Kazakhstan, Azerbaijan, Armenia, and the Kyrgyz Republic. CEE countries included in the calculations are Albania, Bulgaria, Croatia, Turkey, Poland, Romania, Bosnia and Herzegovina, Serbia, Moldova, Estonia, Hungary, Latvia, Lithuania, FYR Macedonia, Czech Republic, Slovak Republic, and Slovenia. The 6 included countries with advanced economies are Greece, Germany, Spain, Portugal, Ireland, and South Korea.

SMEs in CIS and CEE countries, as indicated by the mean differences in the variable *ICP*. Regarding the use of the informal funds obtained, we see a significance difference between CIS and CEE countries, as indicated by the variables *IC_WC* and *IC_FA* in Table 4. The CEE countries tend to use more informal credit to finance working capital, compared to CIS countries. By contrast, SMEs in CIS countries use more informal credit to finance fixed assets, respect to SMEs in CEE countries. Finally, we see that SMEs in both CIS and CEE countries use more informal credit from family/friends than from moneylenders, in respect to SMEs in advanced countries. Not surprisingly, the percentage of working capital financed by informal credit is the highest for the low income developing Asian country, Vietnam.

Table 4: Mean Differences for Informal Credit Use by SMEs across Country Groups

Country group mean	*ICP*	*IC_WC*	*IC1_WC*	*IC2_WC*	*IC_FA*	*IC1_FA*	*IC2_FA*
CIS - CEE	0.80*	−0.77*	−0.83**	0.07	1.18**	0.81*	0.37*
CIS - Advanced	2.72***	1.87***	1.35***	0.52***	3.05***	2.33***	0.72***
CIS - Vietnam	−0.49	−1.66**	−1.51*	−0.15	0.31	−0.04	0.35
CEE -Advanced	1.92***	2.64***	2.18***	0.45***	1.87***	1.52***	0.35**
CEE - Vietnam	−1.29*	−0.89	−0.68	−0.22	−0.87	−0.85	−0.02
Advanced - Vietnam	−3.21***	−3.53***	−2.86***	−0.67***	−2.74***	−2.37***	−0.37

This table reports the mean differences for the dependent variables for all the possible combinations of country groups. We conduct a independent sample *t*-test assuming unequal variances. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%.

Table 5: Summary Statistics for Informal Credit Use by SMEs across Income Groups

Income group	Statistics	*ICP*	*IC_WC*	*IC1_WC*	*IC2_WC*	*IC_FA*	*IC1_FA*	*IC2_FA*
Low income	Mean	1.78	2.15	1.65	0.49	1.65	1.31	0.34
	Std. Dev.	8.83	10.53	9.09	5.24	10.01	8.69	4.74
	# obs.	3,896	5,124	5,128	5,124	3,933	3,933	3,933
Lower Middle Income	Mean	4.39	3.69	2.72	0.97	4.01	3.15	0.86
	Std. Dev.	12.75	12.03	10.34	6.11	14.18	12.52	6.50
	# obs.	764	1,083	1,083	1,083	766	766	766
Upper Middle Income	Mean	5.96	5.15	4.22	0.92	6.15	5.22	0.93
	Std. Dev.	16.54	16.39	15.00	6.21	18.23	17.00	6.36
	# obs.	951	1,360	1,360	1,360	952	952	952
High Income	Mean	3.71	4.41	3.63	0.78	3.67	3.01	0.66
	Std. Dev.	13.57	15.94	14.40	6.00	15.15	13.88	5.73
	# obs.	3,639	4,997	4,997	4,997	3,653	3,653	3,653
Total	Mean	3.18	3.50	2.81	0.69	3.10	2.53	0.57
	Std. Dev.	12.19	13.75	12.28	5.74	13.60	12.30	5.48
	# obs.	9,250	12,564	12,568	12,564	9,304	9,304	9,304

Low-income countries included in these calculations are Tajikistan, Uzbekistan, Kyrgyz Republic, and Vietnam. The lower middle income countries are Albania, Georgia, Ukraine, Moldova, Azerbaijan, and Armenia. The upper middle income countries are Bulgaria, Belarus, Turkey, Russia, Poland, Romania, Serbia, Kazakhstan, Bosnia, and Herzegovina, FYR Macedonia, Latvia, and Lithuania. Finally, the high-income countries are Croatia, Estonia, Czech Republic, Hungary, Slovak Republic, Slovenia, Greece, Germany, Spain, Portugal, Ireland, and South Korea.

