Doctoral Thesis

University of Trento
School of Social Sciences
Doctoral School in Economics and Management

Essays on Loan Markets in Less-Developed Economies

A DISSERTATION SUBMITTED TO THE DOCTORAL SCHOOL OF ECONOMICS AND MANAGEMENT IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DOCTORAL DEGREE (PH.D.) IN ECONOMICS AND MANAGEMENT

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SUMMARY

Financial constraints are one of the most important obstacles for businesses particularly in less–developed and developing economies. Collateral requirements are frequently addressed as one the most important obstacles to starting and running a business especially for small and medium enterprises (SMEs), in these countries. This thesis consists of four empirical papers each corresponding to a chapter on loan markets in less-developed economies. After the introduction chapter, the second chapter investigates both the presence of collateral and the collateral to loan ratios on loans extended to SMEs are examined.

The informal credit mostly serves 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 of formal creditors) in the formal financial markets. The third chapter aims to understand why and to what extend SMEs use informal credit from various sources, moneylenders and family/friends and suppliers/customers as forms of informal credit.

The fourth chapter examines the financial constraints faced by female entrepreneurs. The primary data source in these second, third and fourth chapters is the Business Environment and Enterprise Performance Surveys which are mainly based on Eastern European and Central Asian countries. These surveys are joint projects of the European Bank for Reconstruction and Development and the World Bank.

Chapter five of this thesis takes a different strand and focuses on the effect of banks' market power on banks' risk. The empirical analysis is based on data from Turkish banks and helps to shed light on the relation between market power and financial stability. Finally chapter six highlights the main conclusions and addresses potential future research directions.

Keywords: Collateral, Informal Credit, Financial Constraints, Gender, Market Power, Banking Concentration.

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Chapter 1

Introduction

Financial constraints are one of the most important obstacles to starting and running a business for small and medium enterprises (SMEs), particularly in less–developed and transition economies. As theoretical models acknowledge, financial constraints are stringent in these countries because the financial environment in these economies typically involves opaque information and weak enforcement (Hainz, 2003; Menkhoff et al. 2006 and 2012). Results of Business Environment and Enterprise Performance Surveys (BEEPS) indicate that high collateral requirements are the fourth most important reason that firms do not apply for external loans; with respect to importance, this factor ranked immediately below the issues of complexity of application processes and high interest rates. In less-developed economies, borrowers have relatively low probabilities of holding collateralisable assets and collateral requirements are relatively high as compared to developed economies; thus, firms in less-developed countries are more likely to experience difficulties in obtaining access to external financing. Therefore, collateralisation appears to be a crucial aspect of a firm's access to external financing; this access can determine the eventual disappearance or survival of a firm especially in less-developed and transition economies.

To this end, in this the second chapter we examine the collateral requirements on loans extended to SMEs in less-developed and transition economies by using BEEPS dataset. Chapter two aims to understand the determinants of both (*i*) the presence of collateral and (*ii*) the collateral to loan ratios in loans that are extended to SMEs in less–developed countries, investigates the importance of various firm– and country–specific factors are by testing (*i*) whether higher borrower quality reduces the collateralisation; (*ii*) whether information sharing among lenders can decrease collateralisation; and (*iii*) to what extent lending market and macroeconomic conditions affect the presence and the degree of collateral in loan contracts. Since the incidence of collateral in loan contracts and

the collateral to loan ratios come from two different decision processes, collarelisation is modelled in two different parts. First, the presence of collateral is modelled by using probit models for the binary dependent variable, *i.e.* a dummy which equals to one if the loan contract includes collateral, zero otherwise. Second the collateral to loan value ratios are estimated by excluding the zero collateral. Predictive powers of this two-part model are found to be higher than the alternative tobit model which take into account both zero and positive values simultaneously.

The main result of the empirical analysis indicates that country–specific variables are more important than firm–specific variables for determining both the presence and the degree of collateral for a loan. Accordingly, we find that not all of the borrower's characteristics explain the collateral requirements; collateral requirements appear to represent a tool for resolving the problem of asymmetric information about a borrower's quality.

This chapter contributes to the existing literature in two ways. First, it has a cross–country sample; which allows us to obtain detailed information about borrower firms from different countries. There have been few empirical studies that use this type of survey data; moreover, most of the studies on collateral in the context of less–developed and transition economies have been conducted for a single country. Consequently, there is a paucity of empirical research on this topic and addresses this deficiency by presenting a wide range of cross–country data from less–developed countries, including transition economies from Eastern Europe and Central Asia. This chapter yields new results and important insights for businesses and policy makers that operate in these countries. Second, it contributes to the literature by investigating not only the presence of collateral in lending but also the volume of collateral in loan contracts. Most of the extant empirical studies employ discrete choice models that do not distinguish among

different levels of collateral. To the best of our knowledge, few other studies of SMEs in less–developed markets focus on the collateral to loan ratio[1].

The informal credit mostly serves these people who are excluded from the formal financial services 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). Many studies consider informal credit as a last resort for credit-constrained borrowers (Bell, 1990; Ghosh et al., 2000) where the informal creditors serve to a residual class of borrowers. On the other hand, firms that have easy access to formal financial services can also use informal credit. Less stringent interest rate and collateral requirements in informal credit makes it attractive for borrowers. In particular, less educated and *"finance literate"* women participate more in informal financial transactions compared to men, especially with regard to savings (Baydas et al., 1995).

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 the factors that contribute to the persistence of the informal financial transactions in China and India. 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.

[1] Most of the previous studies on collateralisation depend on the use of collateral in loan contracts and have used logit or probit regressions on a binary dependent variable. However, these discrete choice models do not describe the volume of collateral; for example, loan contracts with 1% or 1000% collateral to loan ratios are considered to be the same and are typically identically coded.

The third chapter of this thesis examines the informal credit extended to SMEs by mainly using the 2005 wave of the BEEPS, as this wave provides more detailed information on percentages of working capital/fixed assets financed by informal credit, *i.e.* family/friends, moneylenders, suppliers/customers. The effect of both country- and firm-level factors (such as perceived difficulty of access to finance, gender of the firm owners, location of firms, the financial development and legal quality level in the country) on the percentages of working capital/fixed assets financed by informal credit are examined. Since the dependent variables are expressed as fractions of working capital/fixed assets, *i.e.* they vary between zero and one, we use a generalised linear model (GLM) with a logit link and the binomial family, as suggested by Papke and Wooldridge (1996) which is also suitable for dependent variables that contain a large number of zeroes.

The main results of this chapter show that SMEs mostly use informal credit to finance their working capital expenses, whereas only a small share of fixed assets is financed by informal credit. SMEs that report access to credit as an obstacle for their business use informal credit more extensively. Moreover, the age and size of SMEs, the gender of their owners and the financial development of the country are factors affecting the reliance of SMEs on informal credit. Female owned SMEs rely less on credit from moneylender as compared to their male counterparts. Finally, the determinants of borrowing from family/friends and from moneylenders are similar, whereas the determinants of using trade credits are different.

This third chapter contributes to the existing literature in several ways. As there is no formal registration of transactions in informal financial transactions, it is difficult to obtain data on the real size of these activities. To our knowledge, this chapter uses one of the largest data set used in the informal credit literature. 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. Many studies concentrate on the individual characteristics of subjects and/or on the institutional environment as determinants of informal finance in developing

countries, whereas only a couple of 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 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[2]. 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.

Gender is one of the primary drivers of economic disparities between people. Although females become more and more visible in business and financial environments in the last decades, there are still only few female examples of the *"richest"* people or the *"biggest businesses"* in all around the world. This situation is a call for research for the systematical differences between the male and females. Women are stereotyped differently from men in general *e.g.* women have more emotional and cautious image as compared to men. Previous literature shows that female owned enterprises are more likely to be smaller, they operate in labour intensive and service sectors as compared to their male counterparts (Carter and Rosa, 1998). Female owned businesses are more likely to use retained earnings and have lower percentage of debt finance (Haines et al., 1999). These differences may have three different explanations: First female firm owners do not prefer to borrow due to their preferences. Second discriminatory lenders do not prefer to extend loans to female owned businesses. Third, market and cultural structures are not suitable enough to allow female owners to get loans.

[2] 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 based on other developing economies.

The fourth chapter of this thesis aims to enrich the first and second chapters by examining the role of female ownership on the financial constraint faced by firms. Financial constraints are defined as the probability of a sole proprietorship firm's getting credit and being discouraged from loan application.

The main findings of this chapter indicates only little evidence in favour of financial constraints faced by female firm owners in loan markets by using probit models and taking selection bias into account by Heckman selection models. Some evidence show that female firm owners are more likely to be discouraged from loan applications as compared to their male counterparts. On the other hand firms' perception of suffering from access to finance do not vary by gender of the owner moreover female ownership do not have a statistically significant effect on the probability of a credit application to be rejected.

As there are only a couple of studies that use data from outside the US and developed economies, this chapter contributes to the limited literature by providing empirical evidence on the issue of gender-based discrimination against female entrepreneurs and risk averse nature of female entrepreneurs in 27 countries from Eastern Europe and Central Asia from 2002 to 2009.

Chapter five of this thesis takes a different strand and focuses on the effect of banks' market power on banks' risk. The aim of this chapter is to examine the role of market power on risk-taking behaviours of banks in Turkey from 2001 to 2011. Testing for this issue is important for the Turkish banking system, which experienced an intense regulation process after 2000 leading to a sharp decrease in the number of banks, and thereby to possible changes in the market powers of banks. Although many banks in developed economies were affected negatively in the recent global financial crisis, Turkish banks remained nearly unaffected as Bredenkamp et al. (2009), BRSA (2009), and Afsar (2011) report.

To put in a nutshell, this chapter contributes to the extensive literature on the relationship between competition and banking stability using a less-developed country example: Turkey. To approximate the each bank's market power Lerner index and the ratio of total profits to total revenues are used. Nonperforming

loans, loan loss provisions, Z-index are used as proxies of banks' financial fragility. The data of this chapter are manually collected from banks' balance sheets and income statements as reported to Banks Association of Turkey. In addition to OLS estimations, since non-performing loans and loan loss provisions are expressed as percentages of total assets, they vary between zero and one we run GLM regressions with a logit link and the binomial family, as suggested by Papke and Wooldridge (1996) for these two variables. Empirical results indicate that Turkish banking became less competitive and more concentrated from 2001 to 2011. Moreover banks with higher market power are found to have less loan risk and to be sounder.

The rest of this thesis is structured as follows. Each chapter starts with an introduction and literature review. Then the data and methodology used in the chapter are presented. Hypotheses are developed to address the research question. These are followed by the empirical results and conclusions. Each chapter contains its own appendices and its own list of references.

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Chapter 2

Collateral Requirements of SMEs: The Evidence from Less–Developed Countries[3]

2.1 Introduction

Financial constraints are one of the most important obstacles to starting and running a business for small and medium enterprises (SMEs), particularly in less–developed and transition economies. Both the information asymmetry between the bank and the firm (Berger and Udell, 1998; Baas and Schrooten, 2006), and the overall banking market structure (Petersen and Rajan, 2002; Berger and Udell, 2006) can influence the borrower–bank relationship. As theoretical models acknowledge, collateral requirements are stringent in these countries because the financial environment in less-developed and transition economies typically involves opaque information and weak enforcement (Hainz, 2003; Menkhoff et al. 2006 and 2012). However, little evidence is available with respect to the determinants of collateral for loans that are extended to SMEs in transition and less-developed markets. Beck et al. (2006) use the World Business Environment Survey (WBES) to examine 12 financing obstacles and report that collateral requirements are the third most important of these obstacles. The Business Environment and Enterprise Performance Survey (BEEPS) results for firms in Eastern Europe and Central Asia indicate that high collateral requirements are the fourth most important reason that firms do not apply for external loans; with respect to importance, this factor ranked immediately below the issues of complex application processes and high interest rates[4]. Therefore, collateralisation appears to be a crucial aspect of a firm's access to external financing; this access can determine the eventual disappearance or survival of a firm.

[3] This paper is coauthored with Eleonora Broccardo and Flavio Bazzana. An earlier version of this paper was presented at International Finance and Banking Society (IFABS) 2012 conference, in Valencia Spain, 7th Porteguese Finance Network (PFN) 2012 conference, in Aveiro, Portugal and Associazione Docenti di Economie degli Intermediari Mercati Finanziari (ADEIMF) 2012 Annual Meeting Capri, Italy and received the second best paper award.

[4] See Table 2.A of the Appendix for a detailed depiction of these results.

An extensive body of literature refers to collateral requirements as a tool that can both reduce the cost of external funds for firms in the presence of agency problems and decrease credit rationing (Besanko and Thakor 1987a; Bester 1987; Coco 1999; Berger et al. 2011b; Jiménez et al. 2011)[5]. In less-developed economies, borrowers have relatively low probabilities of holding collateralisable assets and collateral requirements are relatively high; thus, firms in these countries are more likely to experience difficulties in obtaining access to external financing (Menkhoff et al. 2006 and 2012). The empirical literature on collateralisation has largely focused on developed countries, whereas only a few studies have examined this issue in the context of less–developed and transition economies. One example of the rare examples of these studies on less–developed economies is Feder et al. (1988) that emphasises the role of collateral in decreasing the cost of creditworthiness assessments for lenders in rural Thailand; these decreased costs increase the credit supply of the examined region. Using data from Thailand, Menkhoff et al. (2012) reveal that a lack of collateral is resolved through the use of substitutes for collateral, such as relationship lending, the modification of loan terms (e.g., reductions in loan size), and the inclusion of third-party guarantees. Using firm–level data from Mexico, Gelos and Werner (2002) address the importance of collateral in the form of real estate for investments by firms, particularly following the financial liberalisation of that Mexico.

The objective of our paper is to understand the determinants of both (*i*) the presence of collateral and (*ii*) the collateral to loan ratios in loans that are extended to SMEs in less–developed countries. Using pooled cross–section data, we seek to investigate the importance of various firm– and country–specific factors are by testing (*i*) whether higher borrower quality reduces the collateral to loan ratio; (*ii*) whether information sharing among lenders can decrease collateralisation; and (*iii*) to what extent lending market and macroeconomic conditions affect the presence of collateral in loan contracts. Our main result

[5] For a review of the previous empirical research that addresses collateral as a remedy for credit rationing, see Steijvers and Voordeckers (2009).

indicates that country–specific variables are more important than firm–specific variables for determining both the presence and the degree of collateral for a loan. Accordingly, we find that not all of the borrower's characteristics explain the collateral requirements; collateral requirements appear to represent a tool for resolving the problem of asymmetric information about a borrower's quality.

Our paper contributes to the existing literature in two ways. First, we have a cross–country sample from BEEPS; which allows us to obtain deep and detailed information about on borrower firms. There have been few empirical studies that use this type of survey data; moreover, most of the researches on collateral in the context of less–developed and transition economies have been conducted for a single country. Consequently, there is a paucity of empirical research on this topic. To address this deficiency, our paper presents a wide range of cross–country data from less–developed countries, including transition economies from Eastern Europe and Central Asia, and yields new results and important insights for businesses and policy makers that operate in these countries. Second, we contribute to the literature by investigating not only the presence of collateral but also the volume of collateral in loan contracts. Most of the extant empirical studies employ discrete choice models that do not distinguish among different levels of collateral. To the best of our knowledge, few other studies of SMEs in less–developed markets focus on the collateral to loan ratio[6].

The remainder of the paper is organised as follows. Section 2.2 reviews the theoretical and empirical literature that addresses collateral requirements. Section 2.3 introduces the hypotheses and the methodology of this chapter. Section 2.4 presents data and descriptive statistics. The estimation results are discussed in section 2.5, and section 2.6 concludes the paper.

[6] Most of the previous studies on collateralisation depend on the use of collateral in loan contracts and have used logit or probit regressions on a binary dependent variable. However, these discrete choice models do not describe the volume of collateral; for example, loan contracts with 1% or 1000% collateral to loan ratios are considered to be the same and are typically identically coded. For a review of empirical research that addresses the degree of collateral for loan contracts, see Menkhoff et al. (2006).

2.2 Literature review

An extensive body of theoretical literature addresses collateral as a tool for resolving informational asymmetry problems regarding the borrower's quality in the context of either adverse selection or moral hazards. According to the adverse selection hypothesis, collateral acts as an indicator of the borrower's creditworthiness (Stiglitz and Weiss, 1981; Bester, 1987; Besanko and Thakor, 1987a; Chan and Kanatas, 1985; Chan and Thakor, 1987; Boot et al., 1991). The bank screens firms by offering both loan contracts with higher collateral and lower interest rates and loan contracts with lower collateral and higher interest rates. Although risk factors may not be readily observable, lower–risk borrowers will nonetheless pledge more and better collateral than riskier borrowers because this pledge is less costly for borrowers who have lower likelihoods of losing the proffered collateral. According to the moral hazard hypothesis, the probability of losing collateral acts as a disciplinary tool for the borrower. Thus, the pledge of collateral leads to a higher level of effort to satisfy loan conditions, reducing a borrower's default probability. Collateral therefore serves as a tool for resolving moral hazard problems (Aghion and Bolton, 1992, Boot et al., 1991; Boot and Thakor, 1994; Holmstrom and Tirole, 1997). To support these two divergent hypotheses regarding the role of collateral, empirical studies have investigated whether a reduction in asymmetric information impacts collateral decisions. As noted by Godlewski and Weill (2011), there is a clear dearth of substantial empirical support for the adverse selection hypothesis with respect to the use of collateral. Although several studies support the role of collateral as a tool for mitigating adverse selection problems (Jiménez et al., 2006; Berger et al. 2011b), other investigations (Cressy and Toivanen, 2001) find evidence that risk and collateral are not significantly correlated. Instead, a positive relationship between collateral and loan spread is consistently demonstrated: in other words, because banks are able to distinguish among borrowers of different quality, these financial institutions charge higher interest rates and require higher collateral for riskier borrowers, confirming the observed–risk hypothesis (Berger and Udell, 1990;

Berger and Udell, 1995; Jiménez and Saurina, 2004; Gonas et al., 2004; Chen, 2006; Menkhoff et al., 2006; Chakraborty and Hu, 2006; Brick and Palia, 2007)[7]. Within this debate, several authors indicate that both hypotheses might be empirically validated and reconciled by examining the degree of information asymmetries that are present in a country. Empirical evidence indicates that the observed–risk hypothesis tends to dominate in contexts that involve low levels of asymmetric information (Berger et al., 2011a; Godlewski and Weill, 2011). A recent study by Steijvers and Voordeckers (2011) suggests several explanations for why the observed results regarding this topic may differ across various empirical studies[8].

Several studies assume that the strength of the lender–borrower relationship is an inverse proxy for the degree of asymmetric information (for an overview, see, *e.g.*, Boot, 2000). In particular, these investigations suggest that if this relationship is stronger, then the borrower's risk information will be more reliable and therefore the borrower will be able to obtain a loan contract with more favourable terms (Boot and Thakor, 1994; Petersen and Rajan, 1995)[9]. However, another stream of literature predicts that a strong relationship may induce banks to exploit their information monopoly and extract a rent by requiring more collateral (Sharpe, 1990). Research investigations indicate that the variables that are employed as proxies for the strength of the relationship can affect the empirical results that are observed. For instance, although several studies either find no significant correlation between the duration of the bank–borrower relationship and the pledging of collateral (Menkhoff et al., 2006) or report a

[7] A recent study by Niinimäki (2011) yields a new insight regarding the decision to pledge collateral. This study reveals that for high-risk borrowers, the choice between unsecured and secured lending depends on their expectations for changes in value of the collateral that they plan to pledge for their loans. In particular, borrowers are more likely to choose secured loan contracts if they expect the value of their collateral to depreciate.

[8] They argue that the most relevant limitations in empirical research consist of not only *(i)* the exclusion of other tools for reducing information opaqueness, such as the strength of the borrower-lender relationship, loan maturity, and loan covenants, but also *(ii)* the ignoring of the moderating or interaction effects among the different tools that mitigate informational asymmetries.

[9] However, it must be noted that if the lender obtains access to private information of the borrower, the required collateral for a loan may either decrease or increase, given that private information about borrower quality can be either favourable or unfavourable.

positive correlation between these two factors (Machauer and Weber, 1998; Ono and Uesegi, 2009, Uchida, 2011), the majority of the extant empirical studies demonstrate a negative relationship between these two variables (Berger and Udell, 1995; Harhoff and Körting, 1998; Degryse and Van Cayseele, 2000; Chakraborty and Hu, 2006; Jiménez et al., 2006; Brick and Palia, 2007). Empirical studies have also related the strength of the bank–borrower relationship to the number of banks with which the borrower has transactions, assuming that more exclusive relationships will also be stronger in nature; however, the results from these studies are conflicting. Investigations by Harhoff and Körting (1998), Chakraborty and Hu (2006), and Jiménez et al. (2006) find a negative relationship between borrower exclusivity and collateral, as these studies reveal that relationships with multiple banks increase the probability of pledging collateral for a loan. By contrast, studies by Machauer and Weber (1998), Menkhoff et al. (2006), Voordeckers and Steijvers (2006) and Hernández-Cánovas and Martínez-Solano (2006) report a positive relationship between these two considerations, suggesting that relationships with multiple banks lower the probability of pledging collateral for a loan.

The *"lender–based"* theory of collateral assesses the presence of collateral in loans by considering two different banks in the credit market: one local bank that benefits from possessing an information advantage on the borrower and another bank that is distant from the borrower but introduces competition in the local market (Inderst and Mueller, 2007). Investigations of these types of situations have revealed that the presence of collateral allows local lenders to profit from their superior information advantage; for instance, empirical research by Jiménez et al. (2009) indicates that the use of collateral is higher for loans that are granted by local lenders. Other researchers have examined the relationship between different types of lenders or loans and the pledging of collateral. The results from all of these studies have relevance for asymmetric information theories and/or the relationship issue. Chakraborty and Hu (2006) indicate that loans that are not lines of credit are less likely to be collateralised if borrowers use more of a bank's

services. Jiménez and Saurina (2004) conclude that for savings banks, which are the types of financial institutions that face the greatest adverse selection, collateral appears to be an effective device for decreasing borrower risk. Uchida (2011) finds that compared with large banks, small banks place greater emphasis on both the ability to pledge collateral and the lending relationship. However, Voordeckers and Steijvers (2006) conclude that compared with loan and lender characteristics, firm and relationship characteristics are more important determinants of collateral.

Another stream of literature investigates the role of market competition in collateralisation. An initial theoretical view argues that as bank competition increases, the bank's incentive to invest in information collection diminishes because the probability that borrowers will switch to other banks will rise; thus, under increasingly competitive conditions, a bank's power to extract rent will be reduced, increasing the likelihood of the use of collateral (Besanko and Thakor, 1987a; Petersen and Rajan, 1995). From an empirical perspective, by assuming a negative relationship between competition and loan market concentration, Jiménez et al. (2006) find support for a negative relationship between the use of collateral and loan market concentration[10], thus suggesting that collateral and a bank's market power appear to be substitutes. A second theoretical view asserts that bank competition may induce banks to focus even more deeply on relationship–based lending; this focus can alleviate price competition pressures because a client–driven lending system can help a bank become more unique relative to its competitors (Boot and Thakor, 2000; Berlin and Butler, 2002). Voordeckers and Steijvers (2006) empirically demonstrate that if a company submits a credit request to more banks, the likelihood that the company will pledge any type of collateral as an aspect of its eventual loan diminishes. Finally, in Berger et al. (2011b), lending market concentration does not appear to have a significant effect on the use of collateral.

[10] However, these authors find that credit market concentration does not change the effect that the relationship duration has on the likelihood of collateral use.

Moreover, the existing literature also explores whether collateral requirements help reduce the cost of external funds and the level of credit rationing[11]. In addition, many published studies analyse whether collateral requirements improve a bank's monitoring activity[12]. Recent empirical research supports these two theories[13]. To conclude, the theoretical literature also analyses (*i*) the existence of a ''collateral channel'' through which a large decline in asset markets decreases the value of collateralisable assets and adversely affects the real economy[14]; and (*ii*) the ways in which collateral affects recovery rates within the Basel II framework[15].

2.3 Hypotheses and methodology

We investigate how collateral requirements are related to characteristics of the borrower and/or features of the credit market. We measure the collateral requirement not only by the presence of collateral but also by the collateral to loan value ratio. With respect to borrower characteristics, we analyse whether the risk profile of the borrower positively affects the collateral requirement (hypothesis 1). With respect to market features, we investigate how information sharing (hypothesis 2) and the concentration of the bank market (hypothesis 3) affect collateral requirements. Thus, in accordance with the literature surveyed above, the following hypotheses are tested.

2.3.1 Hypotheses

H1a *As the default risk of borrowers increases, the presence of collateral in SME loan contracts becomes more likely, and collateral to loan ratios will be higher for these high–risk borrowers.*

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[11] See Bester (1987), Besanko and Thakor (1987a), Feder et al. (1988), La Porta et al. (1997), Coco (1999), Gelos and Werner (2002), Jiminez and Saurina (2004), Berger et al. (2011b), and Menkhoff et al. (2012). For a review of recent empirical research on collateral as a remedy for credit rationing, see Steijvers and Voordeckers (2011).

[12] Berglöf and von Thadden (1994), Rajan and Winton (1995), Holmstrom and Tirole (1997), Repullo and Suarez (1998), Gorton and Kahn (2000), Longhofer and Santos (2000), Park (2000), Manove et al. (2001).

[13] Voordeckers and Steijvers (2006), Cerqueiro et al. (2011), Ono and Uesugi (2009).

[14] Mattesini (1990), Kiyotaki and Moore (1997), Feder et al. (1988), Krishnamurthy (2003), Niinimäki (2009), Benmelech and Bergman (2011).

[15] Hui et al. (2006), Chalupka and Kopecsni (2009), Grunert and Weber (2009).

According to the observed–risk hypothesis, borrowers with observably higher risk are more likely be required to provide collateral for loans to defray the costs of the lender in the event of a default (Leeth and Scott, 1989; Berger and Udell, 1990; Jiménez and Saurina, 2004; Chen, 2006; Niinimäki, 2011). In a situation that involves hidden actions, collateral can serve as a means of aligning the interests of the lender and the borrower, acting as a deterrent that discourages the borrower from adopting opportunistic, risk–shifting behaviours that can hinder the success of the project that uses the borrowed funds (Boot et al., 1991; Boot and Thakor, 1994; Holmstrom and Tirole, 1997).

We expect to find evidence of a positive relationship between the risks of the SMEs and the collateral requirements in our sample, particularly given that small and medium businesses typically display even higher perceived levels of risk in less–developed countries than in developed economies.

H1b *Low risk borrowers are more likely to pledge collateral in their loan contracts and more likely to have high collateral to loan values to signal their quality.*

The credible threat of losing the pledged collateral (Aghion and Bolton, 1992) disciplines the borrower's actions by producing a higher level of effort to satisfy loan requirements and therefore reducing the borrower's default probability. Accordingly low risk borrowers might be more likely to pledge collateral to signal their creditworthiness (Bester 1985; Bester 1987; Besanko and Thakor 1987a; Chan and Kanatas 1985). These studies usually concentrate on private information about risk known only to borrowers (Berger and Udell, 1990). Manove et al (2001) imply that high quality borrowers are more likely to pledge collateral to distinguish themselves from low quality borrowers especially when the banking competition is intense. Bester (1985) and Bester (1987) address collateral requirements as a signalling tool and imply that only low risk borrowers accept secured contracts at lower interest premiums. If this hypothesis is valid for our sample we should observe a positive relationship between borrower's quality and collateral requirements. The previous empirical evidence doesnt support this

hypothesis, indeed H1a seems to be the conventional wisdom in the literature. Ono and Uesegi (2009), on the other hand, find that the firms' riskiness doesn't have a significant effect on the use of collateral.

H2 *The collateral requirements in SME loan contracts are less stringent in countries that feature more intensive information sharing among lenders.*

Information sharing among lenders allows banks to inexpensively obtain information on the repayment histories and current debt exposure of loan applicants. Thus, information sharing is an important tool for reducing informational asymmetries and eventually decreasing adverse selection problems. Pagano and Jappelli (1993) demonstrate that information sharing increases the volume of lending by easing loan conditions, particularly for situations involving severe adverse selection problems in the financial markets. From an empirical perspective, Brown et al. (2009) reveal that information sharing is associated with credit that is both more available and less expensive for firms; this effect is especially pronounced for informationally opaque SMEs[16]. In countries with weaker information–sharing mechanisms, lenders may experience difficulties with respect to credit risk measurement, particularly if they are unfamiliar with the loan applicant prior to the loan application. As a consequence, greater opaqueness regarding borrowers' characteristics produces an increased probability of collateral requirements and a higher degree of collateral for any given loan. Therefore, we expect to find negative relationships between information sharing and both the presence of collateral in loans and the collateral to loan ratio.

H3a *Both the likelihood of the presence of collateral and the degree of collateral in SME loan contracts are positively associated with banking concentration.*

Boot and Thakor (2000) argue that banks attempt to build closer relationships with their clients in more competitive banking environments. Therefore, banking competition is expected to decrease the collateral requirements. Berlin and Butler

[16] Brown et al. (2009) use BEEPS data from 2002 and 2005. In particular, data regarding the cost/availability of funds is obtained from the answers of the responding firms to the following question: *"Can you tell me how problematic is access to finance (e.g., collateral requirement) or financing not available from banks for the operation and growth of your business?"* (1 = major obstacle, 2 = moderate obstacle, 3 = minor obstacle, 4 = no obstacle).

(2002) demonstrate that as the competitive pressure in loan markets increases, lenders must relax the contract terms, *i.e.,* lower their collateral ratios; thus, loan contracts become less stringent as competition increases. Based on a sample of bank loans in 70 countries, Hainz et al. (2008) indicate that the presence of collateral in loan contracts is more likely in less competitive loan markets. Assuming that a negative association exists between competition and concentration, we expect to find a positive relationship between the concentration of the credit markets and both the presence of collateral in loans and the magnitude of the collateral to loan ratio. We furthermore postulate that because the banking sector is less-developed and less competitive in less–developed countries than in developed countries, oligopolistic banks in these less–developed countries may extract rents by frequently requiring collateral and mandating higher collateral to loan ratios.

H3b *Both the likelihood of the presence of collateral and the degree of collateral in SME loan contracts are negatively associated with banking concentration.*

There is also another group of studies that address a positive association between competition in banking and the presence of collateral (*e.g.*, Besanko and Thakor, 1987a; Voordeckers and Steijvers, 2006). Assuming a negative relationship between competition and concentration, the use of collateral is expected to be less likely in concentrated lending markets. In concentrated banking environments, lenders possess an informational advantage over borrowers; this advantage produces collateral requirements that are less stringent, as predicted by the *"lender–based"* theory of collateral (Inderst and Mueller, 2007; Jiménez et al., 2006; 2009). Jiménez et al. (2006 and 2009) provide empirical evidence for the negative relationship between the presence of collateral in loan contracts and lender market concentration. By contrast, Berger et al. (2011b, 2011c) demonstrate that lending market concentration—which these researchers use as a control variable—does not have a significant effect on the presence of collateral in loan contracts.