Tables 5 and 6 present the basic summary statistics, and the *t*-test of the mean differences, respectively, of the various types of informal credit in different income groups. The results of the *t*-test in Table 6 shows a statistical difference in the use of informal credit between the high income group and the others groups. In particular SMEs in countries with a high income use more informal credit to finance both working capital and fixed asset purchase, in respect to SMEs in low income group, but SMEs in lower middle and upper middle countries use more informal credit in respect to SMEs in high income countries, as indicated by the *ICP* variable in Table 6. To be more specific, the mean difference of the *ICP* variables between SMEs in high income group increases starting from SMEs in low income group, to SMEs in lower middle to SMEs in upper middle, −1.93, 0.68, and 2.25, respectively. In particular, the mean differences of SMEs in high income countries in respect to SMEs in low income countries are negative for all the dependent variables, in respect to SMEs in lower middle countries are negative only in the case of financing working capital, and in respect to SMEs in upper middle countries are always positive, as indicated in Table 6.

Finally, in our sample of countries, the highest degree of informal credit use by SMEs was found in Armenia, a lower middle-income in CIS country group, compared with other countries, as demonstrated by the mean value of *ICP*. In contrast, Uzbekistan, a

Table 6: Mean Differences for Informal Credit Use by SMEs across Income Groups

Income group mean	*ICP*	*IC_WC*	*IC1_WC*	*IC2_WC*	*IC_FA*	*IC1_FA*	*IC2_FA*
Low - Lower M.	−2.61	−1.54*	−1.07*	−0.48	−2.36	−1.84*	−0.52
Low - Upper M.	−4.18	−3.00*	−2.57**	−0.43	−4.5	−3.91	−0.59
Low - High	−1.93***	−2.26***	−1.98***	−0.29**	−2.02***	−1.70***	−0.32*
Lower M. - Upper M.	−1.57**	−1.46	−1.5	0.05	−2.14**	−2.07*	−0.07
Lower M. - High	0.68***	−0.72***	−0.91***	0.19**	0.34***	0.14***	0.20**
Upper M. - High	2.25***	0.74***	0.59***	0.14*	2.48***	2.21***	0.27**

This table reports the mean differences for the dependent variables for all the possible combinations of income groups. We conduct a independent sample *t*-test assuming unequal variances. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%.

low-income CIS country, is the country in which the informal credit use is the lowest among the countries.

5.2 Estimation Results

In this section, we analyse the factors that affect SMEs' percentages of fixed asset investments/working capital expenses financed via informal credit sources using 2005 BEEPS data[14]. Considering that the informal credit use and *ACCESS* are determined by the same sets of explanatory variables, Table 7 presents the regression results calculated with *ACCESS* as the sole independent variable, as well as country fixed effects[15].

In line with our expectations, in each regression, we find positive and statistically significant associations between *ACCESS* and all forms of informal credit. These strongly positive relationships indicate that credit-constrained SMEs use more informal credit in any form, compared to non credit-constrained SMEs. We observe that financial constraints have similar effects on the borrowing side, i.e from family/friends or from moneylenders, and on the investment side, i.e financing of fixed asset investments or financing of working capital.

Subsequently, we ran seven baseline regressions using the rest of the independent variables. When choosing the independent variables, we made sure to use the least correlated variables and checked the variance inflation factor to avoid multicollinearity. Table 8 presents the results of baseline regressions in which all countries were included[16].

With regard to the firm-level independent variables, these regression results indicate that SMEs that have at least one female owner (*FEMALE*) rely less on the moneylender type of informal credits to finance their fixed asset investments/working capital expenses, compared to SMEs with only male owner. These results can be explained by various results of the previous literature. First, female entrepreneurs are more risk-averse than male entrepreneurs; therefore, they use less external financing. Second, female borrowers

[14] In OLS models, R^2 is strongly accepted as a goodness-of-fit measure for the model. However, there is no commonly accepted measure in previous papers that use GLM. To measure the goodness-of-fit, we use the correlation between the response and its conditional expectation given the predictors $R = corr(Y; E(Y|X))$, as suggested by Zheng and Agresti (2000).