2.3.2 Methodology

Using probit and logit models, most of the previously published studies that examine the presence of collateral in loan contracts use a binary dependent variable[17]. However, these binary dependent variable models do not describe the volume of collateral; for example, loan contracts with 1% or 1000% collateral to loan ratios are considered to be the same and are coded identically. Only a few studies have examined collateral to loan ratios, and these investigations primarily utilise tobit models[18]. However, tobit is a restrictive model due to its assumptions. First, the maximum likelihood estimation for the tobit model assumes that errors are homoskedastic and possess a normal distribution; if these assumptions are violated, the maximum likelihood estimator becomes inconsistent. Although several modified tobit models exist (*e.g.,* the heteroskedasticity–robust tobit estimator), Ramalho and Vidigal da Silva (2009) argue that none of these modifications produce a single modified tobit model that addresses all of the issues with the tobit approach. Second, the tobit model assumes that the same data–generating process determines both the binary and the continuous dependent variables, which in this instance are the presence of collateral and the collateral to loan ratio, respectively.

As originally formulated by Cragg (1971), double–hurdle or two–part models generalise the tobit model in a manner that overcomes this restrictive assumption[19]. As the name "double–hurdle" suggests, Cragg's (1971) model is based on the assumption that households make two separate decisions about buying a durable good; in particular, in this model, each household first decides

[17] Berger and Udell (1995), Degryse and van Cayseele (2000), Jiménez et al. (2009), Menkhoff et al. (2012).

[18] Menkhoff et al. (2006), Peltoniemi (2007).

[19] Goldberger (1964) may be regarded as the first author who addresses the two-part models. However, Cragg (1971) is the first paper to use the term 'two-part model'. These models have been extensively used in consumption studies and health economics research, particularly for situations involving cigarette/alcohol consumption (Cragg, 1971; Jones, 1989; Yen and Jensen, 1996; Labeaga, 1999; Newman et al., 2003; Aristei et al., 2008; Madden, 2008). Two-part models are rarely used in empirical finance studies. Dionne et al. (1996) use this model for credit scoring, and Moffatt (2005) employs this model for loan defaults. To the best of our knowledge, two-part models have not yet been implemented in the empirical literature of collateralisation.

whether to buy a durable good and subsequently determines how much to spend on the purchase of the good. Thus, these decisions are determined by different data–generating processes. As explained in Cragg (1971), to observe a positive level of expenditure on a durable good, two separate hurdles must be passed: the first hurdle is the participation decision (*i.e.,* deciding whether to buy the item), and the second hurdle is the consumption decision (*i.e.*, deciding how much to spend on the item). Adopting this assumption to our model, because the incidence of collateral in loan contracts and the collateral to loan ratios stem from two different processes, two separate hurdles must be passed to observe a positive collateral to loan ratio. In contrast to Heckman models, two–part models depend on the assumption of independence between the errors of the two equations. The sample selection model is first and foremost used for wage estimation equations (Heckman, 1979). In these types of applications, the wages of individuals who do not work are not observed, and the population of interest includes not only the workers who are in the labour force but also persons who are out of the labour force. This model allows for the simultaneous estimation of the effects of independent variables on both actual and potential workers.

Another important point regarding the choice between the sample selection and two–part models is the "exclusion restriction". In most instances, the presence of collateral and the collateral to loan ratios are determined by the same set of variables. In the case of the selection model, it is necessary to use variables that explain the presence of collateral but not the collateral to loan ratio for a loan; these variables are nearly impossible to find.

Menkhoff et al. (2012) and Chakraborty and Hu (2006) use the Heckman selection model to model the presence of collateral in loan contracts for which the selection equation is a loan approval equation. Our paper differs from Menkhoff et al. (2012) and Chakraborty and Hu (2006) in two respects in terms of methodology. First, we are interested in not only the presence of collateralisation in loan contracts but also the degree of this collateralisation. Second, our population of interest are SMEs with loans rather than SMEs without loans

because we are interested in actual collateralisation and not in potential, latent collateralisation. Under these circumstances, the two-part models become more appropriate for the purposes of our study. We also use a standard likelihood ratio test to compare the performances of the two–part model with the performances of the tobit approach.

In the first part of this study's model, we use probit model to explain the presence of collateral in loan contracts, which is expressed by *COLL1*. The information for this dependent variable is extracted from the following question: *"Referring only to this most recent line of credit or loan, what was the approximate value of the collateral required, as a percentage of the value of the loan or line of credit?"*. The variable takes the value of one if the firm reported a positive number and zero otherwise. In the second part of the model in this study, we use a truncated regression model to explain the positive values of collateral to loan ratios.

We model the firm–level dependent variables on collateralization as functions of firm–specific and country–specific variables. To test our hypotheses, we grouped the determinants of the presence of collateral in loan contracts and the collateral to loan value ratios for these loan contracts into four categories. The first category refers to the firm level determinants: these variables include two proxies for borrower risk and allow us to test the first hypothesis of this study. The second category relates to the availability of information on borrowers and permits the testing of this study's second hypothesis. The third category refers to the banking sector characteristics. Because the majority of loans are borrowed from banks in the sample countries, we consider banking sector characteristics to be a proxy for lending market characteristics. This group of variables may be used to test the third hypothesis. Finally, the fourth category includes the *LNGDPPC* as a country–level macroeconomic control variable. The precise definitions and sources of each variable in these four categories are provided in Table 2.1.

Table 2.1 Variable definitions and sources

Variable	Definition	Source
LHS variables		
COLL1	Dummy=1 if the firm has pledged collateral to obtain an external loan and zero otherwise.	BEEPS
COLL2	The ratio of collateral value to loan size (%), including zeros.	BEEPS
COLL3	The ratio of collateral value to loan size (%) if *COLL1*=1.	BEEPS
RHS variables		
Borrower characteristics		
OVERDUE	Dummy=1 if the firm has utility payments that are overdue by more than 90 days and zero otherwise.	BEEPS
CRIME	Dummy=1 if the SME has experienced any losses as a result of theft, robbery, vandalism or arson and zero otherwise.	BEEPS
AGE	The number of years that the firm has been operating.	BEEPS
SIZE	The size of the firm, as measured by the number of full–time employees.	BEEPS
SOLEOWN	Dummy=1 if the firm is owned by a sole owner and zero otherwise.	BEEPS
FEMALEOWN	Dummy=1 if the firm is owned by a sole female owner and zero otherwise.	BEEPS
QUALITY	Dummy=1 if the firm has an internationally recognised quality certification, such as ISO 9000 or ISO 9002, and zero otherwise.	BEEPS
CITY	Dummy=1 if the firm is located in the capital or in a city with a population over one million and zero otherwise.	BEEPS
Information sharing		
PRVTBR	The number of individuals or firms in a country (as a percentage of the adult population of the nation) that are included in a private credit bureau's up–to–date records that track information regarding repayment history, unpaid debts, and outstanding credit.	WB
PUBREG	The number of individuals or firms in a country (as a percentage of the adult population of the nation) that are included in a public credit registry's up–to–date records that track information regarding repayment history, unpaid debts, and outstanding credit.	WB
Lending market characteristics		
CR	The asset share of the three largest commercial banks within the commercial banking sector of the country as a measure of concentration in the banking sector (%).	Bankscope
FOREIGN	The asset share of foreign banks in total banking system assets (%).	EBRD
STATE	The asset share of state–owned banks in total banking system assets (%).	EBRD
Macroeconomic variable		
LNGDPPC	The natural logarithm of the GDP per capita in US dollars.	EBRD

Notes: BEEPS stands for Business Environment and Enterprise Performance Survey, WB stands for the World Bank, and EBRD stands for the European Bank for Reconstruction and Development.

The rest of the control variables that we use are as follows. *SIZE* stands for the firm size and is measured by the number of full–time employees of that firm. *AGE* is the number of years that the firm has been operating. Older firms are more likely to have longer relationship with lenders, as shown by Berger and Udell (1995); thus, these more established firms can obtain loans with better conditions, *i.e.*, lower interest rates and less collateral. Thus, in our model, we expect to observe a negative coefficient for *AGE*. *QUALITY* is a dummy variable that is set equal to one if the firm has an internationally recognised quality certification, such as ISO 9000 or ISO 9002, and zero otherwise. Because higher values of this variable are reflective of higher borrower quality, we expect to find negative coefficients for this variable in our model. *SOLEOWN* is a dummy variable that becomes one if the SME is a sole proprietorship firm.

FEMALEOWN is a dummy variable that is set equal to one if the SME is a sole proprietorship that is owned by a female entrepreneur and zero otherwise. Some studies reveal that because women generally form weaker relationships with bankers due to sexual stereotyping and discrimination, higher interest rates and stricter conditions are likely to apply to loans to women than to men, even if there is no difference in the objective riskiness or the business situation of the male and female borrowers in question (Carter and Rosa, 1998; Alesina et al. 2009; Beck et al. 2011). Thus, we can expect higher collateral requirements for female entrepreneurs*, i.e,* positive coefficient estimate for *FEMALEOWN*. Another body of literature exists that considers women to be better borrowers than men in terms of lower default rates; however, this result is largely attributed to women's difficulties with respect to accessing credit; these difficulties reduce their risk of moral hazard[20]. There is also another type of studies that address females to be more risk averse as compared to males[21]. So they are less likely to agree with loan contracts that have strict collateral requirements. Relying on the fact that females

[20] See D'Espallier et al. (2011) for a review of the literature regarding the gender effect on default rates in micro-finance institutions.

[21] See Croson and Gneezy (2009) for a review of the experimental studies on gender based preference differences.

are more risk averse, and they have lower default rates, we can also expect to observe a negative coefficient for estimate *FEMALEOWN.*

Finally, due to the existence of transaction (for the borrowers) and enforcement costs (for the bank), locations of SMEs are important for determining the cost of loans as well as the various terms of the loan contract, such as collateral. *CITY* is a dummy variable that is set equal to one if the firm is located in a national capital or in a city with a population over one million and zero otherwise. We expect loan contract conditions to be less stringent in larger cities because financial centres are primarily located in these cities. Thus, we expect to find a negative association between this variable and the dependent variables[22].

To test the effect of information sharing among lenders, we use two country–level variables: *PRVTBR* and *PUBREG*. Private credit bureaus in various countries attempt to collect current information regarding repayment history, unpaid debts, and outstanding credit for individuals and firms, and *PRVTBR* represents the number of individuals or firms in a country (as a percentage of the adult population in a country) that are included in the up–to–date records of a private credit bureau. Similarly, public credit registries also attempt to gather current information on repayment history, unpaid debts, and credit outstanding for individuals and firms, and *PUBREG* is a measure of public credit registry coverage (as a percentage of the adult population in a country) that represents the number of individuals and firms that are included in the up–to–date records of a public registry. A public registry is a database that is owned by public authorities, such as a nation's central bank or banking supervisory authority, collects information regarding the standing of borrowers in the financial system, and furnishes this information to financial institutions. Because lenders are less strict with borrowers if they possess better information about the borrowers in question, we expect to find negative coefficients for both *PRVTBR* and *PUBREG* in the model.

[22] See Jiménez et al. (2009) for a discussion of the effect of location on collateralisation.

In the third group of variables, we include banking sector characteristics. To test our third hypothesis, we again use country–level variables that provide information about the structure of the banking system. We use *CR*, the share of all commercial bank assets that are owned by the three largest commercial banks, to measure the concentration in the lending market. To control for differences in ownership structure in the lending markets of the examined countries, we use the shares of the total banking system assets that are owned by foreign banks (*FOREIGN*) and state–owned banks (*STATE*) as measures of the ownership structure in lending markets. Because foreign banks frequently face difficulties in evaluating subjective information about borrowers, they primarily use objective information and standardised decision techniques in their lending decisions, whereas domestic banks are more apt to use soft information and long–term relationships (Berger and Udell, 1995; Berger et al. 2001; Petersen and Rajan, 2002). As Berger and Udell (2006) indicate, state–owned lenders frequently use government support in the form of subsidies to supply additional credit to SMEs. This credit is generally supplied to satisfy political purposes; as another aspect of providing this credit, state–owned firms are also expected to help borrowing firms by easing the collateral requirements for loans. Accordingly, we expect a positive coefficient for *FOREIGN* and a negative coefficient for *STATE* to describe the relationship of these two variables to our dependent variables.

Finally, to control for macroeconomic conditions in the examined countries, we use *LNGDPPC*, which represents the natural logarithm of the per capita gross domestic product. As *LNGDPPC* increases, we expect the presence of collateral to decrease due to the possible occurrence of credit expansion and implementation of less stringent loan conditions, which would produce lower collateral to loan ratios and decreased collateralisation.

2.4 Data and descriptive statistics

The primary data set that is used in this study is provided by BEEPS, which is a joint project of the European Bank for Reconstruction and Development

(EBRD) and the World Bank (WB). The BEEPS is administered throughout 27 transition economies from Eastern Europe and Central Asia (including Turkey) to assess the business environments for private enterprises in the examined countries[23]. Surveys were conducted in 2002, 2005, 2007, 2008, and 2009 in which 6153, 10421, 1952, 3375, and 7815 firms were surveyed, respectively. Our analysis is based on the pooled cross–section data from these surveys[24].

We argue that this data set possesses a number of advantages compared to the data sets that are used in previous studies. Most importantly, it enables us to extract valuable information about firms from different countries. Moreover, the data include firms in both rural areas and large cities. Thus, these data enable us to analyse diverse firms in a large number of countries.

For our final sample of SMEs to be in accordance with both BEEPS definitions and OECD conventions, we define SMEs to be firms that have a maximum of 250 full–time employees and thereby arrive at a total sample of 21570 SMEs. Among these 21570 SMEs, 8365 SMEs had obtained external loan, and 6582 SMEs had agreed to loan contracts that included collateral.

Most of the previous studies on SMEs evaluate all SMEs as a single group of firms and do not distinguish between micro, small and medium firms. However, the determinants of collateral requirements for these groups of firms may differ. In accordance with the BEEPS classifications, we define medium firms as firms that have less than 250 and more than 49 full–time employees and small firms as firms that have less than 50 and more than 9 full–time employees. In addition, we distinguish between small and micro firms by defining micro firms as firms that have less than 10 full–time employees. Using these classifications, we perform not only regressions for the full sample of SMEs but also separate regressions for small, medium, and micro–sized firms.

Table 2.2 in below presents the basic summary statistics for the firm-level variables that are included in the regressions. We grouped the summary statistics

[23] See Table 2.D in the appendix for the sample of countries included in the analysis.

[24] For further information see BEEPS reports on methodology and observations http://www.ebrd.com/pages/research/analysis/ surveys/beeps.shtml

for firms with and without loan in this table. The results in this table show that there is only little difference between the summary statistics of the both groups of firms. This evidence implies that the bias in the regression coefficient estimates due to sample selection will not constitute an important problem.

Table 2.2 Summary statistics for firms with and without loan

	Firms without loan			Firms with loan			Total		
	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N
OVERDUE	0.04	0.19	4832	0.05	0.22	4255	0.04	0.20	9087
CRIME	0.15	0.36	6189	0.24	0.43	5647	0.19	0.40	11836
AGE	13.42	11.36	6177	14.87	12.34	5643	14.11	11.86	11820
SIZE	25.50	43.35	6215	25.46	43.01	5665	25.48	43.19	11880
SOLEOWN	0.16	0.37	6215	0.14	0.35	5665	0.16	0.36	11880
FEMALEOWN	0.06	0.24	6069	0.04	0.20	5550	0.05	0.22	11619
QUALITY	0.22	0.41	6048	0.32	0.47	5426	0.26	0.44	11474
CITY	3.00	1.47	5404	3.10	1.47	4717	3.05	1.47	10121

Table 2.3 provides detailed summary statistics regarding the variables that are used in the empirical part of this study. The mean value of *COLL1* in this table shows that 79% of the loans extended to SMEs were secured by collateral. The average collateral to loan ratio (for the loan contracts that included collateral) was 145% on average with a standard deviation of 87.3%[25]. Of the loan contracts that included collateral, 80% required a collateral that was greater than the value of the loan (that is, *COLL2*>100)[26].

[25] For the 1521 large firms in our sample, 76% of the loans were secured by collateral. Once the collateral is included in the loan contracts, the mean value of the collateral to the loan value (as measured by *COLL3*) was 135%, with a standard deviation of 89%. This comparison implies that the degree of collateral that is required for loans is slightly higher for SMEs than for larger firms.

[26] Along BEEPS firms are also asked to provide the type of lending institution, however only 4194 SMEs answered this question. As presented in Table 2.B in the appendix, our data indicate that collateral was present in loan contracts for 78% of the loans from private commercial banks, whereas state–owned banks and government agencies required collateral for 74% of the loans that they granted. The percentage of loans that required collateral decreased to 53% for loans that were granted by non–bank financial institutions, which include microfinance institutions, credit cooperatives, credit unions, and finance companies, and this percentage is even lower (44%) for the remaining lenders, which include family/friends, moneylenders, and other types of lenders.

Table 2.3 Summary statistics

	SMEs			Medium firms			Small firms			Micro firms		
Variable	N	mean	std. dev.	N	mean	std. dev.	N	mean	std. dev.	N	mean	std. dev.
COLL1	8365	0.787	0.410	2820	0.828	0.378	3616	0.789	0.408	1929	0.724	0.45
COLL2	8365	113.7	97.47	2820	114.2	86.04	3616	115.2	98.06	1929	110.1	111.1
COLL3	6582	144.5	87.3	2334	138.02	75.24	2852	146.1	87.6	1396	152.1	103.3
OVERDUE	7073	0.056	0.23	2462	0.066	0.248	3010	0.052	0.22	1601	0.05	0.217
CRIME	8346	0.257	0.44	2809	0.311	0.463	3609	0.248	0.43	1928	0.19	0.398
AGE	8329	14.35	13.9	2802	19.04	19.22	3603	12.66	10.05	1924	10.65	7.93
SIZE	8365	51.04	58.7	2820	117.1	57.59	3616	23.9	11.26	1929	5.23	2.17
SOLEOWN	8360	0.231	0.422	2820	0.116	0.321	3611	0.223	0.416	1929	0.414	0.493
FEMALEOWN	6211	0.063	0.244	2010	0.031	0.174	2759	0.053	0.223	1442	0.129	0.335
QUALITY	8313	0.239	0.426	2803	0.348	0.476	3593	0.219	0.413	1917	0.116	0.32
CITY	8365	0.200	0.400	2820	0.233	0.423	3616	0.200	0.40	1929	0.153	0.36
PUBREG	86	10.66	14.34	86	10.6	14.77	86	10.9	14.2	86	10.25	13.97
PRVTBR	86	33.17	31.22	86	32.8	31.24	86	31.9	30.2	86	35.97	32.75
CR	77	64.002	20.9	77	61.8	22.5	77	64.5	20.6	77	66.23	18.71
STATE	76	13.90	17.02	76	14.9	17.9	76	13.34	17.2	76	13.48	15.1
FOREIGN	76	54.6	33.3	76	54.8	32.91	76	54.5	33.6	76	54.75	33.2
LNGDPPC	83	8.55	0.88	83	8.57	0.897	83	8.5	0.878	83	8.55	0.866

Notes: N is the number of observations. Std.dev. is the standard deviation.

Table 2.C in the Appendix shows the collateral types included in the loan contracts. The land and buildings seems the most–preferred type of collateral, whereas machinery and equipment are a secondary choice for collateral in loan contracts across the examined countries. These numbers are in line with Niinimäki's (2009), observation that real estate is the most common and dominant form of collateral.

Table 2.E in Appendix presents the summary statistics at the country level; in this table, countries are sorted in descending order of their average values of *COLL1*. The mean value for the presence of collateral is the lowest in Turkey; in the country, approximately only half of commercial loans are secured by collateral. Georgia is the country with the highest collateralisation, as 95% of the examined loans were secured by collateral. Georgia is also ranked first with respect to the degree of collateral that was required for loans, with an average collateral to loan ratio (as measured by *COLL3*) of 217.3%. Among the examined countries, Turkey also has the lowest mean value of collateral to loan ratio as measured by *COLL3* (of 116%)[27].

Finally, Table 2.4 presents the basic summary statistics for collateralisation in different country groups. This table reveals no major differences among the examined country groups with respect to the mean values of collateralisation on loans that are extended to SMEs. We observe that compared with non–EU countries, the EU countries in our sample have lower collateralisation with respect to both the presence of collateral and collateral to loan ratio[28]. As we test the statistical significance of the difference between the mean values of collateralisation variables via t-test we see that this difference is also statistically significant at 0.01% for all collateralisation variables *COLL1*, *COLL2*, *COLL3*. In all of the assessed sub–groups of countries, we observe that among the sizes of

[27] See Figures 2.A and 2.B in the Appendix for the picture.

[28] The gap between EU and non-EU countries grows if we consider the candidate countries of Croatia and Turkey. The 2005 wave of the BEEPS was implemented in several other countries, including Germany. In the 2005 BEEPS results for Germany, 90% of the 793 loans that were extended to SMEs were secured by collateral, and the average collateral to loan ratio for these loans was 127%, with a 37.2% standard deviation. This standard deviation for *COLL3* is lower than the standard deviation for any of the countries in our sample.

firms that are considered to be SMEs, micro firms demonstrate the lowest mean value for the presence of collateral (*COLL1*), and the mean value for the presence of collateral is lower for small firms than for medium firms. By contrast, if collateral is included in the loan contracts (that is, if *COLL1*=1), higher collateral to loan ratios (*COLL3*) are observed as firm size decreases (from medium to small to micro–sized enterprises).

Table 2.4 Collateralisation by country groups and firm size

		SMEs					Medium firms					Small firms					Micro firms				
		N	mean	std. dev.	min	max	N	mean	std. dev.	min	max	N	mean	std. dev.	min	max	N	mean	std. dev.	min	max
	Coll1	2405	0.76	0.43	0	1	833	0.84	0.36	0	1	1010	0.74	0.44	0	1	562	0.66	0.47	0	1
EU	*Coll2*	2405	102.2	89.2	0	1000	833	108.3	72.4	0	700	1010	101.6	92.1	0	1000	562	94.2	104.5	0	1000
	Coll3	1822	134.9	78.0	1	1000	703	128.3	60.3	1	700	749	137.0	81.1	2	1000	370	143.0	98.0	3	1000
	Coll1	5960	0.8	0.4	0	1	1987	0.82	0.38	0	1	2606	0.81	0.39	0	1	1367	0.75	0.43	0	1
NON–EU	*Coll2*	5960	118.3	100.3	0	1500	1987	116.7	91.1	0	600	2606	120.5	99.8	0	1000	1367	116.6	113.1	0	1500
	Coll3	4760	148.2	90.4	1	1500	1631	142.2	80.5	1	600	2103	149.3	89.7	1	1000	1026	155.4	105.0	1	1500
CIS	*Coll1*	2463	0.84	0.37	0	1	912	0.86	0.35	0	1	1099	0.84	0.36	0	1	452	0.79	0.41	0	1
	Coll2	2463	125	93.8	0	1000	912	124.2	92.2	0	600	1099	125.6	92.7	0	1000	452	125.0	99.5	0	600
	Coll3	2071	148.7	83.3	1	1000	785	144.3	83.5	1	600	928	148.8	82.0	2	1000	358	157.9	85.5	1	600
CEE	*Coll1*	5094	0.8	0.4	0	1	1702	0.85	0.36	0	1	2155	0.8	0.4	0	1	1237	0.73	0.44	0	1
	Coll2	5094	116.5	94.2	0	1000	1702	117.7	81.5	0	700	2155	119.3	96.4	0	1000	1237	109.9	105.5	0	1000
	Coll3	4080	145.4	82.8	1	1000	1445	138.6	70.15	1	700	1734	148.2	85.2	1	1000	901	150.9	95.3	2	1000
Total	*Coll1*	8365	0.8	0.41	0	1	2820	0.83	0.38	0	1	3616	0.79	0.41	0	1	1929	0.72	0.45	0	1
	Coll2	8365	113.7	97.5	0	1500	2820	114.2	86.0	0	700	3616	115.2	98.1	0	1000	1929	110.1	111.1	0	1500
	Coll3	6582	144.5	87.3	1	1500	2334	138.0	75.2	1	700	2852	146.1	87.7	1	1000	1396	152.1	103.3	1	1500

Notes: The EU member countries included in the sample are: Bulgaria, Slovakia, Slovenia, Romania, Poland, Latvia, Lithuania, Hungary, Estonia, Czech Republic. The Non-EU countries included in the sample are Albania, Armenia, Azerbaijan, Belarus, Bosnia, Croatia, FYROM, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Montenegro, Russia, Serbia, Tajikistan, Turkey, Ukraine, Uzbekistan. The CEE countries included in the calculations are: Albania, Bosnia, Bulgaria, Croatia, Czech Republic, Estonia, FYROM, Hungary, Latvia, Lithuania, Moldova, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia. The CIS countries included in the sample are: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Ukraine, Uzbekistan. N is the number of observations.

2.5 Estimation results

Table 2.5 reports the estimation results for the underlying parameters of the econometric models that are presented in the previous section. In our regressions we control for sector and year fixed effect while we cannot control for country fixed effects due to multicollinearity between the country level variables and country fixed effects. For all of the examined groups of firms, we first provide the tobit result where the dependent variable is *COLL2*, whereas the remaining two columns report the estimations of the two–part model. In the first part of the two–part modelling strategy, we provide the probit model estimation results to estimate the probability of the presence of collateral in loan contracts; in this assessment, *COLL1* is the dependent variable. In the second part we present the truncated regression results for the positive values of collateral to loan value ratio (*COLL3*). The average variance inflation factor for the dependent variables is calculated as 1.29, which indicates the absence of multicollinearity. As we perform a standard likelihood ratio test to assess the applicability of the two–part model against the tobit approach, we found out that the tobit model is too restrictive due to its assumptions[29].

With respect to the first hypothesis, the positive and significant coefficient estimates for *CRIME* in probit regression provide a degree of support. We note that the presence of collateral is more likely for SMEs that have experienced losses due to theft, robbery, vandalism or arson as compared with other SMEs. However, this effect is not valid for micro and medium enterprises, and the truncated regression results indicate that *CRIME* does not play a role in determining the degree of collateral in loan contracts that are extended to SMEs. *OVERDUE* has no significant impact on either the presence of collateral or the collateral to loan ratio for SMEs.

[29] Following Ramalho and Silva (2009), the likelihood ratio statistic is calculated as $\mathrm{LR} = -2\left[\mathrm{Ltobit} - \left(\mathrm{Lprobit} + \mathrm{Ltrun}\right)\right] \sim \chi^2_k$, where Ltobit is the likelihood of the tobit model; Lprobit is the likelihood of the probit model; Ltrun is the likelihood of the truncated regression model; and k is the number of independent variables in the equations. The formulation of the null hypothesis indicates that the tobit model is an appropriate modelling strategy to explain zero collateralisation; this null hypothesis is rejected in our regressions.

With respect to firm–level control variables, *AGE* affects *COLL1* negatively for the total sample of SMEs and medium firms; this result is in accordance with our predictions that loan contracts for older firms are less likely to include collateral. By contrast, we are unable to observe a negative effect for of AGE on the positive values of collateral to loan value ratios (*COLL3*). Indeed our results indicate that the loan contracts of older firms have significantly higher collateral to loan value ratios in all groups of SMEs. These results show that the loan contracts of older firms are less likely to include collateral, but once included they have to bear high collateral to loan value ratios.

Our estimation results generally yield positive coefficient estimates for the *SIZE* on *COLL1* for the whole sample of SMEs. This finding can be explained by the fact that smaller SMEs often lack collateralisable assets and therefore apply for loans that do not require collateral, such as loans from microfinance institutions or from informal creditors. By contrast, micro–sized firms have insignificant coefficient estimates for *SIZE.*

Examining the ownership structure of SMEs, we see that the presence of collateral in loan contracts is less likely for SMEs that are established as sole proprietorships than for SMEs that are corporations. We observe a negative effect at 10% for the control variable *FEMALEOWN* on the collateral to loan value ratio for loan contracts that are extended to medium firms. There can be two possible explanations for this negative relationship. First, female borrowers are more disciplined than male borrowers with respect to repaying their loans, which make them to receive loan in more favourable terms. Second because they are more risk averse as compared to males, they are do not generally agree with loan contracts that have strict collateral requirements. However it should be kept in mind that this effect is not valid in the rest of the regressions, as the coefficient estimate for *FEMALEOWN* is statistically insignificant.

Table 2.5 Estimation results

	SMEs			Medium firms			Small firms			Micro firms		
	Tobit	Two–part model		Tobit	Two–part model		Tobit	Two–part model		Tobit	Two–part model	
		Probit	Trunc. reg.		Probit	Trunc. reg.		Probit	Trunc. reg.		Probit	Trunc. reg.
	Coll2	Coll1	Coll3	Coll2	Coll1	Coll3	Coll2	Coll1	Coll3	Coll2	Coll1	Coll3
OVERDUE	1.042	0.125	-11.48	-9.955	0.031	-17.420	6.893	0.105	2.012	-8.488	0.165	-39.60
	(8.708)	(0.122)	(11.09)	(11.55)	(0.222)	(13.95)	(13.60)	(0.176)	(17.37)	(20.67)	(0.291)	(22.19)
CRIME	8.313*	0.145*	1.647	9.253	0.123	7.381	10.230	0.174*	1.873	-7.918	-0.063	-1.967
	(3.967)	(0.057)	(4.676)	(5.824)	(0.104)	(6.482)	(6.175)	(0.088)	(7.656)	(10.98)	(0.117)	(11.60)
AGE	0.015	-0.004*	0.410**	-0.283	-0.007**	0.072	0.692*	0.003	0.955**	0.860	-0.001	1.739**
	(0.135)	(0.002)	(0.150)	(0.149)	(0.002)	(0.150)	(0.320)	(0.004)	(0.370)	(0.599)	(0.006)	(0.623)
SIZE	0.091**	0.003***	-0.054	0.050	0.001	0.043	0.162	0.008*	-0.501	1.004	0.016	-0.312
	(0.031)	(0.001)	(0.041)	(0.048)	(0.001)	(0.052)	(0.224)	(0.003)	(0.290)	(2.149)	(0.024)	(2.389)
SOLEOWN	-9.638	-0.207**	2.634	1.513	-0.157	8.360	-8.999	-0.244*	4.871	-13.91	-0.106	-9.181
	(5.241)	(0.068)	(5.455)	(10.720)	(0.173)	(10.02)	(7.804)	(0.103)	(8.594)	(10.51)	(0.116)	(11.75)
FEMALEOWN	-4.623	0.046	-12.26	-13.58	0.235	-35.27	10.77	0.280	-6.756	-7.589	-0.149	3.080
	(7.950)	(0.105)	(8.486)	(16.080)	(0.287)	(18.610)	(12.79)	(0.184)	(14.61)	(13.55)	(0.152)	(13.44)
QUALITY	-3.190	-0.049	-3.009	-10.460	-0.180	-4.924	6.298	0.046	5.252	-7.939	-0.099	-0.638
	(4.352)	(0.058)	(5.433)	(5.969)	(0.098)	(6.753)	(6.669)	(0.090)	(8.643)	(16.530)	(0.165)	(19.84)
CITY	-12.98**	-0.189**	-5.385	-20.90***	-0.249*	-16.19*	-6.002	-0.119	1.372	-15.900	-0.277	3.004
	(4.998)	(0.062)	(6.728)	(6.263)	(0.105)	(7.348)	(7.745)	(0.092)	(10.660)	(16.360)	(0.149)	(23.32)
PUBREG	-0.333*	-0.006**	-0.115	-0.521**	-0.013***	-0.064	-0.154	-0.002	-0.097	-0.058	-0.002	0.200
	(0.139)	(0.002)	(0.168)	(0.197)	(0.003)	(0.203)	(0.209)	(0.003)	(0.253)	(0.354)	(0.004)	(0.449)
PRVTBR	-0.522***	-0.005***	-0.403***	-0.437***	-0.006**	-0.277*	-0.396***	-0.004*	-0.333*	-0.742***	-0.005**	-0.614**
	(0.073)	(0.001)	(0.085)	(0.109)	(0.002)	(0.114)	(0.116)	(0.001)	(0.141)	(0.166)	(0.002)	(0.205)
CR	-0.094	-0.001	-0.065	-0.286*	-0.003	-0.263	0.029	0.001	0.012	0.391	-0.001	0.961*
	(0.095)	(0.001)	(0.120)	(0.125)	(0.002)	(0.146)	(0.147)	(0.002)	(0.184)	(0.329)	(0.003)	(0.438)
STATE	-0.078	0.002	-0.301*	0.224	0.006	-0.013	-0.192	0.002	-0.444	-0.803*	-0.005	-0.958*
	(0.112)	(0.002)	(0.138)	(0.167)	(0.003)	(0.187)	(0.172)	(0.003)	(0.230)	(0.329)	(0.004)	(0.418)
FOREIGN	0.635***	0.005***	0.612***	0.643***	0.008***	0.508***	0.647***	0.006***	0.634***	0.590**	0.003	0.660**
	(0.077)	(0.001)	(0.096)	(0.118)	(0.002)	(0.135)	(0.119)	(0.001)	(0.152)	(0.181)	(0.002)	(0.214)
LNGDPPC	-32.24***	-0.302***	-27.71***	-33.17***	-0.243*	-35.39***	-34.55***	-0.383***	-26.72***	-29.18***	-0.231**	-22.40***
	(3.099)	(0.045)	(3.573)	(5.795)	(0.104)	(6.286)	(4.812)	(0.068)	(6.000)	(5.952)	(0.073)	(6.305)
N	4035	4019	3244	1355	1344	1149	1764	1756	1417	916	907	678
log likelihood	-20598.4	-1865.1	-18659.7	-7024.5	-513.5	-6468.1	-9021.1	-807.4	-8186.1	-4457.2	-488.6	-3934.7

Notes: Observations from Serbia, Montenegro, Moldova, Tajikistan, and Uzbekistan are excluded from these regressions, due to a lack of country level variables. All regressions include constant term, year and sector fixed effects. Robust standard errors are clustered at firm level and reported in parentheses. *, **, and *** indicate statistical significance at the 5%, 1%, and 0.1% levels, respectively.