[15] Note that the dependent variables are not expressed in percentages in the regressions; instead, they are divided by 100 to allow variations in [0,1] to be applied to the GLM model.

[16] However, due to a lack of country-level data, we had to exclude Albania, Belarus, Tajikistan, Ukraine, Uzbekistan, Serbia, and Azerbaijan from the regressions. Accordingly, our data set shrinks to 7,873 SMEs at maximum. Note that this data set is still the largest compared with previous studies.

Table 7: Financial Constraints and Informal Credit Use of SMEs

Variable	Family friends		Moneylender		*ICP*
	IC1_FA	*IC1_WC*	*IC2_FA*	*IC2_WC*	
ACCESS	0.387***	0.328***	0.328***	0.348***	0.383***
	(0.059)	(0.054)	(0.091)	(0.101)	(0.046)
CONSTANT	−4.243***	−3.052***	−5.93***	−5.492***	−3.917***
	(0.155)	(5.69)	(0.323)	(0.262)	(0.119)
Corr(*Y*;*E*(*Y*|*X*))	0.190	0.172	0.080	0.102	0.209
# obs.	8,996	12,077	8,996	12,074	8,947

This table reports GLM estimates of the percentages of fixed assets/working capital financed by informal credit. Asymptotic cluster-robust standard errors (clustered by country) are in parentheses. All regressions include statistically significant country dummy variables. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%.

Table 8: Determinants of Informal Credit Use of SMEs: Full Sample

Variable		Family friends		Moneylender		*ICP*
		IC1_FA	*IC1_WC*	*IC2_FA*	*IC2_WC*	
Firm-level independent variables	*FEMALE*	−0.019	0.015	−0.695*	−0.856**	−0.105
		(0.126)	(0.106)	(0.340)	(0.269)	(0.085)
	CITY	0.084	0.036	0.109	0.036	0.074
		(0.061)	(0.066)	(0.010)	(0.090)	(0.044)
	SIZE	−0.017***	−0.012***	−0.001	0.003	−0.009**
		(0.004)	(0.003)	(0.004)	(0.003)	(0.003)
	AGE	−0.015**	−0.028***	−0.021	−0.037*	−0.023***
		(0.006)	(0.007)	(0.013)	(0.017)	(0.007)
	MACRO	0.165*	0.136	0.064	0.124	0.144*
		(0.080)	(0.083)	(0.113)	(0.080)	(0.067)
	OVERDUE	0.320	0.552*	−0.319	0.840***	0.468*
		(0.360)	(0.274)	(0.277)	(0.235)	(0.234)
Country-level independent variables	*STTRADED*	−0.006	−0.001	0.003	0.003	−0.002
		(0.005)	(0.003)	(0.004)	(0.003)	(0.003)
	CR	0.011*	0.002	−0.019***	−0.000	0.006
		(0.006)	(0.007)	(0.004)	(0.005)	(0.003)
	PRVTCRE	−0.0074*	−0.009*	−0.014*	−0.008	−0.008*
		(0.003)	(0.003)	(0.007)	(0.004)	(0.003)
	TIME	0.060	0.098*	0.166***	0.109***	0.081*
		(0.044)	(0.041)	(0.032)	(0.028)	(0.033)
	CONSTANT	−4.097***	−3.240***	−3.962***	−4.871***	−3.542***
		(0.589)	(0.807)	(0.451)	(0.432)	(0.421)
	Corr(*Y*;*E*(*Y*|*X*))	0.153	0.157	0.108	0.092	0.181
	# obs.	6,033	7,873	6,033	7,872	6,003

This table reports GLM estimates of the percentages of fixed assets/working capital financed by informal credit. Asymptotic cluster-robust standard errors (clustered by country) are in parentheses. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%.

have lower default rates than men, which makes female borrowers attractive to formal creditors. Finally, female entrepreneurs have to be more competent to conduct business in what has traditionally been considered a man's world. In contrast to the stereotyped housewife who is more likely to use informal credit, female entrepreneurs rely less on informal credit. We find insignificant location effects, as measured by *CITY*, on the informal credit use of SMEs in most of the regressions. Regarding the effect of the *SIZE* of the SME, as measured by the number of full-time employees, the coefficient estimates yield some negative results, i.e., an increase in *SIZE* leads to a decrease in borrowing from family/friends, as measured by *IC1_FA* and *IC1_WC*. Regarding the effect of the age of the firm, the negative and statistically significant coefficient estimates for *AGE* show that as an SME becomes older in the market, it uses significantly less informal credit, especially from family/friends and moneylenders.

With regard to the effect of macroeconomic instabilities (*MACRO*), the degree of borrowing from family/friends is significantly higher for SMEs that report macroeconomic instabilities as an obstacle for their business operations. The coefficient estimates for *OVERDUE* indicate that financially distressed firms use more informal credit than other firms.

Looking in the effects of the country-level independent variables, we find no significant association between equity market development, as measured by *STTRADED*, and informal credit use in any of the regressions. Regarding the effect of the banking concentration, as expected, the positive and significant coefficient estimate of *CR* based on *IC1_FA* indicates that as a banking system becomes more concentrated, SMEs finance a higher percentage of their fixed asset investments with credit from family/friends. However, regression results yield insignificant estimates for the percentage of working capital purchases financed by family/friends and for the remaining dependent variables, except for *IC2_FA*, for which we find a significantly negative coefficient estimate. This finding can be regarded as evidence of an intermediation effect, as discussed by Madestam (2008), i.e., an increase in the banking concentration reduces the credit volume, and only some borrowers can obtain credit, such as moneylenders, because they act as an intermediary between the banks and the final borrowers. Because *PRVTCRE* can be an indicator of the supply of funds from formal lenders, the negative and statistically significant coefficients of *PRVTCRE* in regressions 1-3 and 5 indicate a trade-off relationship between the informal credit use and the ratio of the formal credit to the GDP. The coefficient estimates for *TIME* mostly indicate a significant positive influence on the percentages of fixed asset investments/working capital purchases financed by various informal credit sources. This result suggests that in the case of low-quality legal systems and bad institutional settings, banks are reluctant to lend and prefer to provide loans to less risky borrowers rather than to informationally opaque SMEs. In such an environment, the existence of informal creditors serves as a substitute for the credit-rationed SMEs.

Finally, comparing the goodness-of-fit values for the regressions presented in Tables 7 and 8 for the average percentage of fixed asset and working capital purchases financed by informal credit (*ICP*), we observe that financial constraints, as measured by *ACCESS* together with country dummy variables, are superior in determining the variation in the dependent variables compared with the model in Table 8. This observation is an indication that the intensity of informal credit use by SMEs is mostly determined by financial constraints.

We also tested whether our results differ across country groups by running separate regressions for each country group. In Tables 9 and 10, we present the results of the same GLM regressions as those presented in Table 8 for different country groups[17]. We first present the results for high-income countries in Table 9.

Because many low-income and lower middle-income countries[18] lack country-level variables, we chose to report the regression results from middle-income countries in Table 10. In comparing the results in Tables 9 and 10 with Table 8 we only loose a small degree of significance, especially for the country-level financial development variables for high-income countries.

[17] We also replicate the regressions in Table 5 for different country groups, and our results remain the same in terms of the direction of the relationship and statistical significance.

[18] Albania, Belarus, Tajikistan, Ukraine, Uzbekistan, Serbia, and Azerbaijan are the countries that lack country-level data.