The coefficient estimate for *QUALITY* is found to be negative and statistically significant at 10% only for medium firms, indicating that medium firms with quality certifications are less likely to be asked for collateral in their loan applications. However, these firms do not receive loans with more favourable terms in terms of collateral, as demonstrated by the fact that the effect of *QUALITY* is statistically insignificant in the truncated regression.

Finally, compared with SMEs that are located in smaller cities, SMEs that are located in the capital and/or large cities are less likely to obtain loans that require collateral and also benefit from lower collateral to loan ratios. However, this effect is not significant for small and micro firms. In accordance with our expectations, this result demonstrates that the collateral requirements for SMEs are less stringent in the capital and in large cities with a population of over one million. This result can be explained by the fact that financial centres are mostly located in these cities; thus, it is easier to switch to other lenders and search for loans that do not require collateral if the loan terms that are offered by one lender become stricter.

Analysing the estimation results for the effects of the firm–level variables, we observe that these variables do not have a great deal of explanatory power for determining collateralisation. These insignificant results for the examined firm–level explanatory variables can be attributed to the characteristics of less–developed economies[30]. Lenders are more likely to experience difficulties in assessing the available information regarding borrower firms in these countries. Reports about firms in these countries can be unreliable due to the weaknesses of the legal, informational, and institutional infrastructures of these developing nations. This problem may be more severe for informationally opaque SMEs. Thus, firm characteristics might be less important than the market conditions for determining the collateral characteristics of commercial loans. The positive and

[30] We also used additional firm-specific control variables to verify our results. In particular, we used dummy variables to test the effects of being an innovative or exporting firm; however, we do not observe significant effects of these variables.

significant coefficient estimates of *CRIME* and *CITY* provide a degree of support for this inference.

With respect to the second hypothesis, the coefficient estimates for *PRVTBR* and *PUBREG* are negative and significant for many regressions. We interpret these results as evidence for the fact that information sharing reduces informational asymmetries and eventually reduces adverse selection problems by improving the information that banks possess about credit applicants. This situation makes information sharing more important for SMEs than for larger firms because banks refrain from lending to informationally opaque SMEs. In countries where banks can exchange information on the riskiness of borrowers, banks choose to lend to safer SMEs. Our results indicate that as the percentage of individuals or firms listed by private credit bureaus and public credit registries increases in a country, both the probability of the presence of collateral and the collateral to loan ratio decrease for loans. This finding is consistent with the results of Brown et al. (2009), who find a negative association between information sharing and the ease of obtaining external financing. Thus, in countries where lenders possess better information about the repayment history and unpaid debts of borrowers through public and private credit bureaus, both the probability of the presence of collateral and the degree of this collateral decrease, particularly for financially opaque SMEs.

With respect to the third hypothesis, we find evidence indicating that banking concentration has a negative impact on the degree of collateral for medium sized SMEs, confirming hypothesis *H3b* at 10%. This negative relationship is attributed to the lender–based theory of collateral, which presumes that in more concentrated lending markets, lenders have an informational advantage due to their more lengthy borrower–lender relationships. Accordingly, concentrated markets are associated with less stringent collateral requirements. Our findings for medium firms confirm the results of Jiménez et al. (2006 and 2009). However, this effect is not significant in all model specifications, and this relationship appears to be valid only for medium firms. Moreover direction of the relationship turns to

positive for the collateral to loan value ratio as measured by *COLL3* in case of micro sized firms. This result indicates stricter loan conditions *i.e.* higher collateral requirements for micro sized firms, as the lending market concentration increases. However these results are also not particularly robust, as demonstrated by our subsequent robustness assessments.

With respect to the asset share of foreign banks in the total banking system assets, the positive and significant coefficients of *FOREIGN* indicate that the likelihood of collateral and the degree of this collateral is higher in countries with a greater share of foreign banks. This result can be explained by the fact that foreign banks engage in the intensive use of objective information and standardised decision techniques in their lending decisions because they experience difficulties in accurately evaluating subjective information about borrowers. We find that *STATE* only has a significant effect of reducing the collateral to loan ratios for micro sized firms. The effect of *STATE* on *COLL3* is higher for micro–sized firms than for small firms, and this effect vanishes for medium firms[31]. This result indicates that lower collateral to loan ratios exist in countries with higher shares of state banks; this effect is particularly evident for small and micro firms.

With respect to country–level control variables, our estimation results demonstrate a negative and statistically significant association between *LNGDPPC* and collateralisation nearly in all specifications. This significant result reveals that improvements in macroeconomic conditions help ease loan contract terms by relaxing collateral requirements.

2.5.1 Robustness checks

In a first round of robustness checks, we changed the definitions of the borrower risk proxies. We first used a categorical variable instead of *CRIME* to account for the effect of risk that arises from the location of the SME. This variable was set equal to 0 if crime, theft and disorder are no obstacle to the current operations of the firm, 1 if these factors are a minor obstacle, =2 if they

[31] For the small firms the coefficient estimate of *STATE* for *COLL3* is statistically significant at 10%.

are a moderate obstacle, =3 if they are a major obstacle, or =4 if they are a very severe obstacle. Second, we replaced the utility arrears with tax arrears. Although there were fewer available observations for these variables, our results remained mostly unchanged in these regressions.

In the second round of robustness checks, we used additional control variables. First, we added dummy variables for various lender types: (1) private commercial banks; (2) state–owned banks or government agencies; (3) non–bank financial institutions, including microfinance institutions, credit cooperatives, credit unions, or finance companies; and (4) other lenders[32]. Because only 4194 firms answered the survey question about lender type, the inclusion of lender type as a consideration reduces the number of observations across all of the examined groups of firms by more than half. Nevertheless, the coefficient estimates for the remaining variables remain similar and do not lose statistical significance. If we use the private commercial banks as the base group for all other groups, all of the other lender groups yield negative coefficient estimates for small and medium enterprises. These results can be interpreted as evidence that compared with privately owned banks, other groups of lenders help SMEs by reducing collateral requirements and thereby easing loan conditions. However, we do not observe significant coefficient estimates for the effect of borrowing from state–owned banks. Thus, borrowing from the third and fourth groups of lenders has a negative effect on collateralisation for small and medium enterprises. The remaining coefficient estimates generally remained similar to baseline estimations; however, under these conditions, the little evidence that exists to support a negative relationship between bank concentration and collateralisation in our baseline results became insignificant.

We also consider the effect of the legal environment by examining an index from the Doing Business project of the World Bank that measures the strength of legal rights in a nation. This index ranges from 0 to 10, with higher scores

[32] See Table 2.B in the Appendix for information regarding the presence of collateral in the loans that were extended by lender types.

indicating that collateral and bankruptcy laws protect the rights of borrowers and lenders and facilitate lending; thus, better laws expand access to credit. For the countries in our sample, the mean value for this variable is 6.15 (the median is 6), and the standard deviation is 2.02. This variable has its highest value for Montenegro (an average value of 9.95) and its lowest value for Uzbekistan (an average value of 2). Because this variable was highly correlated with the *FOREIGN* and *STATE* control variables, we run separate regressions for this variable to avoid multicollinearity. Our previous estimation results remained unchanged. The coefficient estimates for the legal rights index do not produce significant results for the presence of collateral, as measured by *COLL1*; however, this index has a statistically significant positive effect on the degree of collateral in loan contracts, as measured by *COLL3*. As argued by Brown et al. (2009), better legal protection makes loan contracts easier to enforce and facilitates the issuance of a larger number of loan contracts. This legal protection may cause the lender to require higher collateral to loan ratios.

To control for the effect of legal origin, we used a set of dummy variables for the origin of the legal system of each examined country (French, German, or Socialist) [33]. However, these dummy variables yield insignificant coefficient estimates in all specifications. Thus, we excluded legal origin dummy variables from the regressions. This finding confirms the results of Pistor et al. (2000), who reveal that better shareholder laws and creditor rights cannot solve the problems of obtaining external financing. Many years are required for these laws to generate detectable effects.

In the third round of the robustness checks, we created a subsample by removing observations of firms that were surveyed in more than one year until we obtained a single observation per firm. In particular, we first excluded the firms

[33] This type of consideration was in accordance with the approach of La Porta et al. (1997), a study that addresses the legal origins of countries as a source of differences in financial sectors and firm structures among countries. The countries in our sample feature three different legal origins: French, German, and Socialist. Turkey, Romania, Lithuania, and Albania are the countries that adopted French laws. Bosnia, Bulgaria, the Czech Republic, Croatia, the FYROM, Hungary, Latvia, Montenegro, Poland, Serbia, Slovakia, and Slovakia are the countries that adopted German laws, whereas the remaining nations that were examined adopted socialist laws.

that did not provide information regarding *COLL2*. If the firm reported values of *COLL2* for two different years, we excluded observations from years with at least one missing explanatory variable and the data from the year 2009. If the observations were complete with all of the explanatory variables provided over the course of more than one year, we arbitrarily excluded the observation from the year 2002. Because only few firms were surveyed in multiple years, this subsampling process did not produce dramatic changes in either our empirical results or the descriptive statistics.

Finally, our sample consists of both EU and non–EU countries, and all of the EU countries that we examine are post–communist. We first perform separate regressions based on the 1422 SMEs that answered the survey questions about collateralisation for these post communist EU countries. In these regressions, *OVERDUE* gains a certain degree of significance, whereas all the remaining coefficient estimates except *LNGDPPC* decrease in significance. In all of these estimations, female ownership (*FEMALEOWN*) is found to have a negative but statistically insignificant association with collateralisation. In regressions based on the 2613 SMEs from non–EU countries, we observe a positive association between female ownership and the presence of collateral for the small enterprises from non–EU countries. In the non–EU countries of our sample, the coefficient estimates for *CR* become positive for the presence of a collateral regression (*COLL1*) for the small–sized firms that were surveyed, whereas these coefficient estimates remain negative for medium firms.

In our estimates of different sets of regressions for the CEE and CIS countries, we obtain similar results for the two groups of countries, except for the effects of *CR* and *FEMALEOWN*. The coefficient estimates for *CR* become positive for small and micro–sized firms in CIS countries; by contrast, we observe a negative coefficient for *CR* for small and micro–sized firms in CEE nations. A stronger negative effect of *FEMALEOWN* on collateralisation is observed for the CEE countries than for the CIS countries.

2.6 Conclusion

The aim of this chapter is to investigate the determinants of collateral requirements on loans extended to SMEs in less-developed countries through the examination of firm–specific, lender market–specific and country–specific variables. Using BEEPS, we evaluate extensive information not only by assessing borrowers themselves but also by incorporating the perceptions of these borrowers with respect to their local business environment. In contrast to previous empirical research on collateral, we not only focus on the presence of collateral in loan contracts but also on the degree of collateral in these contracts. Thus, from a methodological point of view, we contribute to the literature by examining the determinants of the degree of collateral for loans. Our analysis assesses both borrower characteristics, which have typically been the major focus of previous investigations, and the country–specific factors that affect collateral requirements. Our results indicate that country–specific variables are more important than firm–specific variables for determining both the presence and the degree of collateral in loan contracts of SMEs in less–developed countries. We find that in countries in which lenders have better information about borrowers' repayment history and unpaid debts through public and private credit bureaus, both the probability for the presence of collateral and the degree of that collateral decrease in loan contracts. Thus, collateral requirements serve as a tool for resolving the problem of asymmetric information about the borrower's quality. In contrast to previous studies we also distinguish between small, medium, and micro enterprises. We present evidence that the determinants of collateral requirements are not necessarily same for businesses of different sizes.

Our study helps remedy the scarcity of empirical evidence for less–developed and transition economies and therefore yields important policy implications for SMEs, financial institutions and policy makers. Because collateral requirements depend more on each country's information asymmetry than on borrower risk, to improve the abilities of SMEs to access finance it appears to be crucial to improve the process of collecting information about the borrower, both in terms of quality

(how the risk is evaluated) and in terms of the affordability/credibility of this information (who performs the analysis). In this context, lending activity may benefit from entities that are dedicated to the information collecting process, such as mutual guarantee societies (MGSs). MGSs can play an important role as principal interlocutors for enterprises in improving access to credit; by entering long–term relationships with banks, MGSs enable banks to acquire reliable information. MGSs also offer guarantees that are effective in mitigating the risks of banks because they are compliant with Basel II guidelines. Moreover, MGSs could help maximise the capacity to leverage public resources. From a macro perspective, the introduction of a method to evaluate risk–based collateral requirements, which can be implemented in the presence of better and shared information, raises interesting policy questions regarding the allocation planning of public resources to enterprises. Within the context of the current economic and financial environment, the public sector must be able to offer targeted and effective resources to enterprises. By improving the risk analysis and the information sharing level of a country, MGSs can help ensure that scarce public resources are used more effectively by providing an indication of the adequate level of guarantees for various enterprises.

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2.8 APPENDIX

2.8.1. Appendix I

The BEEPS is a joint project of the EBRD and the World Bank. The main aim of this series of surveys are to acquire information on the quality of the business environment that from the viewpoints of firms and building a panel data set of this firms to observe the changes in the business environment triennially. The survey was first conducted in 1999–2000 and administered to approximately 4,000 enterprises in 26 countries of CEE (including Turkey) and the CIS to assess the environment for private enterprise and business development. Since the survey questionary has changed a lot from this first round of the survey to the fourth round of the BEEPS in 2008-2009, we do not include this first round of the BEEPS.

The second round of the BEEPS was conducted in 2002 and includes approximately 6500 enterprises in 28 countries,16 from CEE (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, FR Yugoslavia, FYR Macedonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia and Turkey) and 12 from the CIS (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan). The sample structure for the second wave of the BEEPS was designed to be as representative as possible to the population of firms within the industry and service sectors. In each country, the sectoral composition of the total sample in terms of manufacturing versus services was determined by their relative contribution of GDP. Firms that operated in sectors subject to government price regulations and prudential supervision, such as banking, electric power, rail transport, and water and wastewater were excluded in this and rest of the BEEPS waves. As firms from this excluded sectors are excluded from the survey, these were also excluded from the GDP contribution by re-weighting industry and services. The size distribution of at least 10% of the total sample should be in the small, 10% in the medium and 10% in the large size categories where small enterprises are defined as the firms that have 2-49 employees, medium

firms 50-249, large = 250 -9,999 employees. Firms with only one employee and more that 10,000 employees are excluded in the survey design. This sampling procedure in the second round was also followed in the third round of the BEEPS. Approximately 9,500 enterprises in the same 28 countries are included in the third round of the BEEPS, which is conducted in 2004 and 2005. Furthermore, firms from Germany, Greece, Portugal, South Korea and Vietnam were covered in 2004 and Ireland and Spain in 2005 to set a benchmark for the 28 countries surveyed in the BEEPS.

In the fourth round of the BEEPS in 2008-2009, the survey covered approximately 12,000 enterprises in 29 countries (including Mongolia). Industry, establishment size and region levels of stratification were used in all countries. For each country the sample was stratified along Manufacturing, Retail trade and other services. In some of the countries, there were specific target numbers of interviews for more detailed sectors within these three groups. Size stratification was defined following the standardized definition: small (5-19 employees), medium (20-99 employees), and large (more than 99 employees but excluding the firms with more than 10,000 employees).

There were no additional requirements on the ownership, exporter status, location or years in operation of the establishment as was the case in the previous rounds of BEEPS. Along the defined stratification guidelines, priority was given to completing interviews with establishments who participated in BEEPS 2005 in order to obtain a panel dataset of firms.

Two strategies are followed in order to mitigate the item non-response problems:

- For sensitive questions that the respondent may not be willing to answer, such as corruption, informality or tax evasion, enumerators were instructed to collect the refusal to respond as (-8).

- Establishments with incomplete information were re-contacted in order to complete this information if possible. However, there were clear cases of low response. Survey non-response was addressed by maximising efforts to contact

establishments that were initially selected for interviews. Up to 4 attempts were made to contact an establishment for interview at different times/days of the week before a random replacement establishment (with similar strata characteristics) was suggested for interview. Survey non-response did occur, but substitutions were made in order to potentially achieve strata-specific aims.

2.8.2 Appendix II

Table 2.A Why do not firms apply for new loans?

Main reason for not applying for a new loan	N	%
No need for a loan – the firm has sufficient capital	6,300	69.65
Interest rates are not favourable	1,086	12.01
Application procedures for loans or lines of credit are complex	496	5.48
Collateral requirements are too high	435	4.81
Did not think that the loan would be approved	177	1.96
The size or maturity times of available loans are insufficient	99	1.09
It is necessary to make informal payments to obtain bank loans	62	0.69
Other	256	2.83
Don't know	134	1.48
Total	9,045	100

Table 2.B Collateral requirements of SMEs across financial institutions.

Size of firm	Variable	Private commercial banks	State–owned banks or government agencies	Non–bank financial institutions	Other	Total
SMEs	coll1=0	765	158	79	28	1,030
	coll1=1	2,598	454	90	22	3,164
	total	3,363	612	169	50	4,194
Medium	coll1=0	208	50	17	7	282
	coll1=1	1,044	189	24	5	1,262
	total	1,252	239	41	12	1,544
Small	coll1=0	372	73	41	15	501
	coll1=1	1,164	182	38	8	1,392
	total	1,536	255	79	23	1,893
Micro	coll1=0	185	35	21	6	247
	coll1=1	390	83	28	9	510
	total	575	118	49	15	757

Notes: Non–bank financial institutions include microfinance institutions, credit cooperatives, credit unions, or finance companies.

Table 2.C Forms of collateral in loans that are granted to SMEs

	a	b	c	d	e
a. Land and buildings owned by the borrowing firm	3,771				
b. Machinery and equipment, including movables	727	1,732			
c. Accounts receivable and inventories	306	261	650		
d. Personal assets (*e.g.*, houses) of an owner of the SME.	410	262	159	1,165	
e. Other forms of collateral	152	141	101	113	889

Notes: This table presents the number of collateral types that were required. The intersection shows the number of firms that are asked to provide both forms of collaterals.

Table 2.D Sample composition by year and country

Country	Year of survey					Total
	2002	2005	2007	2008	2009	
Albania	34	72	128	0	14	248
Belarus	20	128	0	0	95	243
Georgia	14	23	0	0	38	75
Tajikistan	71	90	0	75	0	236
Turkey	53	86	0	0	136	275
Ukraine	26	67	356	0	57	506
Uzbekistan	53	95	320	0	31	499
Russia	74	89	0	0	87	250
Poland	40	57	0	0	102	199
Romania	29	26	0	0	138	193
Serbia	28	49	0	84	0	161
Kazakhstan	72	260	0	0	81	413
Moldova	56	189	0	0	128	373
Bosnia	31	55	0	0	29	115
Azerbaijan	35	41	0	0	102	178
FYROM	46	70	0	0	116	232
Armenia	60	124	0	0	85	269
Kyrgyz	5	6	0	0	48	59
Estonia	175	302	0	0	110	587
Czech Republic	54	216	0	0	162	432
Hungary	141	148	0	0	252	541
Latvia	30	83	0	0	156	269
Lithuania	35	68	0	0	73	176
Slovakia	90	83	0	0	136	309
Slovenia	32	34	0	71	0	137
Bulgaria	0	430	0	378	0	808
Croatia	78	199	0	143	0	420
Montenegro	59	63	0	40	0	162
Total	1,441	3,153	804	791	2,176	8,365

Table 2.E Summary statistics by country

Country		Coll1	Coll2	Coll3	Overdue	Crime	Age	Size	Sole own	Female own	Quality	City	Pubreg	Prvtbr	Cr	State	Foreign	Lngdppc
Georgia	mean	0.95	205.7	216.5	0.03	0.19	12.89	41.3	0.22	0.08	0.18	0.32	0	16.4	71.2	0	80.6	7.52
	median	1	200	200	0	0	8	20	0	0	0	0	0	16.4	71	0	90.8	7.98
	std dev.	0.22	125.4	119.1	0.17	0.4	15.71	49.0	0.41	0.28	0.38	0.47	0	0	2.35	0	12.2	0.52
	N	161	161	153	161	161	161	161	161	131	160	161	161	161	161	161	161	161
Kazakhstan	mean	0.91	119.3	131.3	0.02	0.25	9.11	57.9	0.29	0.12	0.16	0.11	0	29.9	68.8	0.86	10.4	8.32
	median	1	105	120	0	0	8	34	0	0	0	0	0	29.9	65	0.2	7.3	8.24
	std dev.	0.29	87.4	82.6	0.15	0.43	6.22	61.1	0.46	0.32	0.37	0.31	0	0	5.96	1.21	4.94	0.47
	N	373	373	339	373	372	371	373	373	285	371	373	373	373	373	373	373	373
Hungary	mean	0.9	149.9	166.0	0.03	0.35	14.3	48.5	0.12	0.04	0.35	0.1	0	11.4	69	6.32	78.9	9.24
	median	1	150	150	0	0	12	24	0	0	0	0	0	11.4	61	7	82.6	9.3
	std dev.	0.3	89.51	78.7	0.18	0.48	16.3	57.6	0.32	0.18	0.48	0.3	0	0	15.4	1.21	7.35	0.22
	N	413	413	373	411	413	413	413	413	284	413	413	413	413	413	413	413	413
Moldova	mean	0.9	126.6	141.3	0.03	0.17	11.3	51.6	0.19	0.09	0.07	0.23	0	0	62.1	16.9	29.5	.
	median	1	140	150	0	0	9	29	0	0	0	0	0	0	65	17.6	33.6	.
	std dev.	0.31	60.7	45.03	0.17	0.37	9.37	59.5	0.4	0.29	0.26	0.42	0	0	11.8	2.85	9.54	.
	N	269	269	241	265	269	269	269	269	169	268	269	269	269	269	269	269	0
Albania	mean	0.89	137.9	154.8	0.06	0.15	9.35	34.2	0.31	0.03	0.26	0.12	8.3	0	82.1	3.15	93.4	7.94
	median	1	140	150	0	0	9	20	0	0	0	0	8.3	0	84	0	94.2	8.13
	std dev.	0.31	74.8	60.53	0.24	0.35	5.09	40.8	0.47	0.18	0.44	0.32	0	0	5.48	3.67	0.86	0.29
	N	248	248	221	120	246	248	248	248	208	244	248	248	248	248	248	248	248
Romania	mean	0.88	128.7	145.9	0.02	0.19	12.7	62.2	0.02	0.02	0.3	0.1	13	33.3	64.3	7.15	68.5	8.52
	median	1	120	130	0	0	11	33	0	0	0	0	13	33.3	64.5	7	59.2	8.43
	std dev.	0.32	92.3	84.54	0.14	0.39	9.56	65.8	0.14	0.13	0.46	0.3	0	0	0.97	0.66	12.2	0.4
	N	432	432	381	428	428	429	432	430	307	423	432	432	432	432	432	432	432
FYROM	mean	0.88	143.8	163.3	0.06	0.23	15.5	49.1	0.2	0.01	0.28	0.32	39.4	0	77.0	1.5	80.7	8.22
	median	1	125	167.5	0	0	13	27	0	0	0	0	39.4	0	77	1.4	93.3	8.42

Table 2.E continued

	std dev.	0.32	102.6	93.67	0.23	0.42	13.2	52.9	0.4	0.08	0.45	0.47	0	0	1.07	0.18	20.0	0.33
	N	193	193	170	191	193	191	193	193	158	193	193	193	193	193	193	193	193
Belarus	mean	0.86	109.1	126.9	0.05	0.24	14.8	60.5	0.25	0.16	0.11	0.11	33.5	0	83.2	74.6	28.2	8.04
	median	1	120	130	0	0	10	36.5	0	0	0	0	33.5	0	79.3	75.2	20	8.04
	std dev.	0.35	65.7	52.6	0.22	0.43	14.3	62.2	0.43	0.37	0.31	0.31	0	0	6.75	3.08	15.3	0.57
	N	236	236	203	234	236	233	236	236	140	234	236	236	236	236	236	236	236
Kyrgyz	mean	0.85	139.6	163.8	0.07	0.31	14.6	52.8	0.3	0.14	0.16	0.26	0	11.9	86.7	4.55	72.3	6.21
	median	1	140	150	0	0	9	31	0	0	0	0	0	11.9	86	4.8	73.6	6.17
	std dev.	0.36	100.1	88.11	0.26	0.46	14.39	61.5	0.46	0.35	0.36	0.44	0	0	8.17	0.34	1.69	0.36
	N	115	115	98	115	113	115	115	115	70	115	115	115	115	115	86	86	115
Montenegro	mean	0.85	162.4	191.7	0.17	0.19	13.0	41.5	0.58	0.13	0.17	0.24	26.2	1.69	.	2.23	82.0	8.58
	median	1	120	150	0	0	10	21	1	0	0	0	26.7	0	.	0	87.1	8.74
	std dev.	0.36	160.7	157.6	0.38	0.39	11.8	53.7	0.5	0.34	0.38	0.43	3.47	13.0	.	5.5	15.9	0.36
	N	59	59	50	58	59	58	59	59	54	58	59	59	59	0	59	59	59
Azerbaijan	mean	0.84	103.7	123.4	0.03	0.08	15.8	48.6	0.45	0	0.19	0.36	7	0	70.8	49.4	7.82	7.82
	median	1	100	100	0	0	10.5	23	0	0	0	0	7	0	69	43.4	9.3	8.54
	std dev.	0.37	62.7	47.1	0.17	0.27	15.4	55.4	0.5	0	0.39	0.48	0	0	4.48	6.12	1.54	0.77
	N	75	75	63	66	75	74	75	75	52	74	75	75	75	75	75	75	75
Russia	mean	0.83	114.5	138.6	0.04	0.41	13.5	70.8	0.17	0.06	0.17	0.3	0	14.4	18.65	39.2	12.8	8.6
	median	1	110	130	0	0	9	47	0	0	0	0	0	14.4	18	39.2	8.3	8.58
	std dev.	0.38	85.7	74.5	0.2	0.49	17	69.3	0.37	0.24	0.38	0.46	0	0	9.01	0	5.17	0.53
	N	541	541	447	540	537	540	541	541	355	533	541	541	541	541	252	541	541
Ukraine	mean	0.83	139.9	169.3	0.02	0.27	13.9	56.6	0.26	0.12	0.13	0.22	0	10.1	41.9	9.86	29.74	7.64
	median	1	145	170	0	0	9	30	0	0	0	0	0	10.1	41	9.4	21.3	7.52
	std dev.	0.38	101.1	86.0	0.15	0.45	15.1	62.5	0.44	0.33	0.34	0.41	0	0	6.65	1.29	15.7	0.53
	N	420	420	347	419	420	413	420	417	285	419	420	420	420	420	420	420	420
Croatia	mean	0.82	106.3	130.3	0.1	0.21	17.7	46.6	0.38	0.07	0.26	0.05	0	81.2	59.1	4.25	90.7	9.36
	median	1	100	100	0	0	14	22	0	0	0	0	0	81.2	58	4.7	90.4	9.49
	std dev.	0.39	92.5	85.7	0.3	0.41	16.2	55.7	0.49	0.26	0.44	0.21	0	0	2.41	0.64	0.41	0.25

Table 2.E continued

	N	499	499	407	178	498	499	499	499	413	493	499	499	499	499	499	499	499
Bulgaria	mean	0.81	118.1	145.1	0.01	0.23	12.4	51.5	0.21	0.06	0.31	0.13	37	13.1	55.97	2.09	81.4	8.53
	median	1	130	140	0	0	11	29	0	0	0	0	37	13.1	52	2.1	82.3	8.62
	std dev.	0.39	78.9	61.1	0.12	0.42	9.49	54.9	0.41	0.23	0.46	0.34	0	0	16.24	0.18	2.77	0.26
	N	506	506	412	150	506	503	506	506	459	504	506	506	506	506	506	506	506
Estonia	mean	0.8	101.5	126.2	0.02	0.51	14.9	54.5	0.06	0	0.23	0.29	0	22.4	92.16	0	98.6	9.25
	median	1	100	120	0	1	12	24	0	0	0	0	0	22.4	87	0	98.3	9.51
	std dev.	0.4	79.66	69.01	0.12	0.5	17.2	60.6	0.24	0	0.42	0.45	0	0	5.32	0	0.55	0.35
	N	199	199	160	197	198	199	199	199	137	199	199	199	199	199	199	199	199
Czech	mean	0.8	99.3	124.8	0.18	0.5	12.1	49.3	0.28	0.07	0.3	0.16	4.9	73.2	73.8	.	.	9.44
Republic	median	1	100	100	0	0.5	11	25	0	0	0	0	4.9	73.2	63	.	.	9.41
	std dev.	0.4	91.8	86.1	0.38	0.5	8.65	59.3	0.45	0.26	0.46	0.36	0	0	14.8	.	.	0.41
	N	250	250	199	243	250	247	250	250	157	250	250	250	250	250	0	0	250
Latvia	mean	0.79	102.87	129.9	0.04	0.42	13.0	61	0.15	0.07	0.19	0.35	57.2	0	50.7	11.6	62.6	9.02
	median	1	100	100	0	0	11	21	0	0	0	0	57.2	0	47	17.1	69.3	9.34
	std dev.	0.41	103.4	99.9	0.21	0.5	12.3	68.6	0.36	0.26	0.39	0.48	0	0	4.39	6.42	8.35	0.42
	N	178	178	141	178	178	177	178	178	134	177	178	178	178	178	178	178	178
Armenia	mean	0.79	119.3	151.8	0.04	0.11	12.4	34.7	0.43	0.03	0.15	0.38	16.9	38.3	59.9	0	55.2	7.48
	median	1	130	150	0	0	8	17	0	0	0	0	16.9	38.3	68	0	48.7	7.32
	std dev.	0.41	99.4	87.3	0.19	0.31	13	44.6	0.5	0.16	0.36	0.49	0	0	14.6	0	7.09	0.37
	N	243	243	191	243	243	243	243	243	218	243	243	243	243	243	243	243	243
Lithuania	mean	0.78	104.1	132.8	0.05	0.39	13.5	60.1	0.2	0.07	0.2	0.19	20	67.8	79.9	0	91.4	9
	median	1	100	100	0	0	11	32.5	0	0	0	0	20	67.8	80.5	0	91.5	9.13
	std dev.	0.41	122.5	123.9	0.22	0.49	12.2	61.9	0.4	0.26	0.4	0.4	0	0	1.31	0	0.32	0.38
	N	232	232	182	232	232	232	232	232	168	228	232	232	232	232	232	232	232
Uzbekistan	mean	0.78	97.7	124.6	0.07	0.05	15.6	57.1	0.29	0.12	0.09	0.19	4.5	3.3	85.5	67.6	4.4	6.29
	median	1	120	120	0	0	9	38.5	0	0	0	0	4.5	3.3	83	67.6	4.4	6.34
	std dev.	0.41	61.2	37.5	0.25	0.22	17.2	59.7	0.46	0.32	0.29	0.39	0	0	5.83	0	0	0.43
	N	162	162	127	162	161	162	162	162	78	162	162	162	162	162	59	59	162

Table 2.E continued

Bosnia	mean	0.78	135.1	172.8	0.09	0.23	18.25	55.2	0.37	0.1	0.27	0.34	30.2	47.2	71.9	2.29	90.8	8.17
	median	1	112	150	0	0	12	31	0	0	0	0	30.2	47.2	50	3.6	90.9	8.05
	std dev.	0.41	110.5	95.4	0.29	0.42	17.8	61.2	0.48	0.3	0.44	0.47	0	0	22.9	1.49	5.07	0.44
	N	275	275	215	267	273	273	275	275	199	275	275	275	275	275	275	275	275
Slovakia	mean	0.77	105.1	136.1	0.17	0.4	12.3	49.8	0.2	0.07	0.26	0.09	2.2	44.5	78.4	1.06	94.8	9.38
	median	1	100	120	0	0	11	21.5	0	0	0	0	2.2	44.5	81	1.1	96.7	9.35
	std dev.	0.42	85.2	72.0	0.37	0.49	9.45	57.0	0.4	0.26	0.44	0.29	0	0	5.98	0.15	2.72	0.34
	N	176	176	136	174	176	176	176	176	124	176	176	176	176	176	176	176	176
Tajikistan	mean	0.75	110.4	146.8	0.09	0.12	11.6	46.6	0.27	0.06	0.14	0.22	0	0	.	10.9	7.59	6.16
	median	1	120	150	0	0	6	26	0	0	0	0	0	0	·	9.7	8.9	6.68
	std dev.	0.43	90.4	74.13	0.29	0.32	12.7	54.0	0.45	0.24	0.35	0.42	0	0	·	1.26	1.36	0.59
	N	137	137	103	137	137	135	137	137	102	137	137	137	137	0	66	66	137
Poland	mean	0.73	105.8	144.8	0.02	0.28	17.2	45.9	0.39	0.14	0.17	0.04	0	91.7	64.2	21.7	73.0	8.92
	median	1	120	130	0	0	13	20	0	0	0	0	0	91.7	55	21.5	74.3	8.98
	std dev.	0.44	84.51	64.2	0.15	0.45	15.8	59.1	0.49	0.35	0.38	0.19	0	0	13.0	0.22	1.35	0.27
	N	587	587	429	586	587	586	587	587	345	585	587	587	587	587	587	587	587
Serbia	mean	0.72	112.5	155.8	0.09	0.34	19.6	59.0	0.35	0.06	0.2	0.29	0	100	·	23.8	58.6	8.39
	median	1	100	120	0	0	13	32.5	0	0	0	0	0	100	·	23.9	66	8.68
	std dev.	0.45	105.1	92.4	0.29	0.47	19.6	63.1	0.48	0.23	0.4	0.45	0	0	·	0.22	12.5	0.37
	N	270	270	195	266	270	269	270	270	215	267	270	270	270	0	114	114	270
Slovenia	mean	0.55	71.4	130.5	0.13	0.28	17.0	35.6	0.2	0.03	0.27	0.18	2.7	0	60.7	14.2	24.9	9.79
	median	1	50	100	0	0	13	14	0	0	0	0	2.7	0	56	12.6	22.6	9.81
	std dev.	0.5	88.9	82.1	0.33	0.45	16.7	47.6	0.4	0.17	0.44	0.39	0	0	9.25	2.19	4.18	0.34
	N	309	309	169	306	309	309	309	309	199	309	309	309	309	309	309	309	309
Turkey	mean	0.53	61.7	115.6	0.06	0.11	16.2	39.8	0.05	0.01	0.45	0.35	18.3	42.2	70.7	31.9	11.3	9.05
	median	1	20	100	0	0	14	20	0	0	0	0	18.3	42.2	96	33.1	6.3	8.87
	std dev.	0.5	112.1	131.6	0.24	0.31	10.7	49.1	0.21	0.1	0.5	0.48	0	0	27.0	1.3	5.34	0.19
	N	808	808	431	374	807	805	808	808	766	804	808	808	808	808	808	808	808
Total	mean	0.79	113.7	144.5	0.06	0.26	14.3	51.0	0.23	0.06	0.24	0.2	10.7	33.2	64	13.9	54.7	8.55

Table 2.E continued

median	1	100	130	0	0	11	26	0	0	0	0	2.7	22.4	64	7	63.6	8.69
std dev.	0.41	97.5	87.3	0.23	0.44	13.9	58.7	0.42	0.24	0.43	0.4	14.3	31.2	20.92	17.02	33.3	0.88
N	8365	8365	6582	7073	8346	8329	8365	8360	6211	8313	8365	8365	8365	7900	7467	7756	8096

Notes: Countries are ranked in descending order according to the mean value of *COLL1*.

Table 2.F Pairwise correlation coefficients

	COLL1	*COLL2*	*COLL3*	*OVERDUE*	*CRIME*	*AGE*	*SIZE*	*SOLE OWN*	*FEMALE OWN*	*QUALITY*	*CITY*	*PUBREG*	*PRVTBR*	*CR*	*STATE*	*FOREIGN*
OVERDUE	0.01	-0.02	-0.03	1												
CRIME	0.07	0.03	-0.01	0.06	1											
AGE	-0.02	0.01	0.02	0.08	0.02	1										
SIZE	0.08	0.01	-0.05	0.02	0.10	0.27	1									
SOLE OWN	-0.01	0.01	0.02	-0.01	-0.03	-0.11	-0.21	1								
FEMALE OWN	-0.01	0.01	0.02	-0.02	-0.01	-0.06	-0.10	0.46	1							
QUALITY	-0.02	-0.04	-0.03	0.02	0.00	0.09	0.21	-0.14	-0.08	1						
CITY	-0.05	-0.07	-0.05	-0.02	0.01	0.04	0.08	-0.13	-0.07	0.09	1					
PUBREG	-0.03	-0.02	-0.01	0.00	-0.04	-0.01	0.00	-0.05	-0.03	0.06	0.12	1				
PRVTBR	-0.07	-0.06	-0.03	0.03	0.04	0.10	-0.01	0.10	0.03	0.03	-0.03	-0.25	1			
CR	-0.05	-0.02	0.02	0.03	-0.04	0.01	-0.08	-0.02	-0.03	0.10	-0.16	0.11	0.09	1		
STATE	-0.09	-0.12	-0.09	-0.01	-0.04	0.05	0.03	-0.06	-0.01	0.00	0.07	0.07	-0.06	-0.03	1	
FOREIGN	0.11	0.11	0.06	0.00	0.05	0.03	0.00	0.05	0.01	0.02	-0.04	0.15	0.29	0.25	-0.56	1
LNGDPPC	-0.07	-0.11	-0.09	0.01	0.08	0.08	0.02	-0.13	-0.07	0.14	0.11	-0.01	0.33	-0.06	-0.02	0.20

Figure 2.A Percentage of collateral to the loan value (*COLL3*) by countries

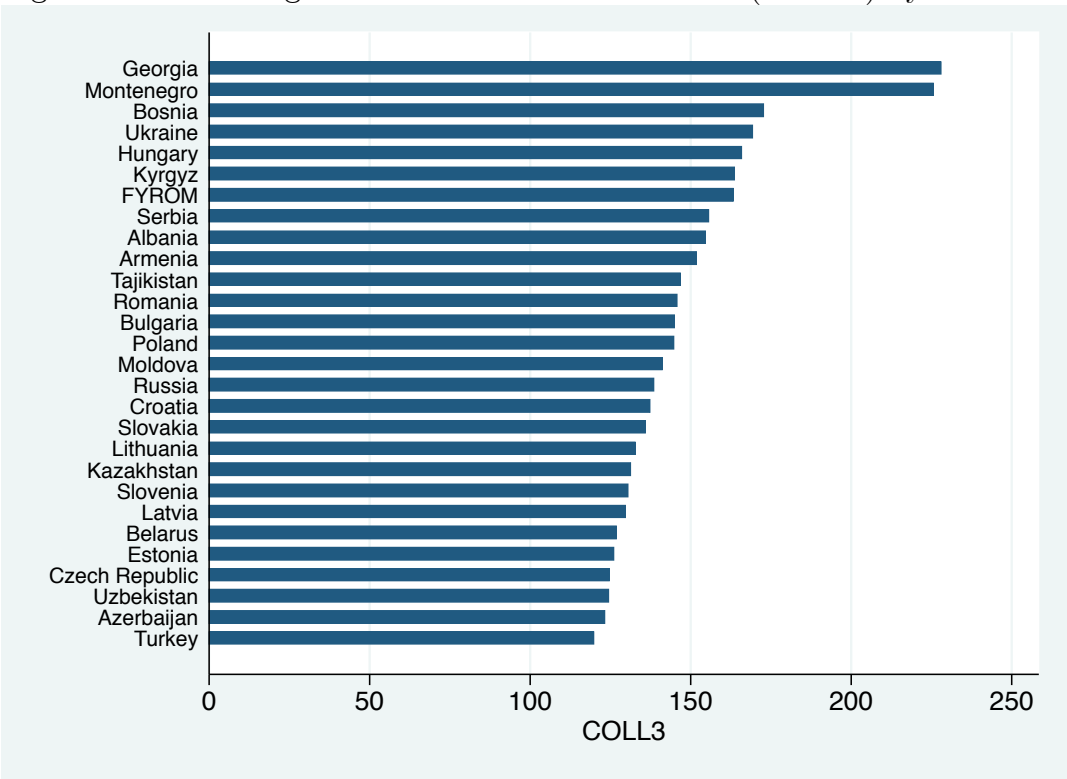
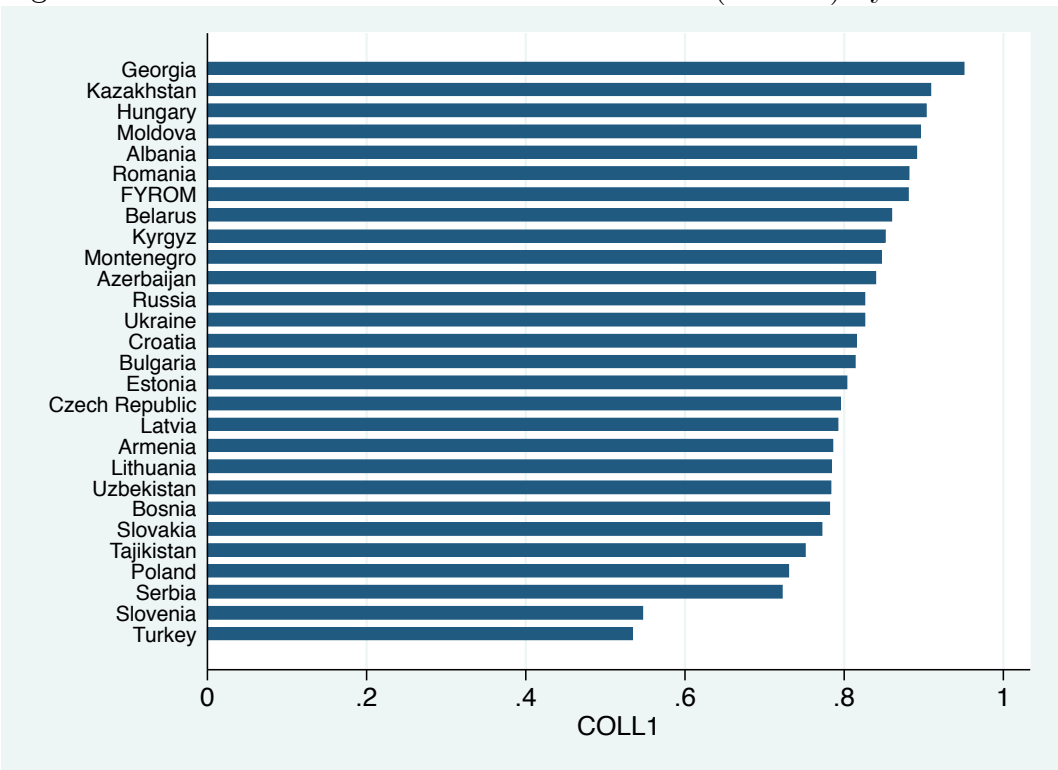


Figure 2.B Presence of collateral in loan contracts (*COLL1*) by countries



Chapter 3

Why Do SMEs Use Informal Credit?[34]

3.1 Introduction

Informal finance refers to financial transactions that occur outside official financial institutions. These transactions are not regulated by governmental authorities. Note 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, such as moneylender activities in many countries[35]. 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.

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; Mantilla, 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 and Beck, 2008). The informal finance 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

[34] This paper is co-authored with Yener Altunbas and Flavio Bazzana. An earlier version of this paper was presented at 61th Midwest Finance Association Meeting in New Orleans, USA and at 4th Economic Development International Conference of the GRETHA-GRES in Bordeaux, France.

[35] See Pagura and Kirsten (2006) for a discussion on the definition of informal financial organisations and Table 3.A in the appendix for a detailed picture.

broader sense, to credit constraint phenomena[36]. Many studies consider informal credit as a last resort for credit-constrained borrowers (Bell, 1990; Ghosh et al., 2000). Accordingly, credit markets are segmented into two parts, a formal and an informal part, with the informal creditors mostly serving a residual class of borrowers.

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, 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

[36] Even though many studies do not distinguish between credit-rationed 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 that do not apply for credit expecting that the application will be rejected, and borrowers without sufficient collateral to pledge are also credit-constrained borrowers. 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.

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[37]. 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 transactions in China and India.

Because there is no formal registration of transactions in informal financial transactions, it is difficult to obtain data on the real size of 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

[37] 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).

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[38]. 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 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[39]. 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 transactions[40].

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[38] 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.

[39] 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.

[40] 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 main purpose of this paper is to understand why SMEs choose to finance their working capital and fixed asset investments via informal credit. Therefore, we examine both country- and firm-level determinants (*e.g.*, the financial development level and size of a country, gender of the owners, and location of firms) of the informal credit use of SMEs. Our primary data sources are the Business Environment and Enterprise Performance Surveys (BEEPS). We use the 2005 version of these surveys as our main dataset 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 2002-2009 sets of BEEPS. To our knowledge, this is one of the largest data set used in the informal credit literature.

The rest of this study is organised as follows. The second section explains the methodology and describes the empirical model. Data are presented in the third section. After the presentation of the empirical results in the fourth section, the final section provides concluding remarks.

3.2 Hypotheses and literature

H1 *Informal credit is mostly used by credit-constrained SMEs.*

Informal credit is seen as financing of last resort for borrowers, in many studies (Bell, 1990; Petersen and Rajan, 1995; Biais and Gollier, 1997; Ghosh et al., 2000). That is to say borrowers who are not found creditworthy in formal credit markets apply for credit from informal creditors[41]. *"Power of the lenders"* is addressed as the main argument in explaining credit rationing phenomenon in loan markets—as formalized by Townsend (1979), (Hart and Moore, 1994)—[42]. According to these theories, lenders prefer the borrowers that they can exercise their power on (Djankov et al., 2007). Stiglitz and Weiss (1981), on the other side, explain the existence of credit rationing by the unique interest rate that maximize the

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the importance of social networks in the lending decisions of informal creditors.

[41] Bolnick (1992), Aliber (2002), Mati and Sen (2009) show that informal creditors can exploit borrowers via high interest rates.

[42] Power of the lenders on borrowers is expressed as the ability of collecting back the debts easily, charging higher interest rates, and requiring higher fees/collaterals etc...

expected return from a loan. Rather than the power of the lender, the important point in lending decisions of banks is the information on risk level of the borrower. Higher interest rates signal higher default risk, and accordingly they lessen the expected return. In this case even some borrowers are ready to pay higher interest rates, they won't get the loan amount they required, because they are evaluated as risky borrowers by the bank, they are credit rationed. It is likely for these credit-rationed borrowers to look for credit if there exists another market segment, *i.e.* informal credit markets. Accordingly credit markets are segmented into two parts: formal and informal, where the informal credit mostly serves to the credit constrained firms.

Park et al. (2003) estimate the effect of competition between informal[43] and formal financial organizations [44] on the performance indicators—measured by deposit growth, loan composition, loan repayment, and bank effort indicators—of formal financial organizations. They find that competition separates the market in which formal financial organizations keep the best customers and leave the secondary market (most household loans) to informal ones.

Kochar (1997), on the other hand, considers formal and informal markets as weak substitutes, and argues that informal financial markets do not stem from credit rationing. Instead, low demand for formal finance is considered as the source of informal finance by Kochar (1997), informal financial markets are indeed a first best choice for borrowers in rural markets where lack of infrastructure.

H2 *SMEs with female owners use informal credit more intensively as compared to SMEs with male owners.*

Previous literature shows that gender matters for participation in the informal finance. Many studies find that women participate in informal finance more than men, especially on the savings side(Baydas et al., 1995; Carter and Rosa, 1998; Tsai, 2004). Tsai (2004), attributes this to the better developed social networks of women with one another. In household level Baydas et al. (1995), Carter and Rosa

[43] Namely Rural Cooperative Foundations (RCF).

[44] Namely Rural Credit Cooperatives (RCC).

(1998), Marlow and Patton (2005) attributes this result to the lower education levels of women, which make formal financial contracts difficult to understand while some studies argue that female entrepreneurs' are subject to a higher credit rationing in formal credit markets. Carter and Rosa (1998) finds that female entrepreneurs' relationships with bankers are weaker compared to men because of sexual stereotyping and discrimination. There is also a vast body of literature that address higher degree of risk aversion of women compared with men (Croson and Gneezy, 2009). Accordingly women can be considered to be less likely to apply for bank credit and refrain from risky borrowings due to their preferences. On the other hand previous evidence show that women entrepreneurs are better borrowers than men in terms of lower default rates (D'Espallier et al., 2011). This result is mostly attributed to women's difficulty in accessing credit, which reduces their risk of moral hazard.

H3 *SMEs located in smaller cities rely more on informal credit compared to SMEs in bigger cities*

Some studies highlight the importance of location of borrowers on informal credit choice (Guirkinger, 2008; Gine, 2010). Using survey data on Thai householders in rural areas, Gine (2010) shows that the existence of transaction (for the borrowers) and enforcement costs (for the bank) promotes informal financial transactions in rural areas. Gine (2010) shows that banks are less willing to lend to borrowers whose creditworthiness is difficult to evaluate in rural areas and banks have limited ability to enforce contracts, when compared to informal lenders which makes banks reluctant to lend people in rural areas. Moreover the fixed transaction costs of borrowing can be another explanation for the higher informal credit usage in rural areas, especially when the needed amount of credit is small. In case of borrowing from formal sources, the average fixed cost will be smaller as the loan amount increases. Since the formal credit providers located generally in bigger towns, transaction costs are higher for the borrowers those are located in rural areas, moreover the enforcement costs are higher for the banks in case of lending to borrowers in rural areas.

Based on a household survey in Peru, Guirkinger (2008) provides evidence on that more geographically and socially distant formal lenders rely on hard information, and apply harsh punishment rules in case of a default. Bolnick (1992) and Liu and Spanjers (2009) argue that lenders grant credit according to their social ties in informal financial transactions. This argument is likely to be prevalent in rural areas where social ties are strong and borrowers are more immobile. Azam et al. (2001) argues that informal credit is easier to obtain compared to with lower interest rates due to altruism concerns. This makes informal credit the first best choice of firms in Azam et al.'s (2001) model. Borrowers who lacks of necessary social ties to get informal credit, apply for formal credit.

Turvey and Kong (2010) examine the effect of trust and other factors on informal credits. They show that informal lending in China largely depends on the sense of community trust. Azam et al. (2001) also addresses the importance of social networks in informal credit decisions. Azam et al. (2001) shows that difficulty of having access to formal sector funds is a most important factor in determining the informal credit demands of firms in Africa and refers informal finance as a tool to reduce moral hazard problems and alleviate credit constraints. Azam et al. (2001) also show that rate of return required by the lenders is lower in informal credit market than in the formal market. This is attributed to the better monitoring performance of informal lenders.

Based on a survey of medium, small, and micro enterprises in Sofia (Bulgaria), Tardieu (2007) finds similar results that of Safavian and Wimpey (2007) and Straub (2005), networks are important for the firms that largely rely on informal credit. Tardieu (2007) also underlines that the lending decisions of formal sources of credit (banks) rely mostly on hard information (financial accounts, business plans, etc.) and these formal creditors mostly prefer to give credits to bigger firms that are also more transparent. Some SMEs only have soft information about their businesses such as informal business plans. This kind of firms with higher degree of informality within business transactions and reports, are more likely to choose

informal sources of credit such as family, friends, acquaintances... Using firm survey data, Zhang (2008) examines the choice of formal or informal finance via the socio-economic indicators. The results indicate the importance of relationships on financing decisions of the firms in China.

H4 *Intensity of informal credit usage of SMEs is negatively associated with the financial development level in their countries*

Using the historical records of banks and courts in Plymouth, US between 1803—1850, Wang (2008) shows that when there was only one bank in the county only richest people were the borrowers. As another bank began to operate, farmers left their informal lenders and their share on total credit volume increased, that is to say, an increase in bank competition leads to poor to rely more on formal bank credit. Accordingly, as the competition in formal banking system increases, a decrease in informal credit demands of firms is expected. Therefore bank competition, as being one of the indicators of financial development, is an important factor in determining the existence and persistence of informal finance in a country (Madestam, 2008; Park et al., 2003). Madestam (2008) explains the effect of bank competition on informal finance and shows that if formal banks operate in a competitive environment, borrowers use banks and moneylenders to get credit[45]. As competition in banking increases, banks will be more efficient, the amount of loanable funds will increase and the interest rates will go down. Moreover the enterprises that are not found creditworthy previously both by banks and moneylenders may be eligible for credit in such a competitive

[45] In his model, moneylenders are also borrowers from banks, in addition to the firm and household borrowers. He shows that if formal banks operate in a non-competitive environment, moneylenders are the only source of credit for the poor. He argues that moneylenders have better monitoring ability compared to banks. In his model, banks' having unlimited funds and informal lenders often lack the needed capital. Together with their own capital, moneylenders are able to access to bank credit with lower costs than their customers and give this money to their customers as loan with a higher spread. In this case the agency cost of banks can be reduced since moneylender is assumed to monitor the borrower more efficiently than the bank. The result of the model yields higher interest rates and lower borrower welfare in case of informal borrowing. In addition to this, informal credit market increases poor people's access to credit. This market segmentation deepens as the competition in formal banking decreases, where the segmented outcome is preferred both by wealthier moneylenders and banks.

environment. There are two channels for these people to get credit: first—and less likely—, they can get credit from the banks directly; second they can get credit form a new moneylender who borrows from the bank. Accordingly, if formal banks operate in a non-competitive environment, moneylenders are the only source of credit for borrowers. This hypothesis is a result of Stiglitz and Weiss's (1981) credit rationing theory, since it implicitly assumes that borrowers may use informal credit when they are excluded by the formal financial system. However, due to transparency concerns, this hypothesis will possibly not be valid for informal or illegal firms even if banks charge lower interest rates on loans.

There are two different views in the literature regarding the role of bank concentration on firm finance: market power and information hypotheses. Market power hypothesis argues that concentration in banking sector is detrimental for credit availability. Information hypothesis, on the other hand, argues that firms built better relationships in concentrated banking environments, which results in higher credit availability. Using firm-level data from 74 countries from the World Business Environment Survey (WBES), Beck et al. (2004) show that firms face higher financing obstacles in countries where the banking systems are less competitive. The results of Beck et al. (2004) indicate a strong relation between bank concentration and higher financing obstacles in economically and institutionally less-developed economies, this relation is insignificant for institutionally, financially, and economically well-developed economies. Using both the Lerner index and concentration measures, Carbo-Valverde et al. (2009) supports both hypotheses by using data on Spanish SMEs. The study shows that the two hypotheses can be reconciled when we controlled for demand elasticity, banking sector contestability and bank investment in information. In particular, bank market power increases firm financing constraints supporting the market power hypothesis together with contestability and information production diminishes this effect supporting the information hypothesis.

H5 *Informal credit usage of SMEs is expected to be higher in countries with lower legal quality.*

After La Porta et al. (1997) a vast literature grew on law, legal origin, institutional quality, finance and economic growth rapidly. Straub (2005) and Madestam (2008) attribute the existence informal financial transactions in developing countries to low quality of institutions like judicial enforcement, corruption, rule of law, and regulatory burden. Similarly Wachtel and Haselmann (2006) show that under low legal quality and bad institutional settings, banks are not eager to lend, and mostly provide loans to less risky borrowers such as governments and bigger firms. In such an environment the existence of informal creditors matters for the credit rationed borrowers.

Moreover Beck et al. (2004) empirically shows that in countries with low levels of economic and institutional development, firms are more likely to have difficulties to access external funds. Using a sample of 3564 enterprises from 29 countries in World Bank Enterprise Survey (WBES) in 2005, Safavian and Wimpey (2007) test the hypothesis whether enterprises may choose to finance their operations entirely from informal sources in order to avoid regulatory burden and examination. Their results address legal environment quality as a key factor that encourages formal lending. Straub (2005) also finds that smaller firms in less stable countries with low legal quality are more likely to prefer informal credit for their financing needs.

3.3 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[46]. 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

[46] See the BEEPS reports at http://www.ebrd.com/pages/research/analysis/surveys/beeps.shtml for detailed information.

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 Kyrgyzstan). 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 12,834 SMEs for the 2005 BEEPS data[47].

This dataset has advantages compared to 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. Moreover, the sample includes both very small and micro firms with only a few employees and firms with up to 9,900 employees, which allows us to make comparisons between SMEs and large firms. Last, the sample provides a direct measure of informal credit use by asking about the finance sources of the firm's working capital and fixed asset investments.

The EBRD also provides a standardised data set of the 2002-2009 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

[47] 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.

information from 27 CEE and CIS countries[48]. In the 2002-2009 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.

3.4 Methodology

The dependent variables of this study (IC) 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*?"[49]. BEEPS provide information on three different types of informal finance: family/friends, moneylenders, and trade credit. Using these different informal credit types, we have 7 dependent variables, as defined in Table 3.1.

Our dependent variables are expressed as fractions of working capital/fixed assets, where $0 \leq IC \leq 1$. 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 generalised linear model (GLM) with a logit link and the binomial family, as suggested by Papke and Wooldridge (1996) which is also suitable for dependent variables that contain a

[48] The CEE and CIS countries included in this pooled 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 6153, 10421, 1952, 3375, and 7815 firms surveyed, respectively.

[49] 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%.

large number of zeroes. This model is applicable for dependent variables in the interval [0,1] and assumes that $E(IC|X) = G(X\beta)$, where $G(\bullet)$ is a known non-linear function that satisfies the following constraint: $0 < G(\bullet) < 1$. Typically, $G(\bullet)$ 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 distribution for IC conditional on X, Papke and Wooldridge (1996) show that it is more efficient to estimate β by maximising the following Bernoulli log-likelihood, $L(\beta) = ic \log[G(X\beta)] + (1 - ic) \log[1 - G(X\beta)]$. We model our firm-level dependent variables as functions of firm- and country-level variables. Table 3.1 presents definitions and data sources of the variables used in the regressions.

Table 3.1 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
IC3_FA	Percentage of fixed asset investments financed by trade credit from suppliers and customers over the previous 12 months.	BEEPS
IC3_WC	Percentage of working capital purchases financed by trade credit over the previous 12 months.	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
Firm-level independent variables		
FINCONST	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

Table 3.1 continued

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 (%).	Bankscope
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

In order to test our first hypothesis, BEEPS provide a direct measure of financial constraints 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 (*FINCONST*). 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— more than men (Tsai, 2004; Estrin and Mickiewicz, 2009). 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; Carter and Rosa, 1998; Marlow and Patton, 2005).

In order to test the second hypothesis an ordinal variable (*CITY*) is employed. This variable ranges from 1 to 4. *CITY* becomes 4 if the firm is located in Capital and/or in a city which has a population of over 1 million, 3 if the firm is located in a city that has a population between 250,000-1,000,000, 2 if the firm is located in a city that has a population between 50,000-250,000, and 1 if the firm is located in a city/town that has population under 50,000. This variable enables us to test for potential differences in financing opportunities available in larger versus smaller towns. 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; Gine, 2010). 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.

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. Three measures of financial development[50] are employed in this study: value of the total shares traded on the stock exchange market to GDP, expressed in percentage (*STTRADED*). This variable is an approximation for the equity market development level. The concentration in banking sector (*CR*) is employed as an inverse measure of financial development in banking sector. 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.

In order to test for the final hypothesis for the effect of legal quality, again a country-specific variable is used. *TIME* is the "Average number of years from the

[50] Source: Beck et al. (2010).

filing for insolvency in court until the resolution of distressed assets"[51]. Since this variable approximates for inefficiency of legal system, we expect a positive association with the dependent variables.