Table 9: Determinants of Informal Credit Use of SMEs: High-income Countries

Variable		Family friends		Moneylender		*ICP*
		IC1_FA	*IC1_WC*	*IC2_FA*	*IC2_WC*	
Firm-level independent variables	*FEMALE*	−0.181	−0.109	−0.743	−0.995**	−0.263
		(0.198)	(0.207)	(0.655)	(0.333)	(0.164)
	CITY	0.062	0.068	0.230	0.144	0.099
		(0.096)	(0.065)	(0.167)	(0.114)	(0.060)
	SIZE	−0.026**	−0.029**	0.0024	0.003	−0.001
		(0.009)	(0.009)	(0.0105)	(0.007)	(0.008)
	AGE	−0.018	−0.054***	−0.014	−0.016	−0.036**
		(0.012)	(0.012)	(0.021)	(0.014)	(0.013)
	MACRO	0.167	0.147	−0.020	0.187	0.137
		(0.111)	(0.106)	(0.233)	(0.147)	(0.090)
	OVERDUE	0.850**	1.132***	−0.392	1.115***	0.798***
		(0.328)	(0.224)	(0.350)	(0.324)	(0.173)
Country-level independent variables	*STTRADED*	0.000	0.000	0.004	0.005	0.000
		(0.005)	(0.003)	(0.010)	(0.008)	(0.004)
	CR	0.012	0.004	−0.029	0.014	0.007
		(0.017)	(0.014)	(0.037)	(0.022)	(0.015)
	PRVTCRE	−0.002	−0.001	−0.015	−0.012	0.000
		(0.006)	(0.005)	(0.017)	(0.011)	(0.006)
	TIME	0.139**	0.140**	0.192***	0.134**	0.180***
		(0.050)	(0.049)	(0.056)	(0.043)	(0.039)
	CONSTANT	−5.031***	−4.041***	−3.645	−6.408***	−4.747***
		−1.190	(0.986)	−2.019	−1.456	(0.961)
	Corr(*Y*;*E*(*Y*|*X*))	0.145	0.207	0.140	0.108	0.153
	# obs.	3,067	3,890	3,067	3,889	3,045

This table reports GLM estimates for the percentages of fixed assets/working capital financed by informal credit. Asymptotic cluster-robust standard errors (clustered by country) are in parentheses. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%..

Table 10: Determinants of Informal Credit Use: Sample of SMEs in Middle-income Countries

Variable		Family friends		Moneylender		*ICP*
		IC1_FA	*IC1_WC*	*IC2_FA*	*IC2_WC*	
Firm-level independent variables	*FEMALE*	0.048	−0.023	−0.625	−0.854*	−0.061
		(0.155)	(0.132)	(0.453)	(0.434)	(0.091)
	CITY	0.081	−0.002	0.121	0.024	0.064
		(0.089)	(0.098)	(0.115)	(0.125)	(0.073)
	SIZE	−0.019***	−0.012***	−0.002	0.003	−0.011**
		(0.005)	(0.002)	(0.002)	(0.003)	(0.004)
	AGE	−0.004	−0.013***	−0.016	−0.052	−0.009*
		(0.004)	(0.003)	(0.013)	(0.033)	(0.004)
	MACRO	0.085	0.045	0.135	0.151	0.073
		(0.112)	(0.120)	(0.133)	(0.107)	(0.096)
	OVERDUE	−0.292	0.024	−1.180	0.448	0.109
		(0.669)	(0.521)	−1.043	(0.366)	(0.500)
Country-level independent variables	*STTRADED*	−0.027**	0.001	0.003	0.021*	−0.011
		(0.008)	(0.008)	(0.008)	(0.009)	(0.006)
	CR	0.018**	−0.000	−0.013***	0.000	0.007
		(0.007)	(0.006)	(0.004)	(0.003)	(0.004)
	PRVTCRE	−0.006	−0.002	0.005	0.021*	−0.009
		(0.016)	(0.017)	(0.017)	(0.009)	(0.014)
	TIME	0.044	0.226	−0.332	−0.139	0.006
		(0.116)	(0.163)	(0.245)	(0.173)	(0.103)
	CONSTANT	−4.132***	−3.340***	−3.701***	−5.048***	−3.159***
		(0.702)	(0.691)	(0.822)	(0.473)	(0.517)
	Corr(*Y*;*E*(*Y*|*X*))	0.152	0.110	0.075	0.093	0.169
	# obs.	2,554	3,533	2,554	3,533	2,547

This table reports GLM estimates of the percentages of fixed assets/working capital financed by informal credit. Asymptotic cluster-robust standard errors (clustered by country) are in parentheses. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%.

We observe that financial distress, as measured by utility arrears (*OVERDUE*), becomes more important in high-income countries compared with middle-income countries. We also observe that the effect of the quality of legal system, meausured by *TIME*, is significant and the coefficient has the expected positive value in all the regressions for high-income countries. In the case of middle-income countries the quality of legal system do not has an effect on the informal credit use. Finally, the effect of the banking concentration, measured by *CR*, becomes significant only in the middle-income countries.