We use four control variables: First the firm size (*SIZE*) is included as a control variable in the regressions. This variable is expressed as the number of full-time employees. Smaller businesses are less likely to have appropriate information (*e.g.* financial statements, business records) when applying for formal credit *i.e.* they are more likely to face financing difficulties in formal markets. Accordingly small firms are expected to be more likely to finance their investments via informal credits due to financial constraints (Tardieu, 2007; Safavian and Wimpey, 2007; Zhang, 2008). Second we use the number of years *(AGE)* that the SME has been operating. This variable is constructed by subtracting the self-reported year that the firm began its operations from the year that the survey is conducted. 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 by the time, it gains reputation. It becomes easier to monitor such a firm for the formal banks. Moreover, these kind of older firms are more likely to be able to provide collateral in order to obtain formal credit. Since it is much difficult to get formal external credit for younger firms, and they mostly rely on internal finance and informal credit (Berger and Udell, 1998). In line with these predictions, Huck et al. (1999) and Zhang (2008) address business experience and age of the firm as an important determinant of informal credit usage of firms. So we expect higher levels of informal credit usage for the younger firms as compared to older firms. Third, we use a dummy variable *(OVERDUE),* which becomes one if the SME reported that it had any utility payments overdue (by more than 90 days) in previous year, zero otherwise. This variable stands here as a proxy for financial distress and we expect higher informal credit use by SMEs that have utility arrears. Finally we use an ordinal variable *(MACRO)* that reflect the SME's perception about how the macroeconomic environment affects the SMEs

[51] Source: World Bank www.doingbusiness.org

operations. This variable becomes 1 if the firm reported that macroeconomic instability (inflation, exchange rate) is "no obstacle" for the operation and growth of the firm, 2 if "minor obstacle", 3 if "moderate obstacle" and 4 if "major obstacle". In instable macroeconomic environments, formal lenders are less willing to lend, in these environments personal relationships and networks gain much more importance people may lend only to people whom they know previously. So, we expect higher informal credit usage of SMEs, in environments where macroeconomic instability is problematic for businesses.

3.5 Results and discussion

3.5.1 Descriptive statistics

Table 3.2 provides the summary statistics of the variables used in the empirical part of the study. According to this table, an average of 9.6% of the working capital (IC_WC) and 5.4% of fixed assets (IC_FA) are financed via informal sources. This information reveals that SMEs use informal credit to meet their smaller financing needs. These numbers may be seen quite marginal, as they are smaller in magnitude. If we calculate the share of each informal credit source in external financing we reach higher values as reported in Table 3.B in the appendix. To give an insight on the importance of informal credit we see that nearly 25% of the working capital expenses that are financed via external sources are trade credit. More importantly, this table reveals that the informal loans account nearly for the 40% of the total loans that are used to finance working capital expenses, while 23% of the total loans that are used to finance fixed asset purchases are informal loans. These numbers reveal that informal credit is an important source of external finance for the SMEs.

We define ICD as a 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. The mean value of ICD shows that 27% of the SMEs in our sample used informal sources to finance a part of their working capital and/or fixed asset purchases. Table 3.2 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 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.

Table 3.2 Summary statistics for the 2005 BEEPS

Variable	Mean	Std. Dev.	Min	Max	N
IC_FA	5.403	17.907	0	100	9304
IC_WC	9.589	22.363	0	100	12564
ICP	7.476	17.415	0	100	9250
ICD	0.272	0.445	0	1	9250
IC1_FA	2.527	12.304	0	100	9304
IC1_WC	2.808	12.277	0	100	12568
IC2_FA	0.571	5.478	0	100	9304
IC2_WC	0.694	5.737	0	100	12564
IC3_FA	2.305	11.538	0	100	9304
IC3_WC	6.086	17.852	0	100	12564
FINCONST	2.207	1.124	1	4	12319
FEMALE	0.281	0.450	0	1	9962
CITY	2.531	1.231	1	4	12834
STTRADED	29.099	42.114	0.023	152.001	28
CR	63.866	16.786	18.484	98.333	32
PRVTCRE	57.864	43.198	6.915	142.109	27
TIME	2.786	1.527	0.400	9.200	34
SIZE	32.204	48.796	2	250	12833
AGE	14.763	14.974	4	200	12824
OVERDUE	0.027	0.161	0	1	12700
MACRO	2.418	1.145	1	4	12462

Notes: This table includes 3 additional variables: *IC_FA* is the percentage of fixed asset investments financed by informal credit over the previous 12 months (*IC_FA=IC1_FA+IC2_FA+IC3_FA*), *IC_WC* is the percentage of working capital purchases financed by informal credit over the previous 12 months (*IC_WC=IC1_WC+IC2_WC+IC3_WC*), and *ICD* is a 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. However, we did not perform regressions on these potential dependent variables to keep the length of the chapter reasonable. N is the number of observations.

Tables 3.3 and 3.4 present the summary statistics of various types of informal credit by country groups. These tables reveal no major differences between the

country groups with respect to mean values of informal credit use by SMEs, especially as measured by *ICP* and *ICD*. However, we observe larger differences, as expected, in the types of informal credits; *i.e.*, SMEs in countries with advanced economies rarely use credit from family/friends and moneylenders compared with other countries. However, these SMEs in advanced economies use informal finance in the form of trade credits from suppliers and customers. In advanced economies, 8.16% of the working capital and 3.09% of the fixed asset purchases are financed by trade credits. These percentages are the highest among the country groups.

Among the three country groups, the CIS countries have the highest average of informal finance from moneylenders, family and friends. Among these countries, only three are upper middle-income countries, namely, Belarus, Russia, and Kazakhstan, whereas the rest are lower middle- and low-income countries according to the IMF World Economic Outlook definition[52]. Not surprisingly, the percentage of working capital financed by family/friends and moneylenders is the highest for the low-income developing Asian country, Vietnam. However, the average values of the percentage of fixed assets financed by family/friends and moneylenders are slightly higher in CIS countries than in Vietnam.

[52] Tajikistan, Uzbekistan, and Kyrgyzstan are the low-income CIS countries, while Georgia, Ukraine, Azerbaijan, and Armenia are the lower middle-income countries.

Table 3.3 Summary statistics for informal credit use by SMEs across country groups

Country gr.	Statistics	*icp*	*icd*	*ic_wc*	*ic1_wc*	*ic2_wc*	*ic3_wc*	*ic_fa*	*ic1_fa*	*ic2_fa*	*ic3_fa*
	Mean	7.23	0.24	7.75	2.88	0.89	3.97	6.27	3.65	0.98	1.63
CIS	Std. Dev.	17.78	0.42	20.3	12.17	6.61	14.71	19.36	14.97	7.07	10.15
	N	2139	2139	3287	3287	3287	3287	2144	2144	2144	2144
	Mean	7.31	0.25	10.3	3.79	0.77	5.74	5.49	2.88	0.56	2.05
CEE	Std. Dev.	18.06	0.43	23.8	14.61	5.80	17.44	18.43	13.15	5.14	10.97
	N	3408	3408	4557	4557	4557	4557	3437	3437	3437	3437
	Mean	7.70	0.31	10.13	1.54	0.43	8.16	4.69	1.28	0.31	3.09
Advanced	Std. Dev.	16.86	0.46	22.81	9.03	5.10	20.65	16.60	8.81	4.70	13.32
	N	3189	3189	4183	4187	4183	4183	3209	3209	3209	3209
	Mean	8.63	0.40	11.22	4.43	1.04	5.74	6.09	3.69	0.63	1.77
Vietnam	Std. Dev.	15.13	0.49	17.86	13.27	4.08	12.66	16.26	13.08	4.69	7.51
	N	447	447	450	450	450	450	447	447	447	447
	Mean	7.49	0.27	9.61	2.82	0.70	6.09	5.42	2.55	0.57	2.30
Total	Std. Dev.	17.45	0.45	22.4	12.31	5.76	17.87	17.95	12.35	5.50	11.55
	N	9183	9183	12477	12481	12477	12477	9237	9237	9237	9237

Notes: This table includes 3 additional variables: *IC_FA* is the percentage of fixed asset investments financed by informal credit over the previous 12 months (*IC_FA=IC1_FA+IC2_FA+IC3_FA*), *IC_WC* is the percentage of working capital purchases financed by informal credit over the previous 12 months (*IC_WC=IC1_WC+IC2_WC+IC3_WC*), and *ICD* is a 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. However, we did not perform regressions on these potential dependent variables to keep the length of the paper reasonable. CIS countries included in the calculations are Belarus, Georgia, Tajikistan, Ukraine, Uzbekistan, Russia, Kazakhstan, Azerbaijan, Armenia, and the Kyrgyzstan. 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. N is the number of observations.

Table 3.4 Summary statistics for informal credit use by SMEs across country groups

Country group	Statistics	*icp*	*icd*	*ic_wc*	*ic1_wc*	*ic2_wc*	*ic3_wc*	*ic_fa*	*ic1_fa*	*ic2_fa*	*ic3_fa*
	Mean	7.51	0.32	7.71	2.74	0.98	3.98	5.35	3.18	0.87	1.31
Low income	Std. Dev.	15.40	0.47	17.30	10.39	6.14	12.37	16.16	12.57	6.52	7.14
	N	758	758	1073	1073	1073	1073	760	760	760	760
	Mean	7.45	0.23	8.44	3.69	1.00	3.75	6.81	4.27	0.85	1.69
Lower Middle income	Std. Dev.	18.46	0.42	21.33	14.15	6.90	14.24	19.63	15.80	5.98	9.40
	N	1367	1367	1830	1830	1830	1830	1368	1368	1368	1368
	Mean	7.58	0.25	10.00	3.81	0.74	5.45	5.93	3.17	0.67	2.10
Upper Middle Income	Std. Dev.	18.50	0.43	23.48	14.76	5.69	17.08	19.46	14.14	5.86	11.50
	N	3178	3178	4468	4468	4468	4468	3192	3192	3192	3192
	Mean	7.43	0.30	10.07	1.66	0.49	7.92	4.53	1.31	0.34	2.87
High Income	Std. Dev.	16.56	0.46	22.73	9.11	5.25	20.35	16.26	8.70	4.75	12.86
	N	3880	3880	5106	5110	5106	5106	3917	3917	3917	3917
	Mean	7.49	0.27	9.61	2.82	0.70	6.09	5.42	2.55	0.57	2.30
Total	Std. Dev.	17.45	0.45	22.40	12.31	5.76	17.87	17.95	12.35	5.50	11.55
	N	9183	9183	12477	12481	12477	12477	9237	9237	9237	9237

Notes: This table includes 3 additional variables: *IC_FA* is the percentage of fixed asset investments financed by informal credit over the previous 12 months (*IC_FA=IC1_FA+IC2_FA+IC3_FA*), *IC_WC* is the percentage of working capital purchases financed by informal credit over the previous 12 months (*IC_WC=IC1_WC+IC2_WC+IC3_WC*), and *ICD* is a 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. However, we did not perform regressions on these potential dependent variables to keep the length of the paper reasonable. Low-income countries included in these calculations are Tajikistan, Uzbekistan, Kyrgyzstan, 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. N is the number of observations.

In our sample of countries, the highest degree of informal credit use by SMEs was found in Latvia, an upper middle-income EU country in CEE, compared with other countries [53]. Although the rate of borrowing from moneylenders and family/friends is not as high as in the other countries (for example, none of the SMEs in Latvia borrows from moneylenders to finance fixed asset purchases), SMEs rely heavily on trade credits to finance their working capital needs in this country. Thus, the higher use of trade credits makes Latvia the country in which the SMEs use the highest level of informal credits, as demonstrated by the mean value of *ICP*.

In contrast, Uzbekistan, a low-income CIS country, is the country in which the average informal credit use is the lowest among the countries. None of the fixed asset investments of SMEs are financed by trade credits in this country, and more than 95% of both fixed assets and working capital purchases of SMEs in Uzbekistan are financed by internal funds.

Another important observation from these simple mean values is that SMEs use informal credit mostly to finance their working capital purchases, rather than using it for fixed asset investments. This finding is not surprising because informal credit is mostly used for small and short-term financing needs. From the same statistics calculated for the large firms with more than 250 full-time employees in Tables 3.3 and 3.4, we observe smaller mean values of informal credit use for large firms compared with SMEs in their respective regions and development levels. These summary statistics are reported in Tables 3.E and 3.F in the Appendix.

The correlations between variables are presented in Table 3.G in the Appendix. We observe high positive correlations between the percentages of working capital purchases and fixed asset investments that are financed by the same group of credit sources. Therefore, if an SME uses loans from family/friends to finance its working capital, the same SME will most likely use loans from family/friends to finance its fixed asset investments. Comparing the correlation coefficients between other groups of credit sources (*IC1_WC* and *IC2_FA* versus *IC1_WC* and

[53] See Table 3.C and 3.D in the Appendix for country level summary statistics.

IC3_FA), we observe that borrowing from family/friends and borrowing from moneylenders are more correlated with each other than with trade credits.

3.5.2 Estimation results

In this section, we analyse the factors that affect SMEs' percentages of fixed asset investments and working capital expenses financed via informal credit sources using 2005 BEEPS data[54]. To test our hypotheses we run seven baseline regressions in which all countries were included.[55] In these regressions we include industry fixed effects to capture industry-level unobservable characteristics.[56] In line with our expectations, in each regression, we find positive and statistically significant associations between *FINCONST* and all forms of informal credit. In order to examine more clearly the role of credit constraints, we also distinguish between firms for whom the variable "access" has a value equal to 1, (i.e. access to finance is reported as "no obstacle") by running separate regressions as presented in Table I in the Appendix. This regression results show that firms that report access to finance as "very severe, major and moderate obstacle" are more likely to use any kind of informal credit as compared to firms that report access to finance as "no obstacle". 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 larger effects on borrowing from family/friends and moneylenders than on borrowing from suppliers and customers (trade credits). Accordingly, if a SME considers itself

[54] 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 $R = corr\left(Y; E\left(Y \middle| X\right)\right)$, as suggested by Zheng and Agresti (2000).

[55] 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. When choosing the independent variables, we made sure to use the least correlated variables and checked the variance inflation factor to avoid multicollinearity. In our regressions we can not control for country fixed effects due to multicollinearity between the country level variables and country fixed effects.

[56] 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.

more financially constrained, it is more likely to use credits from family/friends and moneylenders than from suppliers and customers.

The regression results in Table 3.5 indicate that SMEs that have at least one female owner 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(s). However, we observe that SMEs with at least one female owner use more trade credit compared with SMEs without a female owner(s).

Table 3.5 Determinants of informal credit use of SMEs: full sample

Variable	Family friends		Moneylender		Trade Credit		Tot inf. Credit
	IC1_FA	*IC1_WC*	*IC2_FA*	*IC2_WC*	*IC3_FA*	*IC3_WC*	*ICP*
FINCONST	0.269***	0.242***	0.298**	0.290**	0.131	0.129**	0.200***
	(0.065)	(0.053)	(0.111)	(0.108)	(0.097)	(0.045)	(0.033)
FEMALE	0.006	-0.012	-0.638	-0.823**	0.281**	0.074	0.036
	(0.135)	(0.112)	(0.365)	(0.276)	(0.101)	(0.082)	(0.066)
CITY	0.105	0.054	0.110	0.064	-0.003	-0.019	0.052
	(0.063)	(0.069)	(0.094)	(0.095)	(0.071)	(0.043)	(0.040)
STTRADED	-0.007	-0.001	0.005	0.004	0.004	-0.003	0.001
	(0.004)	(0.003)	(0.005)	(0.004)	(0.004)	(0.004)	(0.001)
CR	0.014**	0.002	-0.020***	-0.001	-0.001	-0.006	0.002
	(0.005)	(0.007)	(0.005)	(0.006)	(0.006)	(0.007)	(0.002)
PRVTCRE	-0.006*	-0.009*	-0.016*	-0.008	0.007	0.011**	0.003*
	(0.003)	(0.004)	(0.008)	(0.005)	(0.005)	(0.004)	(0.002)
TIME	0.054	0.0831*	0.164***	0.096**	0.150**	0.039	0.076***
	(0.038)	(0.040)	(0.028)	(0.029)	(0.050)	(0.053)	(0.020)
SIZE	-0.017***	-0.011***	-0.001	0.004	0.003	0.004**	0.000
	(0.004)	(0.002)	(0.004)	(0.002)	(0.002)	(0.001)	(0.002)
AGE	-0.014**	-0.026***	-0.023	-0.043*	-0.006	0.000	-0.007*
	(0.005)	(0.007)	(0.014)	(0.017)	(0.004)	(0.004)	(0.003)
OVERDUE	0.322	0.538*	-0.639*	0.716**	0.333	0.098	0.322*
	(0.344)	(0.264)	(0.297)	(0.252)	(0.277)	(0.200)	(0.160)
MACRO	0.075	0.067	-0.046	0.036	0.139	-0.039	0.054
	(0.072)	(0.075)	(0.113)	(0.080)	(0.090)	(0.046)	(0.039)
Pseudo R^2	0.181	0.174	0.143	0.122	0.126	0.176	0.151
N	5869	7636	5869	7635	5869	7635	5841

Notes: This table reports GLM estimates of the percentages of fixed assets/working capital financed by informal credit. All regressions include industry fixed effects and constant term. Robust standard errors are clustered by country and reported in parentheses. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%. N is the number of observations.

In addition to these regressions, we created a subsample of sole proprietorship SMEs and tested the effect of female ownership where owner of the firm is also the manager of the firm. Results are tabulated in Table 3.G in the Appendix. In these regressions we do not observe significant gender effect on the trade credit

usage. However we observe stronger negative effect of female entrepreneurship on usage of credit from moneylenders. These results can be explained by various results addressed in the previous literature. First, female entrepreneurs are more risk-averse than male entrepreneurs; which leads them to use less credit from moneylenders as compared to their male counterparts. Second, female borrowers 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 do not find significant location effects, as measured by *CITY*, on the informal credit use of SMEs in most of the regressions. This result can be attributable to the improvements in new banking technologies such as internet and telephone banking which decreases the importance of distances.

Regarding the effect of financial development on informal credit, we do not find a statistically significant association between equity market development, as measured by *STTRADED*, and informal credit use in any of the seven regressions. Regarding the effect of the banking concentration, the positive and significant coefficient estimate of *CR* on the first regression where the dependent variable is *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. These weakly statistically significant and inconsistent coefficient estimates for *CR* can be

evaluated to support Beck et al. (2004) as *CR* doesn't have strong effect in developing and less-developed economies. This argument leads us to run separate regressions by country groups. 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 indicate a trade-off relationship between the informal credit use and the ratio of the formal credit to the GDP as argued in hypothesis 1. However, we find a significantly positive relationship between *IC3_WC, ICP* and *PRVTCRE.* This result can be attributed to intermediation effects, *i.e.*, informal lenders act as intermediaries between borrowers and formal lenders, as discussed by Madestam (2008).

The coefficient estimates of *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, banks are reluctant to lend and prefer to provide loans to less risky borrowers rather than to informationally opaque SMEs. In such an environment, informal creditors serve as a substitute to formal lending institutions for the SMEs.

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.* However, we observe a reverse effect of *SIZE* on the use of trade credit, as measured by *IC3_WC*, which suggests that larger SMEs finance higher percentages of working capital purchases with trade credit. Thus, smaller SMEs use more informal credit in the form of borrowing from family/friends, whereas larger SMEs use more trade credit. 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. The coefficient estimates for *OVERDUE* indicate that financially distressed firms use more informal credit (especially in the form of borrowing from family/friends)

than other firms. With regard to the effect of macroeconomic instabilities (*MACRO*), we do not observe a statistically significant effect.

We also tested whether our results differ across country groups by running separate regressions for each country group. In Tables 3.7 and 3.8 we present the results of the same GLM regression results by different country groups. We first present the results for high-income countries in Table 3.6.

Table 3.6 Determinants of informal credit use of SMEs: high-income countries

Variable	Family friends		Moneylender		Trade Credit		Tot inf. credit
	IC1_FA	*IC1_WC*	*IC2_FA*	*IC2_WC*	*IC3_FA*	*IC3_WC*	*ICP*
FINCONST	0.241*	0.296**	0.621***	0.405***	0.193	0.179***	0.203***
	(0.109)	(0.107)	(0.097)	(0.106)	(0.115)	(0.036)	(0.044)
FEMALE	-0.181	-0.173	-0.608	-0.984**	0.137	-0.021	-0.088
	(0.198)	(0.204)	(0.633)	(0.333)	(0.129)	(0.075)	(0.065)
CITY	0.080	0.077	0.136	0.115	-0.108	-0.075	0.010
	(0.104)	(0.055)	(0.162)	(0.130)	(0.103)	(0.056)	(0.054)
STTRADED	-0.003	0.000	0.008	0.007	0.006	0.000	0.002
	(0.003)	(0.003)	(0.015)	(0.009)	(0.004)	(0.003)	(0.001)
CR	0.007	0.001	-0.024	0.019	0.013	0.009	0.005
	(0.011)	(0.015)	(0.049)	(0.026)	(0.015)	(0.011)	(0.007)
PRVTCRE	0.002	-0.001	-0.015	-0.012	-0.002	0.004	0.006*
	(0.004)	(0.006)	(0.026)	(0.014)	(0.008)	(0.006)	(0.003)
TIME	0.148***	0.119*	0.220*	0.135*	0.049	-0.046	0.106***
	(0.041)	(0.053)	(0.099)	(0.053)	(0.090)	(0.079)	(0.028)
SIZE	-0.027**	-0.028***	0.004	0.004	0.005*	0.004*	0.002
	(0.010)	(0.008)	(0.010)	(0.007)	(0.002)	(0.002)	(0.002)
AGE	-0.020	-0.049***	-0.025	-0.022	-0.004	0.000	-0.007
	(0.011)	(0.012)	(0.029)	(0.015)	(0.004)	(0.004)	(0.004)
OVERDUE	0.677*	1.024***	-1.201**	0.833*	0.671**	0.136	0.495**
	(0.325)	(0.210)	(0.451)	(0.385)	(0.249)	(0.285)	(0.172)
MACRO	0.053	0.069	-0.282	0.047	0.093	-0.089	0.023
	(0.108)	(0.109)	(0.221)	(0.163)	(0.099)	(0.051)	(0.050)
Pseudo R^2	0.148	0.222	0.270	0.169	0.141	0.174	0.195
N	2996	3791	2996	3790	2996	3790	2976

Notes: This table reports GLM estimates for the percentages of fixed assets/working capital financed by informal credit. All regressions include industry fixed effects. Robust standard errors (clustered by country) are in parentheses. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%. N is the number of observations.

Because many low-income and lower middle-income countries[57] lack country-level variables, we chose to report the regression results from middle-income countries in Table 3.7. The results in Tables 3.6 and 3.7 do not show a significant

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

change compared with Table 3.5; we only loose a small degree of statistical significance, especially for the country-level financial development variables for high-income countries. We observe that financial distress, as measured by utility arrears (*OVERDUE*), becomes more important in high-income countries compared with middle-income countries, whereas financial development variables gain importance in middle-income countries in terms of statistical significance.

Table 3.7 Determinants of informal credit use of SMEs: middle-income countries

Variable	Family friends		Moneylender		Trade Credit		Tot inf. credit
	IC1_FA	*IC1_WC*	*IC2_FA*	*IC2_WC*	*IC3_FA*	*IC3_WC*	*ICP*
FINCONST	0.260**	0.214***	0.216	0.294	-0.087	0.059	0.185***
	(0.080)	(0.063)	(0.174)	(0.182)	(0.098)	(0.065)	(0.045)
FEMALE	0.104	-0.028	-0.527	-0.773	0.558***	0.071	0.106
	(0.178)	(0.140)	(0.496)	(0.447)	(0.136)	(0.153)	(0.120)
CITY	0.115	0.021	0.173	0.103	0.145**	0.058	0.100
	(0.095)	(0.106)	(0.118)	(0.140)	(0.047)	(0.080)	(0.056)
STTRADED	-0.024**	0.002	0.013	0.026**	0.002	-0.015	-0.010
	(0.009)	(0.008)	(0.009)	(0.010)	(0.011)	(0.009)	(0.007)
CR	0.023**	0.001	-0.013**	0.000	-0.008	-0.011	0.004
	(0.008)	(0.006)	(0.004)	(0.004)	(0.009)	(0.009)	(0.005)
PRVTCRE	0.000	-0.002	0.012	0.024**	0.027**	0.041***	0.016
	(0.017)	(0.017)	(0.020)	(0.009)	(0.009)	(0.009)	(0.013)
TIME	-0.018	0.197	-0.397	-0.188	0.640***	0.163	0.081
	(0.123)	(0.164)	(0.250)	(0.178)	(0.182)	(0.229)	(0.100)
SIZE	-0.017**	-0.011***	-0.003	0.003	0.001	0.003	-0.003
	(0.005)	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)	(0.002)
AGE	-0.004	-0.012***	-0.015	-0.059*	-0.018	0.005	-0.005
	(0.004)	(0.003)	(0.014)	(0.028)	(0.025)	(0.009)	(0.006)
OVERDUE	-0.251	0.009	-1.150	0.536	-1.301	0.014	0.008
	(0.714)	(0.515)	(1.062)	(0.417)	(0.897)	(0.391)	(0.358)
MACRO	0.023	-0.014	0.078	0.087	0.256	0.044	0.046
	(0.100)	(0.111)	(0.127)	(0.106)	(0.143)	(0.059)	(0.065)
Pseudo R^2	0.191	0.130	0.107	0.153	0.147	0.223	0.154
N	2467	3401	2467	3401	2467	3401	2460

Notes: This table reports GLM estimates for the percentages of fixed assets/working capital financed by informal credit. All regressions include industry fixed effects. Robust standard errors (clustered by country) are in parentheses. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%. N is the number of observations.

3.5.3 Robustness checks

In this section, we present estimation results from the standardised data set of the 2002-2009 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 trade credit and other credit sources, which include moneylenders, family/friends, and non-bank financial sources[58]. 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 (1) internal funds or retained earnings, (2) owners' contributions or newly issued equity shares, (3) private banks, (4) state-owned banks, (5) credit from suppliers and advances from customers, or (6) other sources (moneylenders, friends, relatives, and non-bank financial institutions) [59] . Accordingly, (5) corresponds to trade credit, and the information on the total informal credit use of firms, to finance their fixed asset investments, can be extracted from the sum of (5) and (6). Table 3.8 report the estimation results from this sample[60].

In Table 3.8, we present the GLM regression results. In line with the results from the 2005 BEEPS, as presented in Table 3.5, we find that informal credit is mostly used by SMEs that report access to finance as an obstacle for their business operations in Table 3.8. 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.

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[58] Moreover, we do not have information on SMEs' perceptions on how the macroeconomic instabilities affect their businesses ($MACRO$).

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

[60] The definitions and summary statistics of the variables used in this part of the study are presented in Tables 3.I and 3.J in the Appendix. 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". 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 and our results remained similar to those in Table 3.8.

Table 3.8 Estimation Results for SMEs: 2002-2009 BEEPS

Variable	Other *ICP1*	Trade Credit *ICP2*	Tot. inf. credit *ICP3*
FINCONST	0.218***	0.069	0.170***
	(0.035)	(0.041)	(0.028)
FEMALE	-0.030	0.116	0.020
	(0.090)	(0.113)	(0.073)
CITY	0.278	-0.157	0.036
	(0.178)	(0.138)	(0.114)
STCAPIT	0.002	0.004**	0.004**
	(0.002)	(0.001)	(0.001)
CR	0.012***	-0.001	0.006***
	(0.002)	(0.003)	(0.002)
LOANGDP	0.007***	0.004*	0.006***
	(0.002)	(0.002)	(0.002)
TIME	0.000	-0.0005*	0.000
	(0.000)	(0.000)	(0.000)
SIZE	0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
AGE	-0.005	-0.006	-0.005
	(0.005)	(0.005)	(0.004)
OVERDUE	0.813***	0.366	0.686***
	(0.186)	(0.233)	(0.152)
Pseudo R^2	0.264	0.175	0.188
N	6824	6824	6824

Notes: This table reports GLM estimates of the percentages of fixed asset investments financed by informal credit. The dependent variable "other" stays for moneylenders, friends, relatives, and non-bank financial institutions. All regressions include industry and year fixed effects. Robust standard errors are clustered at firm level and provided in parentheses. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%. N is the number of observations.

These results confirm that informal financial markets mostly serve the credit-constrained SMEs. In these regressions we do not observe a statistically significant coefficient estimate for *CITY*[61], which is in line with the results in Table 3.5. To test for the effect of financial development, three different measures are used to approximate the financial (non-)development level: outstanding loans from commercial banks as a percentage of the GDP (*LOANGDP*); value of listed shares of the GDP expressed in percentages (*STCAPIT*); and, as an inverse proxy for financial development, the asset share of the three largest banks among the commercial banks (*CR*). We find a positive and statistically significant association between *STCAPIT* and informal credit usage of SMEs in the form of trade credit rather than in the form of other informal credit sources. This result implies that

[61] In this set of regressions *CITY* is a dummy variable which takes one if the firm is located in the capital or in a city with more than 1 million population, zero otherwise.

SMEs rely more on trade credit in countries where the stock market is more developed.

Moreover, the positive and significant coefficient estimate for *CR* in the first regression provides evidence regarding the positive role of banking concentration (as a measure of financial non-development) on informal credit use. However *CR* does not have a statistically significant effect on the percentage of fixed assets financed by trade credit. This result can be linked to market power, suggesting that more concentrated banking environments result in reduced credit availability, especially for small businesses[62]. We also find positive and significant coefficient estimates for $LOANGDP$ in all regressions, this result also confirms our regression results of the 2005 BEEPS for $PRVTCRE$ where the dependent variables are percentage of fixed assets/working capital expenses financed by trade credit.

Regarding *TIME*[63], informal credit use and low quality of the legal system are positively but significantly related to *ICP1* but negatively and significantly related to *ICP2*. In countries where the legal quality is low SMEs are more likely to use trade credit rather than using other forms of informal credit. The coefficient estimates for country level explanatory variables reveals that trade credit acts as a substitute to credits from moneylender and family/friends when the financial development level and legal quality increases. In line with previous studies and our findings, the coefficient estimate for AGE in the *ICP3* 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 $OVERDUE$.

[62] As discussed in the hypotheses section, there are two different views in the literature regarding the role of bank concentration on firm finance: market power and information hypotheses. The market power hypothesis argues that concentration in the banking sector is detrimental to credit availability. The information hypothesis, in contrast, argues that firms build better relationships in concentrated banking environments, which results in higher credit availability (Carbo-Valverde et al. 2009).

[63] In this set of regressions *TIME* is the average number of days counted from the moment the plaintiff decides to file the lawsuit in court until payment. This country level data come from the World Bank.

3.6 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 27% 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, while 24% of the SMEs from CEE and CIS countries in our sample from the 2002-2009 BEEPS used informal sources to finance part of their fixed asset investments. As we consider the share of informal credit within the total borrowing we see that the informal loans account nearly for the 40% of the total loans that are used to finance working capital expenses, while 23% of the total loans that are used to finance fixed asset purchases are informal loans.

In our paper, we examine the determinants of a broader spectrum of informal credit sources that include moneylenders, family/friends, and trade credit. We examine both the country and firm-level factors of this choice, 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 different types of informal credit as dependent variables, we are able to distinguish between the determinants of different informal credit types. We observe that determinants of borrowing from family/friends and from moneylenders are similar, whereas determinants of trade credit show a more varied pattern.

In line with the previous literature, empirical results of this paper address informal credit as an important source of credit for SMEs. We observe higher

percentages of working capital financed by informal sources compared with the percentage of fixed assets financed via informal sources. This result is consistent with the characteristics of informal credit, which primarily includes small and short-term loans. We find that credit-constrained SMEs rely more on informal credit of any type.

We find 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.*, female firm owners are more risk averse than males). Another explanation is that female entrepreneurs are addressed as better borrowers with lower default rates in the previous literature. 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. On the other hand female entrepreneurs use more trade credit as compared to their male counterparts.

Our regression results mostly indicate a positive relationship between the legal non quality and informal credit use, which suggests that informal credit usage in the form of borrowing from family friends and moneylenders is higher in countries where legal procedures take longer. On the other hand the length of legal procedures are found to decrease trade credit use of SMEs.

In countries with more developed financial markets, firms have many options for financing their projects; thus, they are less likely to use informal credit in the form of family/friends and moneylenders. We find some evidence supporting this hypothesis, *i.e.*, concentrated banking systems lead SMEs to use these forms of 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. Moreover financially distressed SMEs (as approximated by utility

arrears) use informal credit in any form more intensively. Accordingly, informal credit plays an important role in alleviating problems of firms regarding credit constraints.

There are several directions for future researches. 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 these data problems.

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3.8 Appendix

Table 3.A Informal creditors

Financial Institutions			
Commercial Banks	Apex Organizations	Unregulated MFIs	Self Help Groups
State Banks	Rural Banks	NGOs	Farmers' Organizations
Postal Banks	Cooperative Banks	Savings and Credit Ass.	Women's Associations
Insurance Companies	Microfinance Banks	Village banks	Indigenous Savings Clubs
Leasing Companies	Credit Unions	Moneylenders	Deposit Collectors
Money Transfer Firms	Regulated MFIs	ROSCAs	Loan sharks
←More formal		**Less formal→**	

Source: Pagura and Kirsten (2006)

Table 3.B Share of informal credit types in total external finance

Variable	Obs	Mean	Std. Dev.	Min	Max
IC1EX_FA	3477	11.60	29.35	0	100
IC2EX_FA	3477	2.90	14.90	0	100
IC3EX_FA	3477	8.62	24.41	0	100
IC1EX_WC	5669	12.49	29.62	0	100
IC2EX_WC	5669	3.17	15.07	0	100
IC3EX_WC	5669	24.03	37.40	0	100

Notes: *IC1EX_FA* is the share loans that are borrowed from family/friends that are used to finance the fixed asset purchases. *IC2EX_FA* is the share loans that are borrowed from moneylenders that are used to finance the fixed asset purchases. *IC1EX_FA* is the share loans that are borrowed as trade credit that are used to finance the fixed asset purchases. *IC1EX_WC* is the share loans that are borrowed from family/friends that are used to finance the working capital expenses. *IC2EX_WC* is the share loans that are borrowed from moneylenders that are used to finance the working capital expenses. *IC1EX_WC* is the share loans that are borrowed as trade credit that are used to finance the working capital expenses.

Table 3.C Summary statistics of informal credit use of SMEs across countries

			icp	icd	ic_wc	ic1_wc	ic2_wc	ic3_wc	ic_fa	ic1_fa	ic2_fa	ic3_fa
CIS COUNTRIES	Belarus	Mean	9.52	0.26	9.17	3.47	0.64	5.06	10.89	6.29	1.37	3.23
		Std. Dev.	22.42	0.44	23.58	15.31	4.91	17.66	27.11	21.47	7.77	16.02
		N	183	183	275	275	275	275	186	186	186	186
	Georgia	Mean	4.03	0.11	4.71	2.52	0.48	1.71	4.35	1.61	1.21	1.53
		Std. Dev.	14.87	0.32	17.75	11.93	3.69	8.99	16.16	6.32	5.63	8.66
		N	62	62	184	184	184	184	62	62	62	62
	Tajikistan	Mean	8.64	0.29	7.09	2.12	1.18	3.79	8.21	5.00	1.47	1.74
		Std. Dev.	19.49	0.46	19.94	9.68	8.01	14.70	22.20	18.07	6.48	11.64
		N	92	92	178	178	178	178	92	92	92	92
	Ukraine	Mean	9.17	0.28	10.08	2.86	0.98	6.23	8.01	4.41	0.80	2.80
		Std. Dev.	19.94	0.45	23.14	12.46	7.49	18.36	22.41	17.04	6.93	12.63
		N	380	380	523	523	523	523	380	380	380	380

Table 3.C is continued.

	Uzbekistan	Mean	1.02	0.06	1.04	0.15	0.37	0.52	0.16	0.00	0.16	0.00
		Std. Dev.	4.48	0.24	6.54	1.92	3.93	4.93	1.14	0.00	1.14	0.00
		N	96	96	270	270	270	270	96	96	96	96
	Russia	Mean	7.44	0.26	10.85	2.86	0.92	7.07	4.87	1.33	1.09	2.45
		Std. Dev.	16.71	0.44	22.88	11.58	6.17	18.62	17.69	9.05	8.95	12.16
		N	373	373	526	526	526	526	373	373	373	373
	Kazakhstan	Mean	4.88	0.22	6.31	1.64	0.79	3.88	3.23	1.86	0.45	0.91
		Std. Dev.	12.51	0.41	17.87	7.52	5.78	15.08	13.28	10.25	3.37	8.00
		N	274	274	528	528	528	528	274	274	274	274
	Azerbaijan	Mean	4.80	0.11	5.97	2.70	1.57	1.70	4.48	2.22	1.04	1.22
		Std. Dev.	16.78	0.32	19.01	13.23	10.04	9.26	16.71	13.03	6.19	8.43
		N	270	270	300	300	300	300	270	270	270	270
	Armenia	Mean	9.62	0.32	8.37	7.42	0.58	0.37	9.94	8.79	0.98	0.17
		Std. Dev.	19.96	0.47	19.69	19.14	3.58	2.71	21.11	20.61	5.95	2.13
		N	286	286	328	328	328	328	286	286	286	286
	Kyrgyz Republic	Mean	7.62	0.27	9.63	3.06	1.57	5.00	4.60	2.44	1.84	0.32
		Std. Dev.	17.27	0.44	21.12	9.54	9.97	15.61	15.98	10.03	12.14	2.52
		N	123	123	175	175	175	175	125	125	125	125
CENTRAL AND EASTERN EUROPE	Bulgaria	Mean	8.47	0.32	15.32	9.32	0.92	5.08	6.28	3.86	1.01	1.40
		Std. Dev.	17.31	0.47	29.56	25.10	5.73	15.97	18.44	14.58	7.01	8.50
		N	207	207	266	266	266	266	207	207	207	207
	Albania	Mean	3.82	0.17	4.24	1.20	0.61	2.44	3.09	1.70	0.00	1.40
		Std. Dev.	11.35	0.37	13.60	6.26	4.87	10.73	13.95	10.70	0.00	9.09
		N	161	161	189	189	189	189	161	161	161	161
	Croatia	Mean	4.04	0.23	8.24	2.03	0.96	5.24	3.01	1.06	0.35	1.60
		Std. Dev.	10.10	0.42	19.81	8.02	4.62	15.78	10.67	5.94	3.47	8.31
		N	137	137	193	193	193	193	141	141	141	141
	Turkey	Mean	6.37	0.19	8.06	5.30	1.28	1.48	5.41	3.59	0.54	1.28
		Std. Dev.	16.67	0.40	21.43	16.53	8.57	8.70	16.50	12.69	3.20	8.73
		N	305	305	493	493	493	493	306	306	306	306
	Poland	Mean	5.61	0.23	7.08	2.61	0.53	3.95	4.45	2.39	0.78	1.28
		Std. Dev.	14.90	0.42	18.26	11.81	4.28	12.86	15.48	11.50	6.73	7.82
		N	749	749	900	900	900	900	750	750	750	750
	Romania	Mean	9.68	0.27	11.78	4.48	0.23	7.08	7.50	3.82	0.07	3.61
		Std. Dev.	22.40	0.45	26.33	16.46	2.44	19.93	22.24	16.08	1.05	14.86
		N	452	452	533	533	533	533	453	453	453	453
	Serbia	Mean	5.29	0.15	10.31	4.28	0.53	5.49	4.44	2.32	0.65	1.47
		Std. Dev.	17.32	0.36	24.86	15.40	4.98	18.39	18.67	12.00	5.69	10.41
		N	190	190	253	253	253	253	191	191	191	191
	Moldova	Mean	8.58	0.24	12.95	4.32	1.47	7.16	6.94	3.25	1.08	2.61
		Std. Dev.	20.15	0.43	26.23	15.47	7.27	19.61	19.61	13.01	6.29	10.01
		N	208	208	306	306	306	306	209	209	209	209
	Bosnia and Herzegovina	Mean	3.58	0.16	6.38	2.92	0.00	3.45	3.61	2.33	0.00	1.28
		Std. Dev.	11.34	0.37	18.76	13.41	0.00	12.46	13.72	11.90	0.00	7.25
		N	88	88	168	168	168	168	90	90	90	90
	FYR Macedonia	Mean	12.53	0.20	12.22	5.88	1.14	5.20	11.30	8.00	1.00	2.30
		Std. Dev.	29.16	0.40	29.18	18.71	7.00	18.82	30.34	24.33	7.04	11.62
		N	99	99	176	176	176	176	100	100	100	100
	Estonia	Mean	12.59	0.37	17.90	2.43	1.74	13.74	8.19	2.86	1.07	4.26
		Std. Dev.	23.20	0.49	30.81	11.71	11.02	26.80	22.56	11.76	8.93	16.26
		N	129	129	175	175	175	175	140	140	140	140
	Hungary	Mean	4.95	0.22	7.78	2.16	0.43	5.19	2.65	1.12	0.33	1.19

Table 3.C is continued.

		Std. Dev.	12.50	0.42	19.41	9.15	3.48	16.25	12.02	7.39	3.27	8.47
		N	425	425	555	555	555	555	427	427	427	427
	Latvia	Mean	18.19	0.56	22.39	5.37	0.99	16.02	11.81	6.87	0.00	4.94
		Std. Dev.	26.89	0.50	31.37	17.88	7.40	26.65	29.10	23.33	0.00	17.75
		N	104	104	168	168	168	168	107	107	107	107
	Lithuania	Mean	9.76	0.34	15.63	2.04	1.41	12.18	6.19	2.10	0.87	3.23
		Std. Dev.	19.81	0.48	28.98	10.05	7.93	25.49	21.40	11.49	6.30	16.63
		N	154	154	182	182	182	182	155	155	155	155
ADVANCED	Czech Republic	Mean	10.80	0.29	12.34	5.01	1.47	5.87	10.19	3.77	1.92	4.50
		Std. Dev.	24.62	0.46	27.44	17.43	10.94	19.46	26.43	15.08	11.86	18.33
		N	259	259	300	300	300	300	260	260	260	260
	Slovak Republic	Mean	4.10	0.22	6.04	2.00	1.88	2.16	3.71	1.25	1.71	0.75
		Std. Dev.	11.63	0.42	16.64	10.88	9.63	8.53	14.70	8.94	10.79	5.05
		N	140	140	185	185	185	185	140	140	140	140
	Slovenia	Mean	2.78	0.12	4.08	0.67	0.10	3.31	1.74	1.74	0.00	0.00
		Std. Dev.	9.19	0.33	14.17	4.88	1.43	12.95	12.39	12.39	0.00	0.00
		N	132	132	195	195	195	195	132	132	132	132
	Greece	Mean	6.68	0.18	13.32	0.48	0.35	12.50	5.29	0.42	0.00	4.87
		Std. Dev.	19.06	0.39	29.86	3.01	4.20	29.34	18.31	3.54	0.00	17.93
		N	307	307	492	492	492	492	307	307	307	307
	Germany	Mean	8.69	0.41	11.98	1.01	0.04	10.94	5.28	0.89	0.00	4.39
		Std. Dev.	15.28	0.49	21.14	6.20	0.75	20.14	14.96	5.30	0.00	14.17
		N	1058	1058	1070	1070	1070	1070	1059	1059	1059	1059
	Spain	Mean	9.88	0.35	14.84	1.23	0.59	13.01	4.87	0.91	0.20	3.77
		Std. Dev.	18.18	0.48	27.08	7.85	5.66	25.86	17.43	7.29	3.04	15.55
		N	546	546	546	550	546	546	550	550	550	550
	Portugal	Mean	6.03	0.20	7.38	2.04	0.07	5.26	3.23	2.48	0.00	0.75
		Std. Dev.	17.72	0.40	20.61	12.83	1.11	16.72	15.68	14.66	0.00	5.87
		N	158	158	405	405	405	405	161	161	161	161
	Ireland	Mean	6.27	0.27	10.69	1.30	0.53	8.86	1.81	0.93	0.21	0.67
		Std. Dev.	15.15	0.44	23.54	8.93	6.71	21.18	12.09	9.29	4.63	6.35
		N	456	456	456	456	456	456	466	466	466	466
	South Korea	Mean	2.73	0.12	2.69	1.96	0.33	0.40	2.95	2.43	0.45	0.07
		Std. Dev.	9.62	0.33	10.21	8.31	3.54	3.79	13.78	11.93	3.85	0.86
		N	133	133	534	534	534	534	134	134	134	134

Source: 2005 BEEPS

Table 3.D Summary statistics of the independent variables across countries

			size	age	female	city	overdue	macro	sttraded	cr	prvtcre	time
CIS COUNTRIES	Belarus	Mean	35.09	11.27	0.24	2.78	0.05	2.25	.	78.08	.	5.80
		Std. Dev.	48.98	8.73	0.43	1.07	0.23	1.09	.	0.00	.	0.00
		N	294	294	232	294	291	287	0	294	0	294
	Georgia	Mean	33.40	18.95	0.37	2.83	0.03	2.65	0.59	74.99	11.31	3.30
		Std. Dev.	48.58	23.39	0.49	1.23	0.16	1.21	0.00	0.00	0.00	0.00
		N	186	186	145	186	186	182	186	186	186	186
	Tajikistan	Mean	49.58	11.60	0.22	2.46	0.13	2.07	.	.	.	1.70
		Std. Dev.	59.28	11.61	0.42	1.18	0.33	0.99	.	.	.	0.00
		N	182	182	157	182	181	178	0	0	0	182
	Ukraine	Mean	35.33	13.43	0.35	2.81	0.02	2.80	0.77	41.50	.	2.90
		Std. Dev.	51.91	15.15	0.48	1.09	0.13	1.11	0.00	0.00	.	0.00
		N	542	541	401	542	541	538	542	542	0.0	542

Table 3.D is continued

	Uzbekistan	Mean	34.72	12.40	0.17	2.38	0.03	2.08	0.27	80.42	.	4.00
		Std. Dev.	52.69	12.33	0.38	1.21	0.16	1.03	0.00	0.00	.	0.00
		N	273	273	192	273	273	247	273	273	0	273
	Russia	Mean	43.58	11.23	0.29	3.12	0.03	2.59	20.84	18.48	22.65	2.00
		Std. Dev.	59.43	12.52	0.45	1.13	0.17	1.05	0.00	0.00	0.00	0.00
		N	535	535	414	535	530	518	535	535	535	535
	Kazakhstan	Mean	37.49	9.87	0.37	2.84	0.02	2.01	1.89	65.79	27.59	1.50
		Std. Dev.	50.12	9.55	0.48	1.06	0.13	1.00	0.00	0.00	0	0.00
		N	536	536	411	536	536	523	536	536	536	536
	Azerbaijan	Mean	42.40	9.59	0.15	3.46	0.01	1.52	.	68.42	.	2.70
		Std. Dev.	55.07	8.01	0.36	0.94	0.10	0.80	.	0.00	.	0.00
		N	316	315	214	316	275	264	0	316	0	316
	Armenia	Mean	30.54	14.17	0.13	3.01	0.02	2.84	0.02	68.55	6.91	1.90
		Std. Dev.	45.89	15.03	0.33	1.29	0.13	1.03	0.00	0.00	0.00	0.00
		N	334	334	300	334	334	329	334	334	334	334
	Kyrgyz Republic	Mean	45.34	17.49	0.27	2.32	0.04	2.61	0.53	80.27	7.24	4.00
		Std. Dev.	56.48	18.04	0.45	1.19	0.21	1.06	0.00	0.00	0.00	0.00
		N	181	181	139	181	181	177	181	181	181	181
Total		**Mean**	**38.29**	**12.38**	**0.27**	**2.86**	**0.03**	**2.38**	**4.97**	**58.04**	**18.41**	**2.78**
		Std. Dev.	**53.14**	**13.56**	**0.44**	**1.17**	**0.17**	**1.12**	**8.13**	**21.56**	**8.59**	**1.23**
		N	**3379**	**3377**	**2605**	**3379**	**3328**	**3243**	**2587**	**3197**	**1772**	**3379**
CENTRAL AND EASTERN EUROPE	Bulgaria	Mean	30.63	15.32	0.37	2.25	0.01	2.28	5.11	40.37	37.82	3.30
		Std. Dev.	50.68	15.45	0.48	1.18	0.12	1.13	0.00	0.00	0.00	0.00
		N	272	272	204	272	272	267	272	272	272	272
	Albania	Mean	30.19	10.75	0.14	2.53	0.02	2.76	.	78.30	11.80	2.00
		Std. Dev.	35.16	8.71	0.35	1.20	0.14	1.03	.	0.00	0.00	0.00
		N	189	189	165	189	189	185	0	189	189	189
	Croatia	Mean	35.70	17.57	0.20	2.16	0.08	2.42	2.05	64.09	56.26	3.10
		Std. Dev.	50.31	15.79	0.40	1.23	0.27	1.02	0.00	0.00	0.00	0.00
		N	203	203	136	203	202	202	203	203	203	203
	Turkey	Mean	28.49	15.66	0.09	3.07	0.00	2.72	41.58	96.23	18.38	3.30
		Std. Dev.	40.64	16.70	0.29	1.18	0.00	1.21	0.00	0.00	0.00	0.00
		N	505	505	440	505	492	496	505	505	505	505
	Poland	Mean	28.96	16.43	0.34	2.42	0.02	2.90	9.86	55.52	27.73	3.00
		Std. Dev.	48.02	14.65	0.47	1.00	0.12	1.08	0.00	0.00	0.00	0.00
		N	913	912	752	913	912	899	913	913	913	913
	Romania	Mean	43.69	13.31	0.28	2.42	0.02	2.89	3.44	65.36	16.57	4.60
		Std. Dev.	56.77	14.08	0.45	1.04	0.15	1.05	0.00	0.00	0.00	0.00
		N	544	544	384	544	543	532	544	544	544	544
	Serbia	Mean	38.38	17.35	0.27	2.92	0.09	3.31	.	.	.	2.70
		Std. Dev.	58.03	18.65	0.44	1.17	0.28	0.96	.	.	.	0.00
		N	261	261	196	261	256	258	0	0	0	261
	Moldova	Mean	41.39	11.70	0.27	2.62	0.02	3.04	0.57	51.11	20.75	2.80
		Std. Dev.	53.72	10.42	0.45	1.38	0.15	0.89	0.00	0.00	0	0.00
		N	317	317	233	317	312	308	317	317	317	317
	Bosnia and Herzegovina	Mean	41.85	15.40	0.26	2.51	0.04	2.56	.	50.12	.	3.30
		Std. Dev.	55.75	17.01	0.44	1.13	0.21	1.18	.	0.00	.	0.00
		N	182	182	138	182	178	169	0	182	0	182
	FYR Macedonia	Mean	29.21	16.31	0.17	3.03	0.06	2.22	1.67	75.62	22.56	2.00
		Std. Dev.	49.37	17.22	0.38	1.22	0.23	1.13	0.00	0.00	0.00	0.00
		N	182	182	145	182	179	156	182	182	182	182

Table 3.D is continued

	Estonia	Mean	30.04	12.32	0.35	2.71	0.01	1.62	17.79	98.33	61.85	3.00
		Std. Dev.	43.37	10.24	0.48	1.33	0.10	0.83	0.00	0.00	0.00	0.00
		N	198	198	132	198	195	187	198	198	198	198
	Hungary	Mean	31.64	13.72	0.41	2.49	0.02	2.57	21.64	61.85	47.50	2.00
		Std. Dev.	44.37	14.09	0.49	1.19	0.14	1.12	0.00	0.00	0.00	0.00
		N	563	563	459	563	561	554	563	563	563	563
	Latvia	Mean	30.59	13.39	0.44	2.75	0.04	2.58	0.60	57.07	54.94	3.00
		Std. Dev.	52.47	16.60	0.50	1.41	0.21	1.09	0.00	0.00	0.00	0.00
		N	187	187	143	187	183	184	187	187	187	187
	Lithuania	Mean	40.53	14.83	0.25	2.42	0.01	2.18	2.88	78.26	32.81	1.70
		Std. Dev.	57.22	13.74	0.43	1.23	0.10	1.01	0.00	0.00	0.00	0.00
		N	187	187	141	187	185	180	187	187	187	187
Total		**Mean**	**33.81**	**14.75**	**0.28**	**2.57**	**0.03**	**2.68**	**12.41**	**65.81**	**31.37**	**2.97**
		Std. Dev.	**49.81**	**14.86**	**0.45**	**1.20**	**0.16**	**1.12**	**12.91**	**16.18**	**14.62**	**0.77**
		N	**4703**	**4702**	**3668**	**4703**	**4659**	**4577**	**4071**	**4442**	**4260**	**4703**
ADVANCED	Czech Republic	Mean	28.70	11.61	0.22	2.08	0.12	2.60	16.13	53.95	29.95	9.20
		Std. Dev.	48.84	8.95	0.42	1.21	0.32	0.98	0.00	0.00	0.00	0.00
		N	317	313	254	317	311	311	317	317	317	317
	Slovak Republic	Mean	32.94	13.90	0.18	2.64	0.02	1.96	0.15	71.93	31.36	4.80
		Std. Dev.	49.14	14.73	0.39	1.18	0.12	1.04	0.00	0.00	0.00	0.00
		N	197	198	139	198	196	194	198	198	198	198
	Slovenia	Mean	28.84	20.66	0.35	1.93	0.08	2.02	2.24	56.49	52.96	2.00
		Std. Dev.	45.53	19.21	0.48	1.21	0.28	0.89	0.00	0.00	0.00	0.00
		N	195	195	136	195	193	193	195	195	195	195
	Greece	Mean	16.51	16.95	0.24	2.62	0.00	2.07	23.00	68.76	71.49	2.00
		Std. Dev.	31.65	12.63	0.43	1.22	0.04	1.11	0.00	0.00	0.00	0.00
		N	499	499	442	499	497	488	499	499	499	499
	Germany	Mean	21.19	18.70	0.21	1.76	0.01	1.97	63.26	69.34	110.9	2.00
		Std. Dev.	33.96	14.23	0.41	1.03	0.10	1.14	0.00	0.00	0.00	0.00
		N	1077	1077	851	1077	1073	1065	1077	1077	1077	1077
	Spain	Mean	30.29	18.01	0.35	2.28	0.01	2.09	138.29	66.15	130.07	1.50
		Std. Dev.	49.81	17.19	0.48	1.18	0.12	1.06	0.00	0.00	0.00	0.00
		N	553	552	492	553	544	544	553	553	553	553
	Portugal	Mean	25.48	18.34	0.51	1.81	0.02	2.76	22.48	91.45	140.33	2.00
		Std. Dev.	47.54	19.26	0.50	1.12	0.14	1.10	0.00	0.00	0.00	0.00
		N	454	454	319	454	447	423	454	454	454	454
	Ireland	Mean	27.03	23.17	0.42	2.16	0.04	1.75	32.28	55.36	142.1	0.40
		Std. Dev.	45.46	24.57	0.49	1.34	0.20	0.91	0.00	0.00	0.00	0.00
		N	467	465	406	467	463	462	467	467	467	467
	South Korea	Mean	25.64	11.50	0.19	3.16	0.02	2.71	152.00	45.29	89.35	1.50
		Std. Dev.	46.54	8.27	0.39	1.01	0.14	1.29	0.00	0.00	0.00	0.00
		N	537	537	318	537	535	522	537	537	537	537
Total		**Mean**	**24.90**	**17.30**	**0.29**	**2.22**	**0.03**	**2.19**	**62.50**	**65.08**	**100.34**	**2.36**
		Std. Dev.	**43.09**	**16.27**	**0.45**	**1.23**	**0.16**	**1.15**	**51.90**	**12.39**	**36.04**	**2.10**
		N	**4296**	**4290**	**3357**	**4297**	**4259**	**4202**	**4297**	**4297**	**4297**	**4297**
Vietnam		**Mean**	**39.32**	**8.67**	**0.28**	**2.53**	**0.00**	**2.15**	**0.17**	**74.45**	**58**	**5.00**
		Std. Dev.	**46.62**	**6.03**	**0.45**	**1.36**	**0.07**	**0.98**	**0.00**	**0.00**	**0.00**	**0.00**
		N	**455**	**455**	**332**	**455**	**454**	**440**	**455**	**455**	**455**	**455**

Table 3.E Summary statistics of informal credit use of large firms by country groups

		icp	icd	ic_wc	ic1_wc	ic2_wc	ic3_wc	ic_fa	ic1_fa	ic2_fa	ic3_fa
CIS	Mean	4.08	0.27	5.26	0.21	0.41	4.64	2.66	0.33	0.54	1.79
	Std. Dev.	11.72	0.45	15.46	1.35	3.00	15.09	11.85	3.13	3.43	10.96
	N	92	92	121	121	121	121	92	92	92	92
CEE	Mean	5.77	0.20	6.35	0.43	0.88	5.04	5.25	0.50	0.87	3.88
	Std. Dev.	15.50	0.40	17.37	3.10	6.45	15.17	16.72	4.58	6.36	13.91
	N	161	161	185	185	185	185	161	161	161	161
Advanced	Mean	5.65	0.27	8.72	0.61	0.34	7.77	3.16	0.19	0.27	2.70
	Std. Dev.	13.30	0.44	20.49	6.72	3.14	19.29	12.33	2.02	3.70	11.67
	N	362	362	477	477	477	477	364	364	364	364
Vietnam	Mean	5.11	0.42	7.67	0.11	1.11	6.44	2.56	0.00	1.11	1.44
	Std. Dev.	7.25	0.50	12.82	0.75	4.87	11.76	7.12	0.00	4.87	5.07
	N	45	45	45	45	45	45	45	45	45	45
Total	Mean	6.10	0.29	8.89	0.48	0.29	8.12	3.10	0.30	0.27	2.53
	Std. Dev.	13.79	0.45	20.32	5.30	3.21	19.45	12.39	3.84	3.40	11.15
	N	1086	1086	1327	1329	1327	1327	1092	1092	1092	1092

Source: 2005 BEEPS

Table 3.F Summary statistics of informal credit use of large firms by country groups

		icp	icd	ic_wc	ic1_wc	ic2_wc	ic3_wc	ic_fa	ic1_fa	ic2_fa	ic3_fa
Low income	Mean	3.75	0.18	4.85	0.34	0.35	4.16	2.92	0.32	0.51	2.09
	Std. Dev.	11.32	0.38	15.30	2.46	3.77	14.65	11.79	3.55	4.86	10.15
	N	277	277	358	358	358	358	277	277	277	277
Lower Middle	Mean	7.37	0.31	11.08	0.67	0.42	9.99	3.85	0.24	0.26	3.35
income	Std. Dev.	15.73	0.46	22.96	7.08	3.93	21.60	14.83	2.45	3.62	13.83
	N	379	379	476	476	476	476	381	381	381	381
Upper Middle	Mean	6.75	0.33	10.02	0.43	0.02	9.57	2.58	0.38	0.00	2.20
Income	Std. Dev.	13.85	0.47	21.11	5.04	0.48	20.66	10.58	5.19	0.00	9.29
	N	380	380	443	445	443	443	384	384	384	384
High Income	Mean	4.60	0.38	6.90	0.10	1.00	5.80	2.30	0.00	1.00	1.30
	Std. Dev.	7.04	0.49	12.37	0.71	4.63	11.31	6.79	0.00	4.63	4.82
	N	50	50	50	50	50	50	50	50	50	50
Total	Mean	6.10	0.29	8.89	0.48	0.29	8.12	3.10	0.30	0.27	2.53
	Std. Dev.	13.79	0.45	20.32	5.30	3.21	19.45	12.39	3.84	3.40	11.15
	N	1086	1086	1327	1329	1327	1327	1092	1092	1092	1092

Source: 2005 BEEPS

Table 3.G Pairwise Correlations

	icp	ic_wc	ic_fa	ic1_wc	ic1_fa	ic2_wc	ic2_fa	ic3_wc	ic3_fa
ic_wc	0.9	1							
ic_fa	0.85	0.54	1						
ic1_wc	0.56	0.53	0.48	1					
ic1_fa	0.57	0.35	0.69	0.68	1				
ic2_wc	0.27	0.27	0.21	0.04	0.03	1			
ic2_fa	0.28	0.18	0.33	0.04	0.03	0.62	1		
ic3_wc	0.58	0.7	0.23	-0.02	-0.02	0	0	1	

Table 3.G continued.

	icp	ic_wc	ic_fa	ic1_wc	ic1_fa	ic2_wc	ic2_fa	ic3_wc	ic3_fa
ic3_fa	0.5	0.32	0.59	0	0	0	0.01	0.4	1
access	0.11	0.08	0.1	0.09	0.09	0.04	0.04	0.04	0.04
female	0.01	0	0.01	0	0.01	-0.03	-0.02	0.01	0.02
city	-0.01	-0.02	0.01	0.01	0.02	0	0.02	-0.04	-0.02
sttraded	0.01	0	-0.03	-0.05	-0.06	-0.03	-0.04	0.05	0.06
cr	0.01	0	0	-0.01	0.01	0	-0.02	0.02	0.01
prvtcre	0.02	0.04	-0.05	-0.08	-0.08	-0.04	-0.05	0.13	0.06
time	0.03	0.01	0.06	0.06	0.05	0.03	0.05	-0.04	0
size	-0.02	-0.01	-0.03	-0.05	-0.04	-0.01	0	0.01	0
age	-0.03	-0.01	-0.05	-0.07	-0.06	-0.03	-0.03	0.04	-0.01
overdue	0.02	0.03	0.02	0.02	0.01	0.02	0	0.01	0.01
macro	0.05	0.03	0.06	0.04	0.05	0.03	0.03	0	0.03

Table 3.G continued.

	access	female	city	sttraded	cr	prvtcre	time	size	age	overdue
female	-0.01	1								
city	-0.01	-0.04	1							
sttraded	-0.07	-0.03	0	1						
cr	-0.01	-0.05	-0.07	-0.06	1					
prvtcre	-0.1	0.07	-0.19	0.6	0.13	1				
time	0.09	-0.05	-0.01	-0.36	0.11	-0.43	1			
size	-0.05	-0.04	0.06	0	-0.01	0	0.02	1		
age	-0.04	-0.03	-0.02	0.03	0.03	0.12	-0.07	0.24	1	
overdue	0.06	-0.01	-0.02	-0.03	-0.03	-0.02	0.05	0.01	0.05	1
macro	0.3	0	0.04	-0.05	-0.08	-0.17	0.07	0	0	0.02

Table 3.H Estimation results for sole proprietorship firms

Variable	Family friends		Moneylender		Trade Credit		Tot inf. Credit
	IC1_FA	*IC1_WC*	*IC2_FA*	*IC2_WC*	*IC3_FA*	*IC3_WC*	*ICP*
FINCONST	0.243*	0.226**	0.154	0.215	0.081	0.087	0.170***
	(0.099)	(0.087)	(0.176)	(0.156)	(0.170)	(0.066)	(0.051)
FEMALE	0.033	-0.015	-1.354*	-1.275**	0.183	-0.148	-0.069
	(0.188)	(0.159)	(0.540)	(0.479)	(0.159)	(0.109)	(0.097)
CITY	0.052	0.041	0.093	0.114	0.060	-0.091	0.015
	(0.080)	(0.094)	(0.158)	(0.106)	(0.099)	(0.048)	(0.049)
STTRADED	-0.003	0.000	0.016**	0.003	-0.002	-0.007	0.000
	(0.006)	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)	(0.002)
CR	0.019**	0.002	-0.017***	-0.008	-0.003	-0.006	0.008**
	(0.007)	(0.010)	(0.005)	(0.005)	(0.010)	(0.009)	(0.003)
PRVTCRE	-0.009	-0.009	-0.033***	-0.016*	0.010	0.0125*	0.000
	(0.005)	(0.005)	(0.008)	(0.008)	(0.006)	(0.005)	(0.002)
TIME	0.066	0.088*	0.170***	0.098	0.156**	-0.013	0.069***
	(0.037)	(0.038)	(0.035)	(0.060)	(0.048)	(0.064)	(0.013)
SIZE	-0.016***	-0.007*	-0.005	0.003	0.001	0.003	-0.002
	(0.005)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)
AGE	-0.037**	-0.038***	-0.031	-0.0837*	0.002	0.003	-0.015
	(0.013)	(0.011)	(0.022)	(0.036)	(0.009)	(0.006)	(0.011)
OVERDUE	0.648	0.327	-1.248	0.315	0.630	0.110	0.371
	(0.485)	(0.460)	(1.078)	(0.387)	(0.356)	(0.350)	(0.332)
MACRO	0.057	0.053	0.168	-0.077	0.082	-0.082	0.042
	(0.103)	(0.091)	(0.227)	(0.102)	(0.133)	(0.076)	(0.070)
Pseudo R^2	0.201	0.168	0.173	0.125	0.150	0.170	0.153
N	2413	3279	2413	3279	2413	3279	2401

Notes: This table reports GLM estimates of the percentages of fixed assets/working capital financed by informal credit. All regressions include industry fixed effects and constant term. Robust standard errors are clustered by country and reported in parentheses. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%. N is the number of observations.