5.3 Robustness Checks

In this section, we present estimation results from the standardised data set of the 2002-09 waves of the BEEPS. In this pooled sample, data from previous years are standardised to fit the 2009 wave of the BEEPS and include information from 27 countries in Central and Eastern Europe and Central Asia. Although many questions remained the same in different years, information on the informal credit use is not as detailed as it was in the 2005 wave. For instance, we do not have any information on the percentages of working capital purchases financed by various sources, and we only have information on the percentages of fixed assets financed via other credit sources, which include moneylenders, family/friends, and non-bank financial sources. However, we use this data set because it is larger than the 2005 wave of the BEEPS.

These standardised data are available in terms of the percentages of fixed asset investments financed via *i*) internal funds or retained earnings, *ii*) owners' contributions or newly issued equity shares, *iii*) private banks, *iv*) state-owned banks, *v*) credit from suppliers and advances from customers, or *vi*) other sources (moneylenders, friends, relatives, and non-bank financial institutions)[19]. Accordingly, the last source of financing corresponds to the variable *IC_FA* used in the 2005 wave of BEEP. Moreover, we do not have information on SMEs' perceptions on how the macroeconomic instabilities affect their businesses (*MACRO*), so we drop this variable from the robustness checks. As country-level independent variables we must also replace the *STTRADE* variable with the value of listed shares of the GDP expressed in percentages (*STCAPIT*), and the *PRVTCRE* variable with the outstanding loans from commercial banks as a percentage of the GDP (*LOANGDP*). The summary statistics of the variables used in this part of the study are presented in Table 11.

Tables 12 and 13 report the estimation results from this sample and, as a comparison, for the principal sample, the 2005 BEEPS data[20].

[19] Interviewers are asked to ensure that the percentages of fixed assets financed by different financing sources sum up to 100%.

[20] In the 2009 wave of the BEEPS, interviewers were asked to report their opinions and perceptions of the responses. If the interviewer reported that responses to the questions were not truthful, we excluded those observations. We also excluded observations for which the interviewer reported: «The responses to the questions regarding figures are arbitrary and unreliable». The regression results from this sample are presented in Tables 12 and 13. Some of the firms were surveyed in multiple years as a second sub-sample; we excluded these SME observations until we obtained a single firm surveyed in each year. Because our results remained similar to those in Tables 12 and 13, we chose not to report those estimation results due to space constraints.

Table 11: Summary Statistics for 2002-2009 Data

Variable		Mean	Std. Dev.	Min	Max	# obs.
Dependent variables	*IC_FA*	9.181	24.633	0.000	100.000	14,904
	ICD	0.177	0.381	0.000	1.000	14,904
Firm-level independent variables	*ACCESS*	1.432	1.264	0.000	4.000	24,524
	FEMALE	0.344	0.475	0.000	1.000	18,069
	CITY	0.143	0.350	0.000	1.000	25,592
	SIZE	40.891	53.519	1.000	250.000	25,592
	AGE	14.014	14.078	0.000	202.000	25,455
	OVERDUE	0.046	0.210	0.000	1.000	22,643
Country-level independent variables	*STCAPIT*	36.540	39.192	0.100	172.000	63
	CR	64.091	21.200	11.000	100.000	73
	LOANGDP	40.244	23.740	1.600	133.700	75
	TIME	451.389	205.497	195.000	1,290.000	81

The table shows the summary statistics of the main variables used in the robustness checks.

Table 12: Financial Constraints and Informal Credit Use by SMEs: 2005 and 2002-09 BEEPS

Variable	*IC_FA*	
	2005	2002-09
ACCESS	0.382***	0.131***
	(0.049)	(0.022)
CONSTANT	−3.962***	−2.500***
	(0.128)	(0.211)
Corr(*Y*;*E*(*Y*|*X*))	0.196	0.256
# obs.	8,996	14,364

This table reports GLM estimates of the percentages of fixed asset investments financed by the informal credit. The variable «Other» stays for moneylenders, friends, relatives, and non-bank financial institutions. Robust standard errors are provided in parentheses. All regressions include statistically significant country and year dummies. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%.

In line with the results from the 2005 BEEPS, as presented in Table 7, we find that informal credit is mostly used by SMEs that report access to finance as an obstacle for their business operations. The results of the GLM models show that as the access to finance becomes more problematic (from 1, no obstacle, to 4, major obstacle) for an SME, this SME uses credit from informal sources more intensively. These results reveal that informal financial markets mostly serve the credit-constrained SMEs.

To observe how the other hypotheses are affected by the inclusion of other waves of the BEEPS, we ran GLM regressions on our dependent variable (*IC_FA*) and present the estimation results in Table 13.

We find evidence of a negative association between female ownership and informal credit use. These negative coefficient estimates contradict previous studies that showed a positive association between female ownership and informal credit use; our results indicate that firms with at least one female owner rely less on informal credit to finance fixed asset investments. Rather than a less-educated, «finance literate» housewife stereotype, this contradiction with the previous literature, which is mostly based on household surveys, suggests a «business woman» character. To conduct business in a man's world, businesswomen can be considered as better educated and more competent compared with businessmen. This situation may have a positive impact on women's ability to obtain formal finances. In this case, firms run by females rely less on informal credit to finance their fixed asset investments. Moreover, previous literature suggests that female entrepreneurs

Table 13: Estimation Results for SMEs: 2005 and 2002-09 BEEPS

Variable		*IC_FA*	
		2005	2002-09
Firm-level independent variables	*FEMALE*	–0.116	–0.188*
		(0.111)	(0.086)
	CITY	0.091	–0.710***
		(0.049)	(0.143)
	SIZE	–0.011**	–0.002*
		(0.004)	(0.001)
	AGE	–0.017**	–0.009
		(0.006)	(0.005)
	MACRO	0.148*	–
		(0.070)	–
	OVERDUE	0.221	0.588***
		(0.304)	(0.178)
Country-level independent variables	*STTRADED*	–0.004	–
		(0.004)	–
	STCAPIT	–	–0.008***
		–	(0.002)
	CR	0.005	0.002
		(0.004)	(0.002)
	PRVTCRE	–0.008**	–
		(0.003)	–
	LOANGDP	–	0.000
		–	(0.002)
	TIME	0.082*	0.001***
		(0.036)	(0.0002)
	CONSTANT	–3.548***	–2.387***
		(0.437)	(0.158)
	Corr(*Y*;*E*(*Y*|*X*))	0.164	0.150
	# obs.	6,033	14,364

This table reports GLM estimates of the percentages of fixed asset investments financed by informal credit. The variable «Other» stays for moneylenders, friends, relatives, and non-bank financial institutions. Robust standard errors are provided in parentheses. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%.

are more risk averse than male entrepreneurs. On the contrary, we observe a positive but statistically insignificant association between female ownership and trade credit use.

Coefficient estimates for *CITY*, as a proxy for physical outreach to financial services, yield negative and statistically significant results. This result suggests that firms in larger cities use less informal credit compared with firms located in smaller cities, which can be explained by the abundance of formal financial services in larger cities. There are two main arguments to explain the better accessibility of formal credit in larger cities. First, in smaller cities, borrowers are more immobile due to transportation issues. Due to high transaction costs, borrowers are also less willing to borrow from a distant formal creditor, especially if the needed amount is small. Moreover, the long distance to borrowers makes monitoring more difficult and increases enforcement costs for the banks. Accordingly, banks refrain from funding distant projects.

Estimation results for *SIZE* are in line with our findings for the 2005 BEEPS and the previous empirical evidence. Accordingly, estimation results for the effect of *SIZE* support the view that smaller SMEs use informal credit more intensively to finance their fixed asset investments. Another control variable used is the number of years for which the firm has been operating (*AGE*). In line with previous studies and our findings, the

coefficient estimate for *AGE* in the *ICP1* regression is negative but statistically significant at only 10%. The most robust result obtained in this table is consistent with the results from the 2005 BEEPS; specifically, we find a positive association between the informal credit use of SMEs and financial distress, as measured by *OVERDUE*.

To test for the effect of financial development, three different measures are used to approximate the financial (non-) development level: value of listed shares of the GDP expressed in percentages (*STCAPIT*); outstanding loans from commercial banks as a percentage of the GDP (*LOANGDP*); and, as an inverse proxy for financial development, the asset share of the three largest banks among the commercial banks (*CR*). We can interpret the negative and statistically significant coefficient estimates for *STCAPIT* in the regression as evidence for the trade-off relationship between informal financial markets and formal financial developments. This result implies that enterprises in countries where the stock market is more developed rely less on informal finance. This result can be due to two reasons: first, as an alternative to informal finance, the probability of being listed on the stock exchange reduces a company's demand for informal credit; second, and more likely for an SME, informal lenders channel their funds to stock markets, reducing the supply of informal credit. We find no significance for that coefficient estimates for *LOANGDP*, in comparison for the *PRVTCRE* coefficient we find for the regressions of the 2005 BEEPS. Regarding *TIME*, which is a country-specific variable, informal credit use and low quality of the legal system are positively and significantly related, but with a lower degree.