Table 3. I Estimation Results for separate groups of *FINCONST*

	Family friends		Moneylender		Trade Credit		Tot inf. Credit
Variable	*IC1_FA*	*IC1_WC*	*IC2_FA*	*IC2_WC*	*IC3_FA*	*IC3_WC*	*ICP*
2.FINCONST	0.411	0.576***	0.185	0.528	0.073	0.130	0.234
	(0.242)	(0.128)	(0.392)	(0.305)	(0.302)	(0.152)	(0.132)
3.FINCONST	0.576**	0.529**	0.314	0.724*	0.305	0.365*	0.442***
	(0.206)	(0.172)	(0.321)	(0.336)	(0.346)	(0.147)	(0.115)
4.FINCONST	0.840***	0.820***	0.921**	0.910**	0.362	0.333*	0.591***
	(0.203)	(0.148)	(0.290)	(0.338)	(0.282)	(0.134)	(0.101)
FEMALE	0.007	-0.012	-0.651	-0.819**	0.281**	0.074	0.036
	(0.133)	(0.112)	(0.372)	(0.278)	(0.101)	(0.082)	(0.066)
CITY	0.105	0.055	0.112	0.063	-0.003	-0.020	0.051
	(0.063)	(0.069)	(0.095)	(0.095)	(0.070)	(0.044)	(0.040)
STTRADED	-0.007	0.000	0.005	0.004	0.004	-0.003	0.001
	(0.004)	(0.003)	(0.005)	(0.004)	(0.004)	(0.004)	(0.001)

Table 3.I continued							
CR	0.0135**	0.002	-0.0200***	-0.001	-0.001	-0.006	0.002
	(0.005)	(0.007)	(0.005)	(0.006)	(0.006)	(0.007)	(0.002)
PRVTCRE	-0.006*	-0.009**	-0.016*	-0.008	0.007	0.011**	0.003*
	(0.003)	(0.004)	(0.008)	(0.005)	(0.005)	(0.004)	(0.002)
TIME	0.053	0.0812*	0.169***	0.0938**	0.149**	0.037	0.0749***
	(0.038)	(0.039)	(0.030)	(0.029)	(0.051)	(0.054)	(0.021)
SIZE	-0.017***	-0.011***	-0.001	0.004	0.003	0.004**	0.000
	(0.004)	(0.002)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)
AGE	-0.014**	-0.026***	-0.023	-0.042*	-0.006	0.000	-0.007*
	(0.005)	(0.007)	(0.014)	(0.017)	(0.004)	(0.004)	(0.003)
OVERDUE	0.323	0.540*	-0.648*	0.726**	0.337	0.106	0.323*
	(0.344)	(0.262)	(0.294)	(0.251)	(0.284)	(0.200)	(0.160)
MACRO	0.076	0.069	-0.040	0.035	0.138	-0.040	0.054
	(0.071)	(0.075)	(0.113)	(0.081)	(0.090)	(0.047)	(0.039)
N	5869	7636	5869	7635	5869	7635	5841

Notes: This table reports GLM estimates of the percentages of fixed assets/working capital financed by informal credit. All regressions include industry fixed effects and constant term. Robust standard errors are clustered by country and reported in parentheses. The * indicates statistical significance at 5%, ** at 1%, and *** at 0.1%. N is the number of observations.

Table 3.J Variable Definition and Sources for 2002-9 BEEPS data

Variable	Definition	Source
ICP1	Percentage of fixed assets financed by moneylenders, family/friends, and other non-bank financial sources	BEEPS
ICP2	Percentage of fixed assets financed by credits from suppliers or customers.	BEEPS
ICP3	The sum of the *ICP1* and *ICP2*.	BEEPS
FINCONST	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 as "minor obstacle", "moderate obstacle", and "major obstacle" respectively.	BEEPS
FEMALE	Dummy=1 if there is at least one owner is female, zero other- wise.	BEEPS
CITY	Dummy=1 if the firm is located in the capital or in a city with population over one million, zero otherwise.	BEEPS
STCAPIT	Value of listed shares to GDP expressed in percentage	Beck et al. (2010)
CR	Asset share of the three largest banks within the commercial banks (%)	Beck et al. (2010)
LOANGDP	Outstanding loans from commercial banks (%of GDP)	FAS
TIME	Average number of days counted from the moment the plaintiff decides to file the lawsuit in court until payment.	WB
SIZE	Number of the full time employees.	BEEPS
AGE	The number of years that the firm has been operating	BEEPS
OVERDUE	Dummy=1 if the firm had any payments overdue more than 90 days in the previous year, zero otherwise.	BEEPS

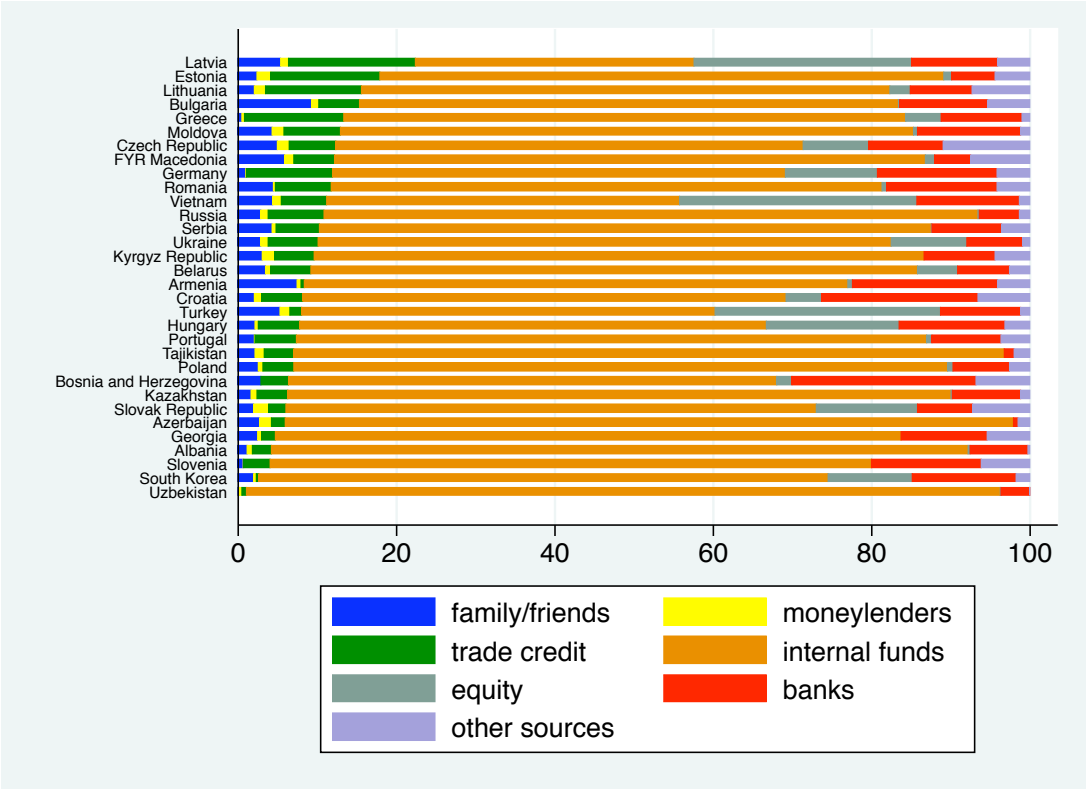
Table 3.K Summary Statistics for 2002-9 Data

Variable	Mean	Std. Dev.	Min	Max	N
ICP1	9.181	24.633	0	100	14904
ICP2	3.658	14.955	0	100	16041
ICP3	12.715	28.124	0	100	14861
FINCONST	1.432	1.264	0	4	24524
FEMALE	0.344	0.475	0	1	18069
CITY	0.143	0.350	0	1	25592
STCAPIT	36.540	39.192	0.1	172	63
CR	64.091	21.200	11	100	73
LOANGDP	40.14	23.76	1.6	133.7	74
TIME	451.389	205.497	195	1290	81
SIZE	40.891	53.519	1	250	25592
AGE	14.014	14.078	0	202	25455

Table 3.L Country composition of the 2005 BEEPS sample.

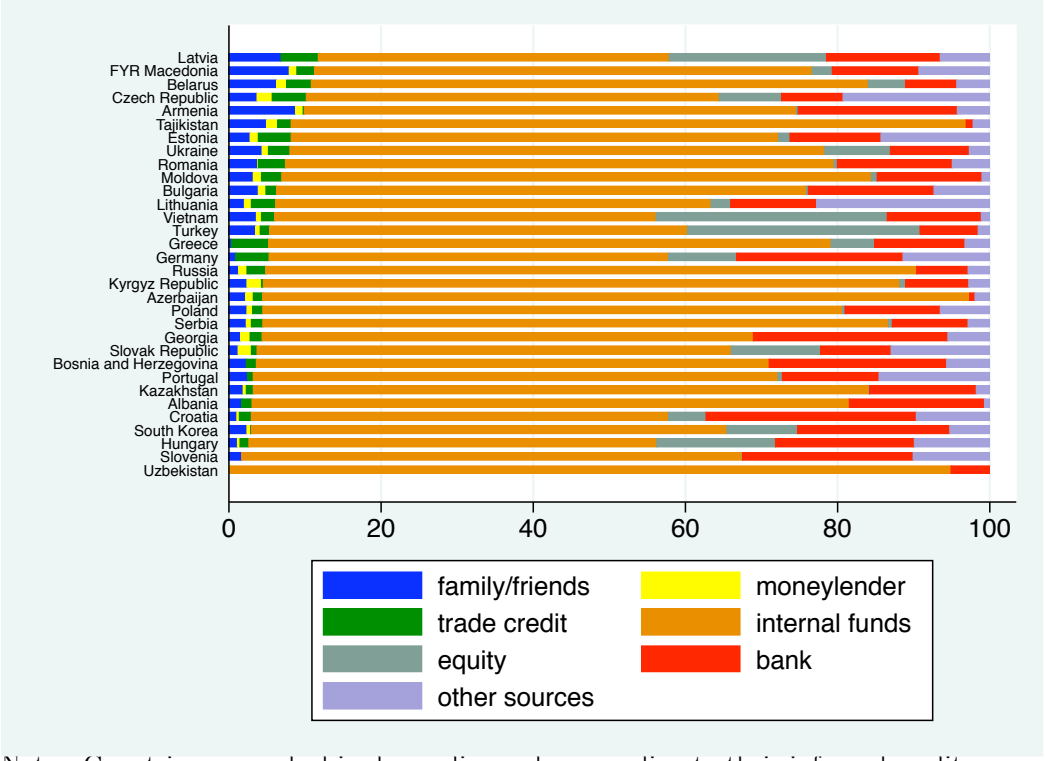
Country	N	Country	N
Bulgaria	272	FYR Macedonia	182
Albania	189	Armenia	334
Croatia	203	Kyrgyz Republic	181
Belarus	294	Estonia	198
Georgia	186	Czech Republic	317
Tajikistan	182	Hungary	563
Turkey	505	Latvia	187
Ukraine	542	Lithuania	187
Uzbekistan	273	Slovak Republic	198
Russia	535	Slovenia	195
Poland	913	Vietnam	455
Romania	544	Greece	499
Serbia	261	Germany	1,077
Kazakhstan	536	Spain	553
Moldova	317	Portugal	454
Bosnia and Herzegovina	182	Ireland	467
Azerbaijan	316	South Korea	537
	Total 12,834		

Figure 3.A Composition of the financing sources for working capital purchases



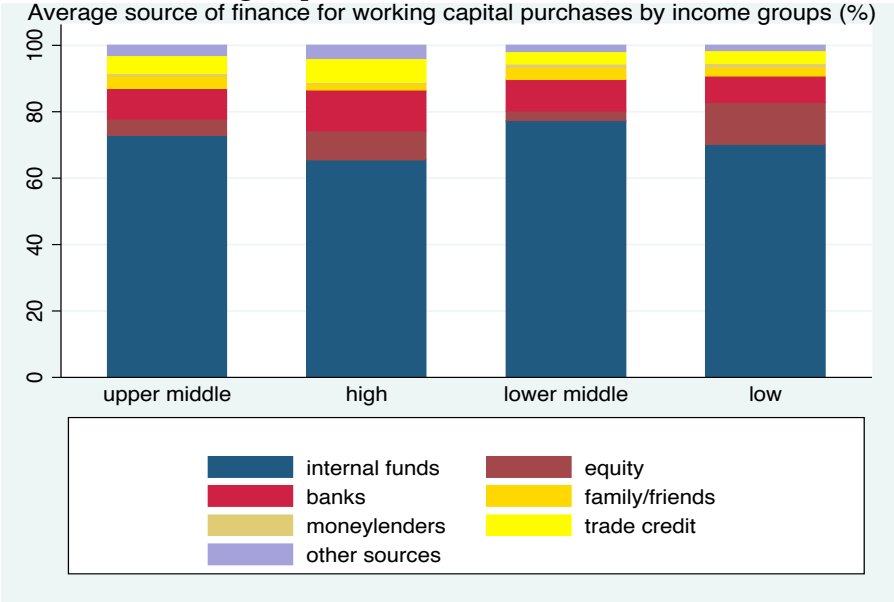
Notes: Countries are ranked in descending order according to their informal credit usage. Source: 2005 BEEPS.

Figure 3.B Composition of the financing sources for fixed asset investments



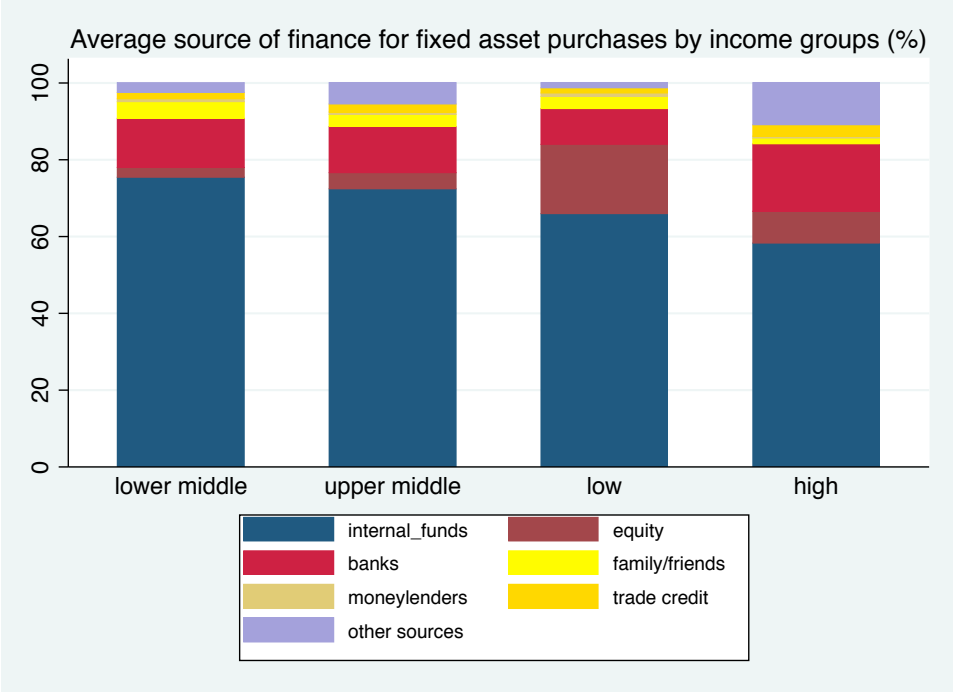
Notes: Countries are ranked in descending order according to their informal credit usage. Source: 2005 BEEPS.

Figure 3.C Composition of the financing sources for fixed asset investments by different income groups.



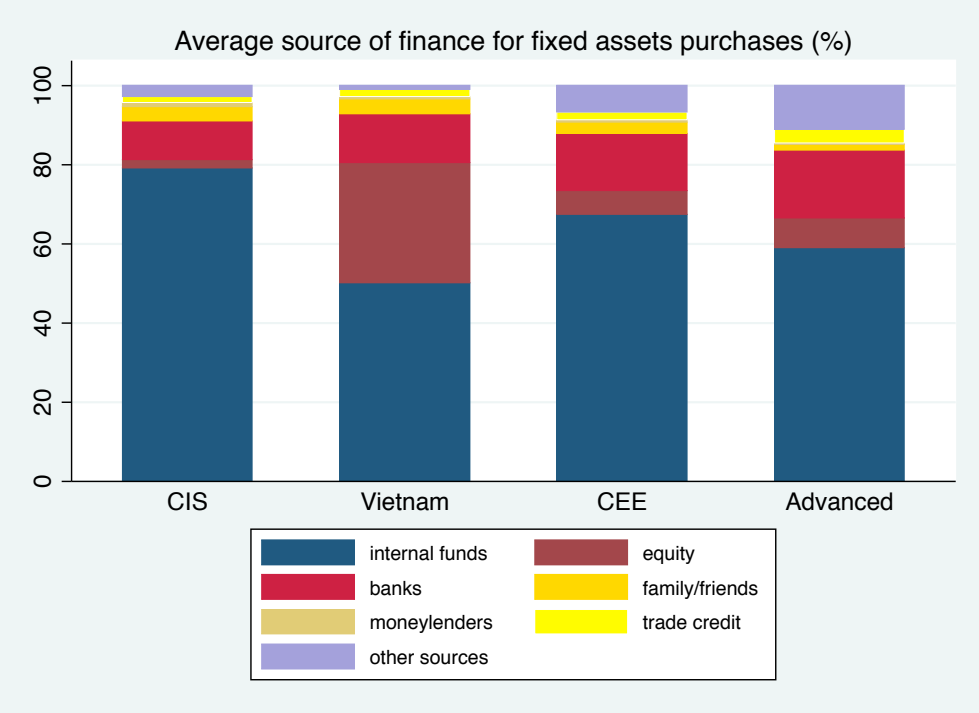
Source: 2005 BEEPS.

Figure 3.D Composition of the financing sources for fixed asset investments by different income groups.



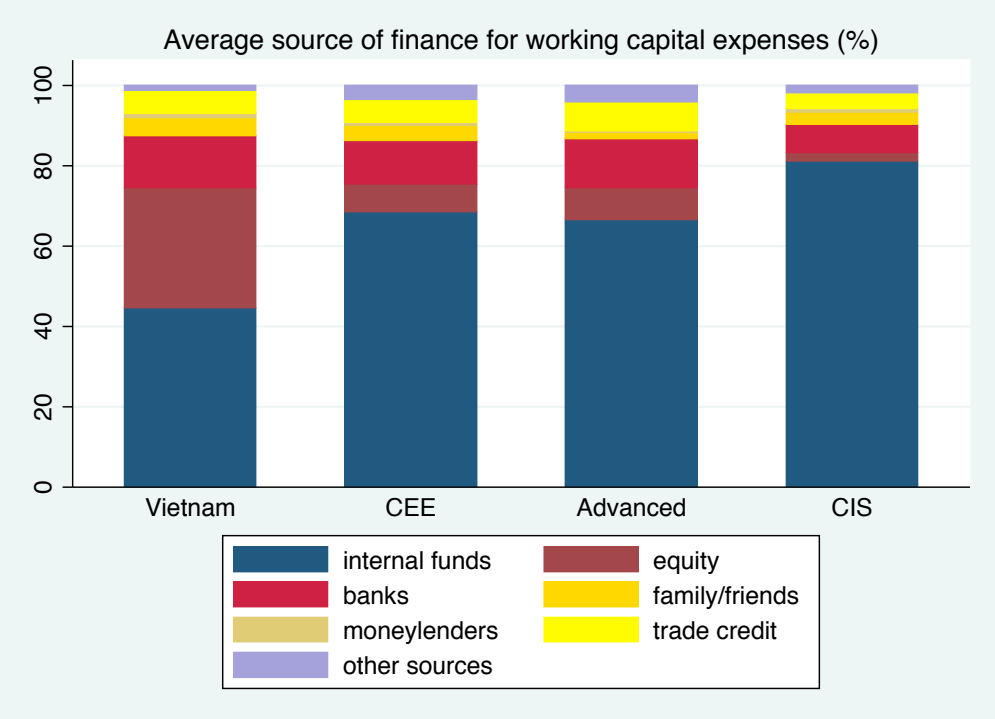
Source: 2005 BEEPS.

Figure 3.E Composition of the financing sources for fixed assets purchases by different country groups. Source: 2005 BEEPS.



Source: 2005 BEEPS.

Figure 3.F Composition of the financing sources for working capital purchases in different country groups.



Source: 2005 BEEPS.