6 Conclusion

SMEs have many obstacles to overcome to be eligible for formal credit. These firms often lack the necessary collateral and hard information on their business. Even if they have the necessary collateral and hard information, these firms may opt to use less expensive funds from family/friends due to their stronger social ties. Our sample of SMEs from the 2005 BEEPS indicates that 12.5% of the SMEs (including SMEs in Vietnam and advanced economies in addition to SMEs in CEE and CIS countries) used informal credit to finance part of their fixed asset investments and/or working capital purchases. However, our results show that these credits correspond only to relatively small fractions of the working capital/fixed asset purchases, 3.5% and 3.1%, respectively. Regarding the determinants of informal credit sources, we find that the SMEs in our full sample tend to use less credit from moneylenders, compared to the family/friends source.

In our paper, we examine both the country and firm-level factors of the determinants of informal credit, such as the formal financial development of the countries or the firm size, owners' gender, and location of the firms. We address these issues using BEEPS, which is a joint project of the EBRD and the World Bank. This data set is relatively large, especially compared with the data sets used in most of the previous studies on informal finance; thus, it enables us to analyse a diverse set of SMEs in a large number of countries. Using the two different types of informal credit as dependent variables – moneylenders, and family/friends –, we are able to distinguish between the determinants of different informal credit types.

In line with the previous literature, empirical results of this paper address informal credit as an important source of credit for SMEs. We find that credit-constrained SMEs rely on informal credit of any type. Contradictory to the previous studies, this paper finds some evidence suggesting that SMEs with female owners use less informal credit from moneylenders. An explanation for this result is the different risk preferences of female entrepreneurs (i.e., females are more risk averse than males). Moreover, female entrepreneurs are found to be better borrowers with lower default rates. This situation may affect women's ability to easily access formal finance. Additionally, female entrepreneurs must be more competent compared with their rivals to conduct business and survive in what has traditionally been a man's domain.

Although we expect SMEs in larger cities to use less informal credit, only a small degree of support is found for this hypothesis in the 2002-09 BEEPS regressions. However, we do not find a significant association between trade credits and the location of the SMEs. Our regression results mostly show a positive relationship between the effect of low quality of the legal system and informal credit use, which suggests that informal credit use is higher in countries where legal procedures take longer.

In countries with more developed financial markets, firms have many options for financing their projects; thus, they are less likely to use informal credit. We find some evidence supporting this hypothesis, i.e., concentrated banking systems lead SMEs to use informal credit more intensively. This result can be linked to market power, suggesting that more concentrated banking environments result in reduced credit availability, especially for small businesses. The overall results of this study indicate financing obstacles as the cause of informal credit use and indicate that informal creditors meet the financing requirements of SMEs in less developed countries. Accordingly, informal financial networks play an important role in alleviating problems of firms regarding credit constraints.

This paper can be extended in several ways. First, informal credit use has potential effects on a firm's performance and growth, especially for start-up firms. Therefore, how to encourage the use of informal finance to establish new businesses can be an interesting research question. Another interesting topic of future research is the interaction between the expansion of new banking technologies (e.g., internet banking) and the informal credit choice of firms, especially in smaller cities. Because there is no registration of the transactions in informal financial markets, finding accurate data is the biggest obstacle for future research. The BEEPS provide relevant data with which to test the effects of informal credit use on firms' performance and growth. However, there is no firm-specific data on the use of new banking technologies by sample firms. Using country-specific data on Internet banking usage to approximate advances in banking technologies can be a potential solution to this data problem.

Acknowledgements

We are grateful to Shanti Chakravarty, Carlos Humberto Mendez Sazo and two anonymous referees for their valuable comments on the earlier versions of this paper. We also would like to thank the participants of the 61st Midwest Finance Association Meeting

in New Orleans, the 4th Economic Development International Conference of the GRETHA-GRES in Bordeaux, and the Third Research Forum on Small and Medium-Sized Enterprises in Frankfurt am Main. Any errors in this manuscript are our own.

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