Figure 3.G Kernel Density Function of IC1_FA

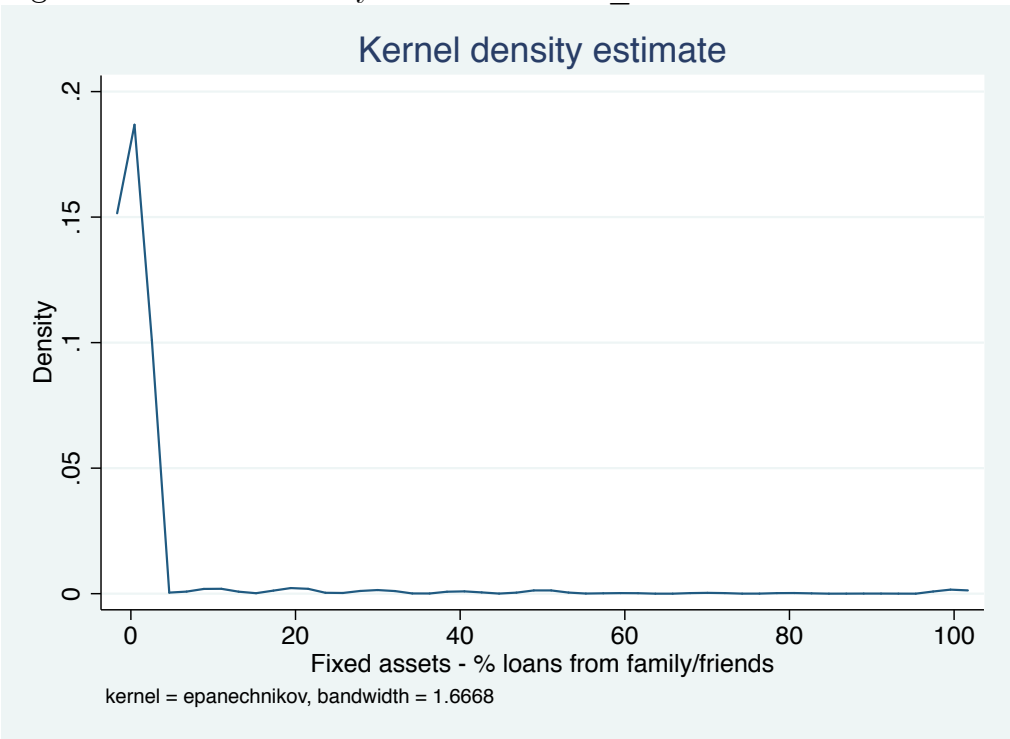


Figure 3.H Kernel Density Function of IC1_WC

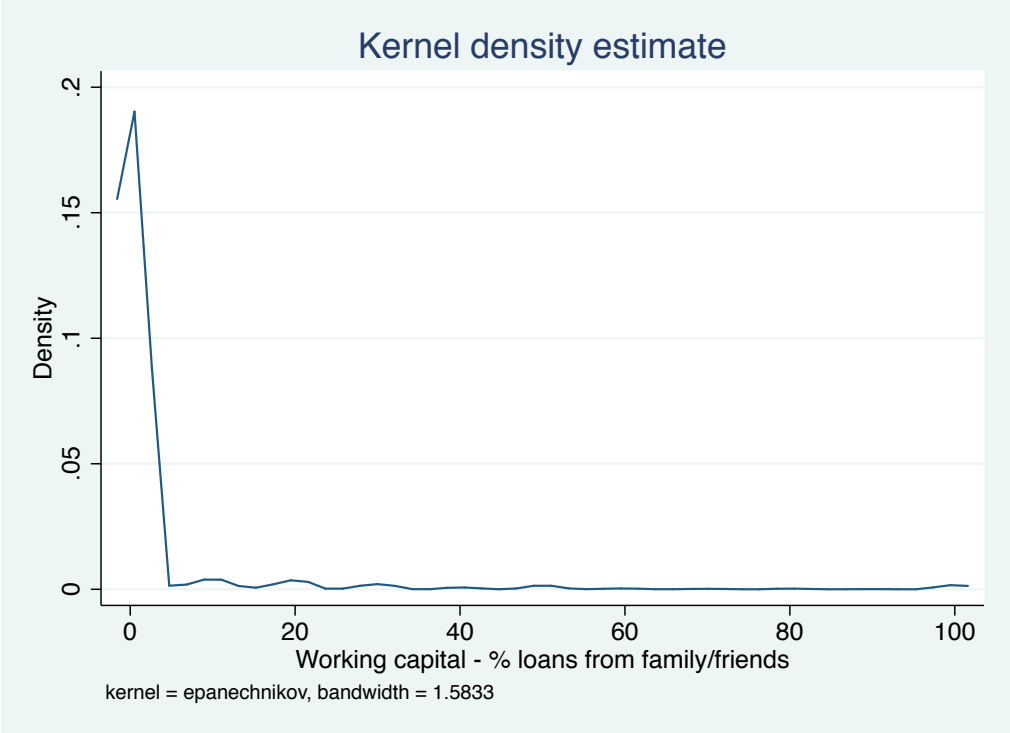


Figure 3.I Kernel Density Function of IC2_FA

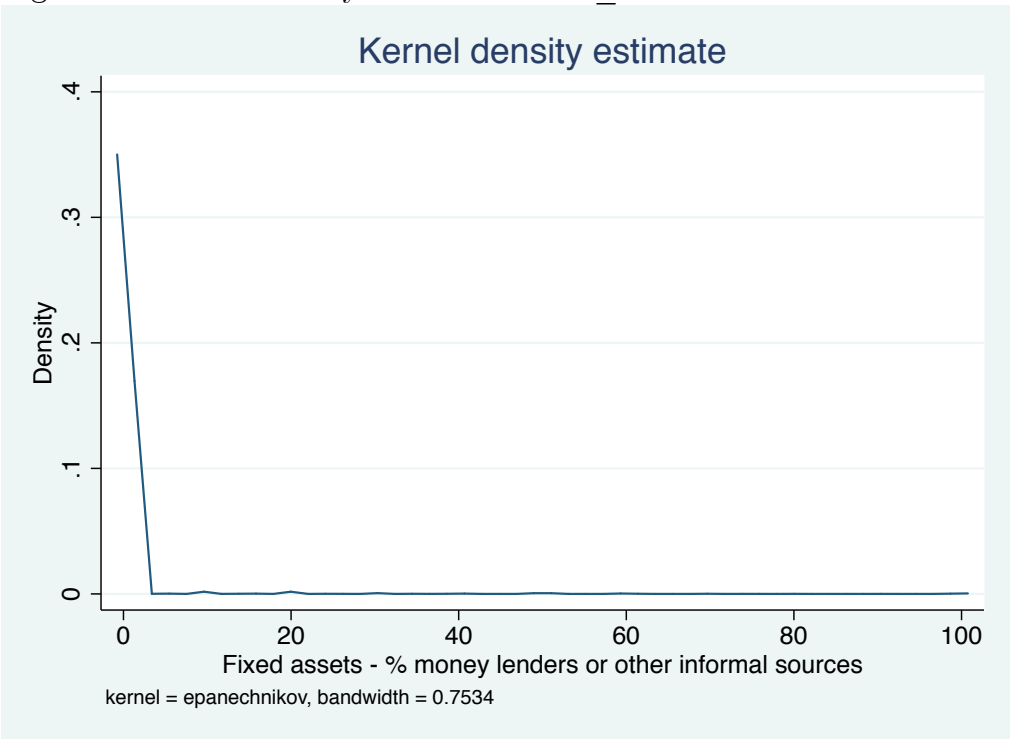


Figure 3.J Kernel Density Function of IC2_WC

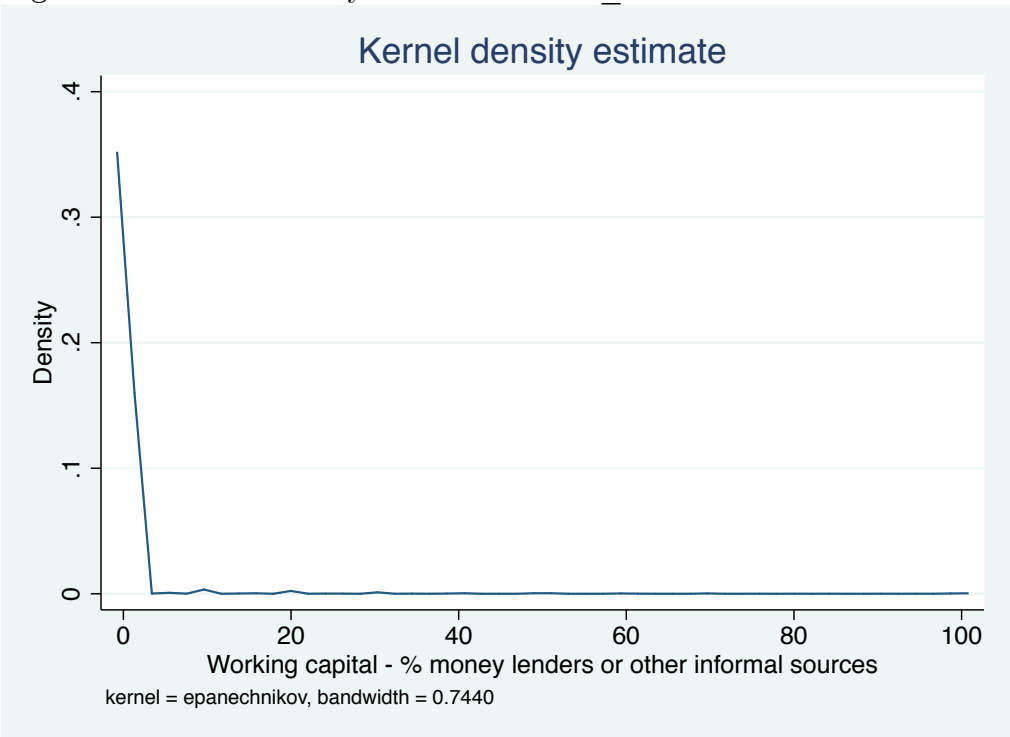


Figure 3.K Kernel Density Function of IC3_FA

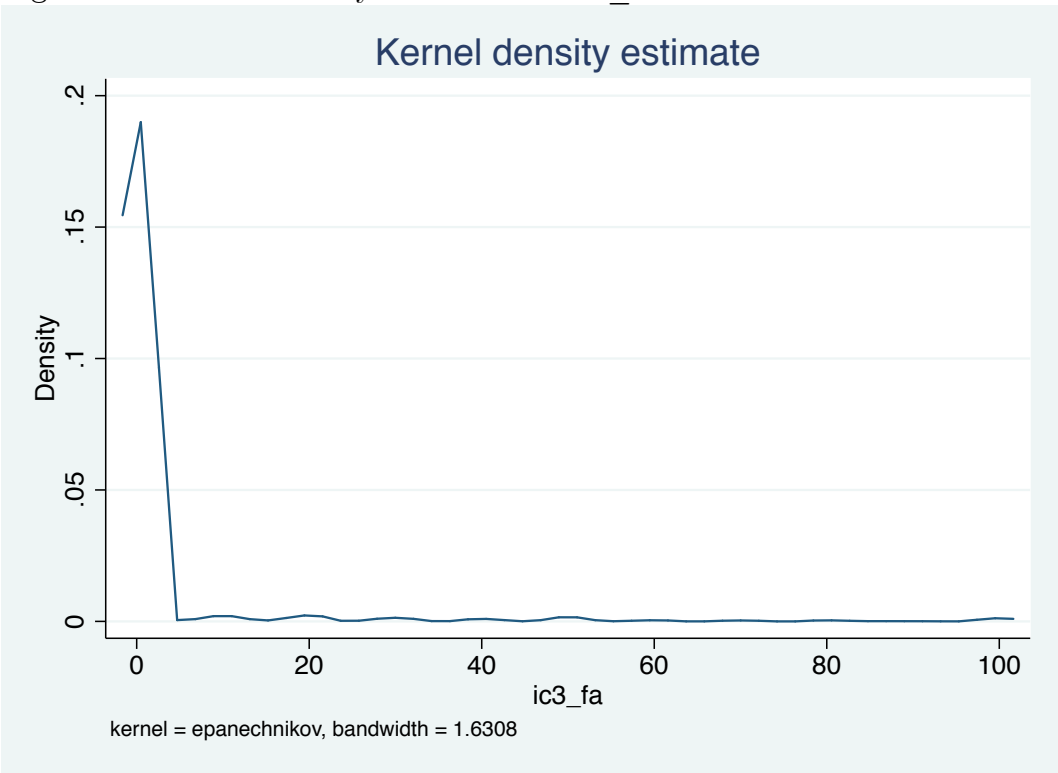
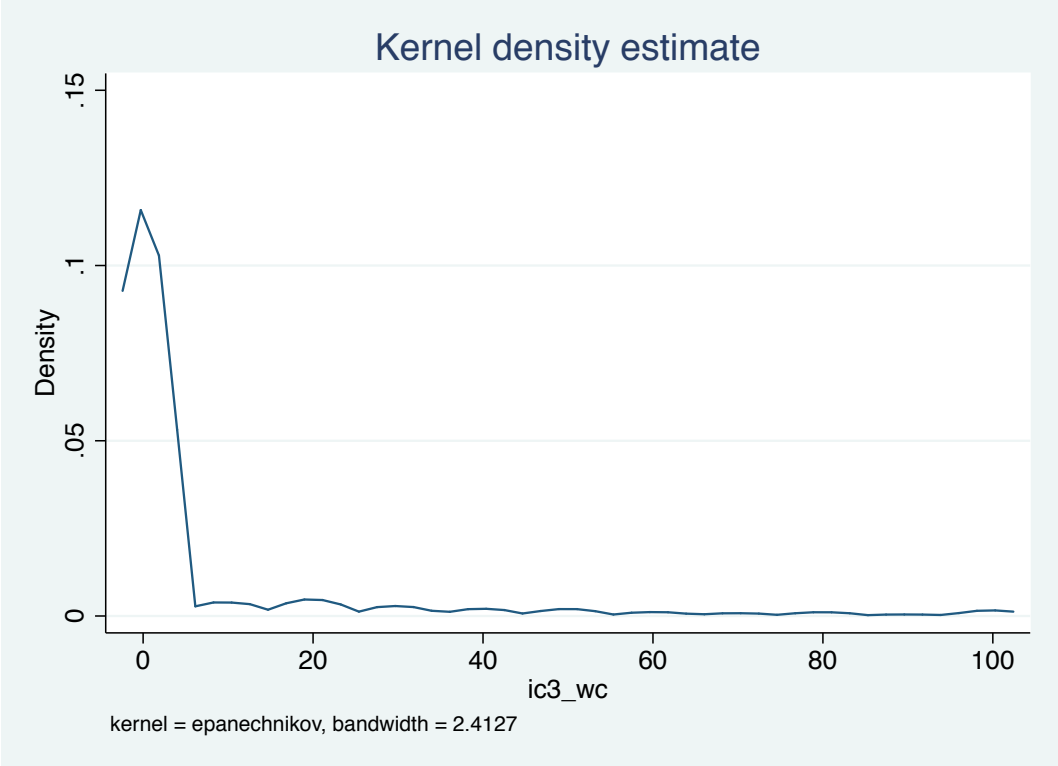


Figure 3.L Kernel Density Function of IC3_WC



Chapter 4

Female Entrepreneurs and Financial Constraints[64]

4.1 Introduction

Gender is one of the primary drivers of economic disparities between people. Although females become more and more visible in business and financial environments in the last decades, there are still only few female examples of the "richest" people or the "biggest businesses" in all around the world. This situation is a call for research for the systematic differences between the male and females. Women are stereotyped differently from men in general *e.g.* women have more emotional and cautious image as compared to men. Previous literature shows that female owned enterprises are more likely to be smaller, they operate in labour intensive and service sectors as compared to their male counterparts (Carter and Rosa, 1998). Female owned businesses are more likely to use retained earnings and have lower percentage of debt finance (Haines et al., 1999). These differences may have three different explanations: First female firm owners do not prefer to borrow due to their preferences. Second discriminatory lenders do not prefer to extend loans to female owned businesses. Third, market and cultural structures are not suitable enough to allow female owners to get loans.

Previous studies attach more risk aversion to females as compared to males (Powell and Ansic, 1997; Jianakoplos and Bernasek, 1998; Watson and Robinson, 2003; Croson and Gneezy, 2009) and this risk averse nature of females might be one explanation for their lower ratios of debt finance. Because women perceive greater risk with use of alcohol and other drugs, they are less likely to be drug and alcohol addicted (Spigner et al., 1993). Harrant and Vaillant (2008) compare male and female attitudes toward HIV. They find that even when other factors are controlled, women infected by the HIV virus are more risk averse than men in their contestation behaviour. Croson and Gneezy (2009) present a review of the

[64] An earlier version of this paper was presented at 4th Economic Development International Conference of the GRETHA-GRES in Bordeaux, France.

experimental studies on gender based preference differences. In this framework women entrepreneurs are more likely to use retained earnings rather than using external finance not because they are discriminated in loan markets but due to female entrepreneurs own preferences. Schubert et al. (1999) provide contradictory experimental evidence to the studies that find females more risk averse as compared to their male counterparts. Different from the other experimental studies Schubert et al. (1999) controls for economic conditions and finds that female subjects do not generally make less risky financial choices than male subjects. Their findings suggest that the source of gender-specific risk behaviour found in the other studies may be due to differences in male and female opportunity sets rather than stereotypic risk attitudes.

There is also a body of literature on the existence of gender-based discrimination against women in lending markets. In general, discrimination in lending markets comes from the desire of lenders to avoid making transactions and/or building relationships with certain demographical groups just because of their personal characteristics. In such cases, lenders have a disutility from granting loans to certain groups of borrowers and this discriminatory lenders may simply reject the loan applications or discourage the borrowers that they have a disutility, via stringent loan contract terms, *i.e.* charging higher interest rates, requiring higher collateral compared to loan size. Discriminatory lenders may decide regardless the riskiness of the alternative projects and they even may forgo profits in order to avoid interaction with the specific demographic groups. Sometimes lenders avoid granting loans to members of a certain group due to their beliefs and previous information on the demographic group. Literature on discrimination in loan markets is mostly dominated by the studies on racial discrimination and mortgage loan markets[65] (Munnell et al., 1992, 1996; Berkovec et al., 1998; Ladd, 1998; Han, 2004) while only little evidence found in favour of gender based discrimination in business loan markets in non-developed economies. Previous studies on racial discrimination present evidence mostly from U.S. data.

[65] These studies show that Blacks and Hispanics are more likely to have their mortgage applications rejected and if they get loan, they are more likely to end up with default.

In general these studies concentrated on racial discrimination in loan markets, while there are only few studies on gender based discrimination in business loan markets.[66]

Alesina et al. (2009) find that women in Italy pay higher interest rates for loans as compared to men, although there is no evidence show that women are riskier then men. Similar to Alesina et al. (2009), Bellucci et al. (2009) show that female entrepreneurs in Italy face more difficulties in accessing to credit, even though the interest rates they pay do not differ from those paid by male business owners. They present evidence consistent with the taste-based discrimination theory. Recently, Beck et al. (2011) find that loan officers charge higher interest rates to borrowers of the other gender although there is no difference in riskiness. They also show that the effect varies across borrower and loan officer characteristics, consistent with the idea of social distance; that is, younger loan officer are more likely to charge higher interest rates to older borrowers.

All these studies examine the female and male owned firms. Kim (2006) examines the equally owned firms in addition to female and male owned firms by using small business data from USA. She finds that female owned firms experience least difficulties in terms of successful loan applications as compared to other groups of firms. Using BEEPS 2005 data, Muravyev et al. (2009) provide some evidence in favour of discrimination against female entrepreneurs. They also show that the probability of loan approval for female entrepreneurs increases as financial development level-as measured by percentage of financial institutions' lending to GDP- in the country increases.

Finally market conditions in a country are important to determine the severity of discrimination. Becker (1957) argues that if the firms operate in more competitive product/service markets, they have much less incentives for discrimination. A firm that operates in a competitive environment gets lower profits and in order to survive the tough market conditions, the firm sometimes has to leave its discriminatory behaviour. Accordingly as the competition in

[66] Cavalluzzo and Cavalluzzo (1998); Blanchflower et al. (2003) are based on SMEs in USA.

lending markets gets tougher, lenders have much less incentives to discriminate against a certain group of borrowers (See Berkovec et al. 1998; Cavaluzzo and Cavaluzzo, 1998; Cavaluzzo et al., 2002).

To the best of our knowledge, our study is the second, after Muravyev et al. (2009) that use BEEPS data to address the financial constraints faced by female entrepreneurs in loan markets. Unlike Muravyev et al. (2009) we do not only use the 2005 data. We used pooled cross section dataset of 2002, 2005, 2007, 2008 and 2009 BEEPS. Secondly unlike Muravyev et al. (2009) we do not have Germany, Greece, Ireland, Spain, Portugal, South Korea and Vietnam. Finally we use different control variables[67] to examine whether the female entrepreneurs are more disadvantaged as compared to their male counterparts in loan markets.

The aim of our study is to see whether gender based advantage/disadvantage exists in loan markets and to determine the factors that contribute to rejection of loan applications. The rest of the paper is structured as follows. The next section provides brief information on the data and introduces the variables used in the empirical part. Section three gives descriptive statistics. We present the regression results in section four and section five concludes.

4.2 Data and variables

To address our research question we use firm-level data from The Business Environment and Enterprise Performance Surveys (BEEPS)[68]. BEEPS are joint projects of the European Bank for Reconstruction and Development (EBRD) and the World Bank which consist of firm-level data on 27 countries in Eastern Europe and Central Asia from 2005 to 2009[69] [70]. The BEEPS database covers

[67] As we used a standardized version of BEEPS along 2005-2009 the information set on firms differs from that of Muravyev et al. (2009).

[68] We used the standardized panel data along 2002-2009 waves of BEEPS as of April 30, 2010.

[69] Albania, Belarus, Georgia, Tajikistan, Turkey, Ukraine, Uzbekistan, Russia, Poland, Romania, Serbia, Kazakhstan, Moldova, Bosnia, Azerbaijan, Macedonia, Armenia, Kyrgyzstan, Estonia, Czech Republic, Hungary, Latvia, Lithuania, Slovakia, Slovenia, Bulgaria, Croatia, and Montenegro. Surveys are conducted in 2002, 2005, 2007, 2008 and 2009 and each year 6153, 10421, 1952, 3375 and 7815 firms surveyed respectively.

[70] Refer to BEEPS Reports on methodology and observations for information on stratification on regions and for more details on sampling http://www.ebrd.com/pages/research/analysis/surveys/beeps.shtml .

firms of various legal types, *i.e.* shareholding companies (both listed and shares traded privately), sole proprietorship firms, partnership and limited partnership firms... For the purpose of our analysis, we are only interested in the firms that has only one owner, and in the firms that we have information on the gender of their sole owner. Accordingly our sample shrinks to 5025 enterprises.

We have three binary dependent variables in this study. First we have *REJECT* which equals to one if the loan application of the firm is rejected, zero if the firm has an approved loan application. As we see in the summary statistics of the rejection rates are only slightly higher for female entrepreneurs. This direct comparison of rejection rates may underestimate the disadvantages of female entrepreneurs as previous studies address females to be more risk averse (Spigner et al., 1993; Powell and Ansic, 1997; Jianakoplos and Bernasek, 1998; Watson and Robinson, 2003; Harrant and Vaillant, 2008; Croson and Gneezy, 2009;) and overconfident as compared to their female counterparts (Barber and Odean, 2001; Beck et al. 2009). Accordingly female entrepreneurs may refrain from applying credit by thinking their loan application would be turned off. If this is the case, then using only *REJECT*, as the dependent variable may lead to underestimation of the disadvantages of female entrepreneurs in loan markets. The second dependent variable is *DISCOURAGED,*— conditional on the firm needs credit— which equals to one if the firm is a discouraged borrower *i.e.* give up looking for a loan because credit conditions are not suitable for the firm and/or the firm didn't think it would be approved. If the firm is a loan applicant (*REJECT*=1 or *REJECT*=0). *DISCOURAGED* equals to zero. Our third dependent variable is *LOAN*, which takes 1 if the firm gets credit, zero if is the firm is discouraged from borrowing or the loan application of the firm is rejected.

Table 4.1 gives the definitions of these variables as well as the other variables. Our independent variable of interest is the *FEMALE* dummy, which equals to one if the firm owner is female, zero otherwise, we examine the effect of *FEMALE* on our dependent variables using the many control variables.

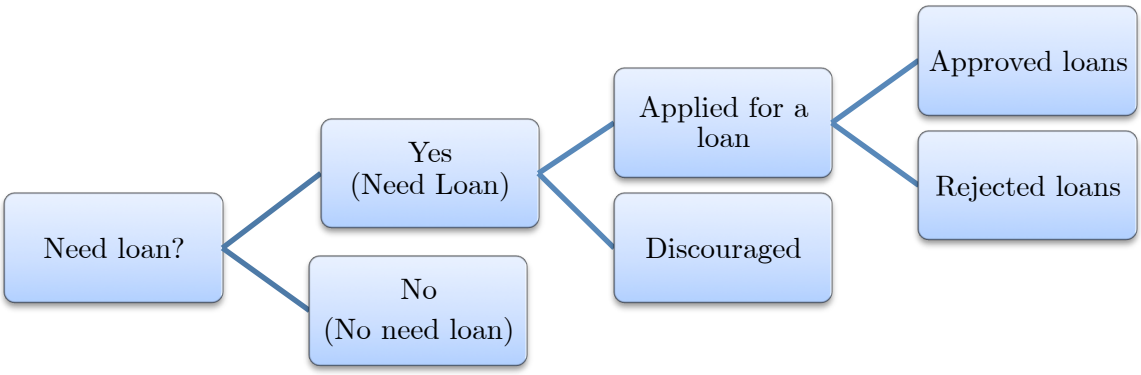


Figure 4.1 Loan application process (taken from Muravyev et al. 2009)

We employ the number of full–time employees as a measure of firm size (*SIZE*). *AGE* is the number of years that the firm has been operating. Older firms are more likely to have longer relationship with lenders, as shown by Berger and Udell (1995); accordingly, we expect these more established firms to get credit as compared to younger firms. *QUALITY* is a dummy variable that is set equal to one if the firm has an internationally recognized quality certification, such as ISO 9000 or ISO 9002, and zero otherwise. As the firms that have quality certifications are more likely to perform better we expect to observe these firms to be less financially constrained as compared to the firms that do not have quality certifications. Additionally we consider innovative and exporter firms—as captured by binary variables of *INNOV* and *EXPORT*—to be less financially constrained and as we expect these firms to perform better. As proxies for firm level risk and firm level financial distress *OVERDUE* and *CRIME* are employed in the regressions. We expect lenders to be less willing to grant loans to the firms that have more than ninety days unpaid utility bills and/or if the firm is located in environments that feature intense criminal activity. *CITY* is a dummy variable, which equals to one if the firm is located in the capital or in a city that has over one million inhabitants. This variable controls for potential differences in availability of financial services in larger versus smaller cities.

Table 4.1 Variable definitions

Variable	Definition	Source
REJECT	Dummy=1 if the firm has a rejected loan application, zero if the firm has an approved loan application.	BEEPS
DISCOURAGED	Dummy=1 if the firm is a discouraged borrower *i.e.* give up borrowing because credit conditions are not suitable for the firm and/or the firm didn't think it would be approved, equals to zero if the firm is a loan applicant (*REJECT*=1 or *REJECT*=0).	BEEPS
LOAN	Dummy=1 if the firm gets a loan, zero if *DISCOURAGED*=1 or *REJECT*=1.	BEEPS
FEMALE	Dummy=1 if the owner is female, zero otherwise.	BEEPS
SIZE	The number of the fulltime employees.	BEEPS
AGE	The number of years that the firm has been operating.	BEEPS
QUALITY	Dummy=1 if the firm has an internationally recognized quality certification such as ISO 9000, 9002 or 14000, zero otherwise.	BEEPS
EXPORTER	Dummy=1 if the firm is an exporter firm, zero otherwise.	BEEPS
INNOV	Dummy=1 if the firm has introduced new products or services within the last three years, zero otherwise.	BEEPS
OVERDUE	Dummy=1 if the firm has utilities payments overdue by more than 90 days, zero otherwise.	BEEPS
CRIME	Dummy=1 if the firm has experienced losses due to theft, robbery, vandalism or arson in the previous year, zero otherwise.	BEEPS
CITY	Dummy=1 if the firm is located in the capital or in a city with population over one million, zero otherwise.	BEEPS
CR	Asset share of the three largest banks within the commercial banks.	Bankscope
LNGDPPC	Natural logarithm of the GDP per capita.	EBRD

As the lenders have market power, they may charge higher interest rates and lead to lower loan to GDP ratios in more concentrated lending markets. Accordingly higher concentration ratios can be associated with higher loan rejection probabilities. However this view is challenged by recent studies in relationship banking. In Petersen and Rajan's (1995) seminal paper presents evidence on the strength of relationship banking to the degree of that banks' market power. Accordingly, as the concentration rates in banking increases, banks

are more likely to built closer relationships with their borrowers that will results in lower loan rejection rates especially for young and small firms. Survey results show that private commercial banks are the biggest source of external finance to cover the fixed asset investments. They provide loans for 12.31% of the fixed asset, together with the state owned commercial banks and government agencies this share increases to 14.45%. Since banks are the primary lending institutions banking sector concentration measures can be considered as a good proxy for loan market concentration. In our study we use *CR*, the share of commercial bank assets that are owned by the three largest commercial banks, as a measure of banking concentration to control for differences in concentration in the lending markets of the examined countries. Finally we use the natural logarithm of the GDP per capita to control for the macroeconomic environment in each country.

4.3 Descriptive statistics

Before presenting regression results, we examine the effects of gender on financing behaviours using descriptive statistics. First of all Table 4.2 shows that the share female owned enterprises on the total number of enterprises decrease as with the size of the enterprises. 34% and 26% of the micro and small sized enterprises are female owned respectively. This share gets smaller for the medium and large enterprises as female entrepreneurs own 22% of the both medium and large enterprises. This picture reveals that female entrepreneurs own smaller businesses as compared to male entrepreneurs.

Table 4.2 Gender and firm size

Size	Number of male owned firms	Number of female owned firms	Total number of firms	% of female owned firms
Micro (smaller than 10)	1,730	896	2,626	0.34
Small (10-49)	1,314	449	1,763	0.26
Medium (50-249)	409	116	525	0.22
Large (250 and over)	86	25	111	0.22
Total	3,539	1,486	5,025	0.29

Secondly we use the available information on firms' perception on difficulty of accessing finance. In BEEPS surveys firms are asked to report on a 1 ("no

obstacle") to 5 ("very severe obstacle") scale how difficult access to finance (which includes availability and cost, interest rates, fees and collateral requirements) is for the current operations of the firm. Table 4.3 presents the distribution of firms with respect to their perception on difficulty of accessing finance and gender. This rough picture shows that firms perception of suffering from access to finance do not vary extensively by gender categories. The percentage of the firms that perceive access to finance as a minor and no problem were 51 % both for male owned and female owned enterprises. The percentage of the firms that perceive access to finance as a major and very severe were 23% both for male owned and female owned enterprises. We also do not observe statistically significant differences by gender as the t-test results confirm in Table 4.5. Accordingly we can say that female and male owned enterprises have the same perception on difficulty of accessing finance.

Table 4.3 Gender and perception on difficulty of accessing finance

Access to finance	Number of male owned firms	% of male owned firms	Number of female owned firms	% of female owned firms	Total
No obstacle	1,016	29.96	447	31.81	1,463
Minor obstacle	732	21.59	280	19.93	1,012
Moderate obstacle	863	25.45	353	25.12	1,216
Major obstacle	668	19.7	262	18.65	930
Very severe obstacle	112	3.3	63	4.48	175
Total	3,391	100	1,405	100	4,796

Firms are asked several questions regarding their loan applications the most recent loans received (if any) in the BEEPS. BEEPS also collects information on the reasons of firms not having loan (in case of firms answered they had no loan). There can be several reasons for a firm of not having loan. First of all the firm may not need loan. Secondly the firm may have a loan application that is rejected. Finally the firm may be discouraged with loan application. In our study we define discouraged borrowers as the enterprises that need loans but do not apply loan for the following reasons: (1) application procedures for loans or lines of credit are complex, (2) interest rates are not favourable, (3) collateral requirements are too high, (4) size of loan and maturity are insufficient, (5) it is

necessary to make informal payments to get bank loans, (6) did not think it would be approved. In order to understand these sub-groups of firms, the graphical representation of the loan application process is given in Graph 1 in the previous section.

Table 4.4 Loan applications and gender

	Number of male owned firms	% of male owned firms	Number of female owned firms	% of female owned firms	Total number of firms	% of Total
need loan	2,515	71	1,003	68	3,518	70
no need loan	1,013	29	472	32	1,485	30
Total	3,528	100	1,475	100	5,003	100
loan applicants	870	60	299	54	1,169	59
discouraged	577	40	252	46	829	41
Total	1,447	100	551	100	1,998	100
approved loans	740	85	247	82	987	84
rejected loans	130	15	53	18	183	16
Total	870	100	300	100	1,170	100

Table 4.4 presents the data on loan application sub-groups by gender. In this table we grouped firms that need loan and did not need loan by gender of the owner as a first step of the loan application process. We have information on the firms that did not need loan[71], and we can infer the sub group of the firms that need loan: we can consider the discouraged borrowers, and loan applicants (both resulted in rejected and approved loans) as the firms that need loan.

In the second step of the loan application process, we have discouraged and non-discouraged firms (loan applicants). We define the discouraged borrowers as the enterprises that we understand that the firm needed loan but do not apply loan for the following reasons: (1) Application procedures for loans or lines of credit are complex, (2) Interest rates are not favourable, (3) Collateral

[71] In BEEPS, the following question is asked to the enterprises: *"What was the main reason why this establishment did not apply for any line of credit or loan in the previous fiscal year?"* and firms are asked to choose one of the following eight options as an answer: (1) No need for a loan—establishment has sufficient capital (2) Application procedures for loans or lines of credit are complex (3) Interest rates are not favourable (4) Collateral requirements are too high (5) Size of loan and maturity are insufficient (6) It is necessary to make informal payments to get bank loans (7) Did not think it would be approved (8) Other.

requirements are too high, (4) size of loan and maturity are insufficient, (5) it is necessary to make informal payments to get bank loans, (6) did not think it would be approved. We define a non-discouraged (loan applicant) firm as the firm that applied for loan. To sum in a nutshell, we have a binary dummy variable that equals to one if the firm is a discouraged from applying for a loan, zero if the firm is a loan applicant conditional on the firm needs loan.

Finally, in the third step of the loan application process we have rejected and approved loans, conditional on being applied for a loan. In our sample, 68% of female owned enterprises need loan, 71% of male owned enterprises need loan. This result shows that female entrepreneurs may be more likely to conduct businesses that do not require external financing[72]. This result also confirms the previous studies which show that females are more risk averse as compared to males accordingly they are more likely to use internal funds rather than applying for external finance.

Second, the share of discouraged borrowers among female owned enterprises is higher than that of their male counterparts, 46% versus 40%. The loan rejection rates for female owned enterprises are only slightly higher than that of male owned enterprises. Conditional on applying a loan, are rejected in their loan applications, 18% of the female owned enterprises, while 15% of the male owned enterprises. These numbers may show that female entrepreneurs are disadvantaged in loan markets because they are more discouraged than male entrepreneurs.

Table 4.5 reports the mean and standard deviations of the variables by gender of the entrepreneurs. The last column of the table reports the p-values for the t-tests of the equality of means between the female and male owned enterprises. In line with tabulations presented in Table 4.2, the t-test for the equality of that female and male owned enterprises show that both groups have the same perception on difficulty of accessing finance as summary statistics of *FINCONST*

[72] See Table 4.C in appendix for a picture of sectoral composition of the sample by gender of the owner. The average share of female entrepreneurs in the sectors is 25% and only in garments sector the share of female entrepreneurs exceed 50%.

indicate. Statistics in Table 4.4 reveal that the number of discouraged enterprises (*DISCOURAGED*) and the number of enterprises that have no demand for loan (*NONEEDLOAN*) is higher for female entrepreneurs group as shown in Table 4.5. We observe higher mean values of rejection rates for female firm owners but this difference is not statistically significant.

Table 4.5 Selected characteristics of male and female owned firms

	Male owned firms			Female owned firms			Total			
	mean	std dev	N	mean	std dev	N	mean	std dev	N	p-value
FINCONST	1.45	1.20	3391	1.44	1.24	1405	1.45	1.21	4796	0.85
NONEEDLOAN	0.29	0.45	3528	0.32	0.47	1475	0.30	0.46	5003	0.02**
REJECT	0.15	0.36	870	0.18	0.38	300	0.16	0.36	1170	0.26
DISCOURAGED	0.40	0.49	1447	0.46	0.50	551	0.41	0.49	1998	0.02**
LOAN	0.51	0.50	1447	0.45	0.50	551	0.49	0.50	1998	0.01**
SIZE	31.0	76.7	3522	21.2	57.1	1475	28.1	71.6	4997	0.00***
AGE	11.9	9.99	3523	10.8	8.35	1473	11.6	9.5	4996	0.00***
OVERDUE	0.04	0.19	3168	0.03	0.16	1385	0.03	0.18	4553	0.01**
QUALITY	0.11	0.31	3526	0.08	0.27	1483	0.10	0.30	5009	0.00***
CITY	0.30	0.46	3539	0.25	0.43	1486	0.28	0.45	5025	0.00***
CRIME	0.18	0.39	3535	0.18	0.38	1484	0.18	0.39	5019	0.52
INNOV	0.38	0.49	3241	0.35	0.48	1394	0.37	0.48	4635	0.02**
EXPORTER	0.18	0.39	3539	0.12	0.33	1486	0.17	0.37	5025	0.00***
LNGDPPC	8.34	0.94	56	8.41	0.87	56	8.36	0.92	56	0.02**
CR	0.63	0.18	52	0.61	0.19	52	0.62	0.18	52	0.00***

Notes: The last column report p-values for t-tests of the equality of means between female and male owned enterprises. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. N is the number of observations.

On the other hand we observe that female owned enterprises tend to be smaller and younger as compared to male owned enterprises. Female owned enterprises are less innovative, less likely to have research and development expenditures, less likely to have an internationally recognized quality certification (such as ISO 9000, 9002 or 14000). Moreover they experience higher ratios of losses due to theft, robbery vandalism or arson to the sales and they perceive crime, theft and disorder as a bigger obstacle to the operations of their enterprise as measured by *CRIME*[73].

[73] BEEPS also collects information on firms' perception on crime. Specifically, firms are asked to report on a 0 ("No obstacle") to 4 ("Major obstacle") scale *"How much of an obstacle are crime, theft and disorder to their establishment"*. Using this variable doesn't make a significant change in

Table 4.6 Financial sources of fixed asset investments by gender

		(1)	(2)	(3)	(4)	(5)	(6)
male	mean	68.40	4.65	13.35	2.09	2.75	8.76
owned firms	std dev	40.34	18.36	28.60	11.98	13.29	23.71
	N	2,082	2,082	2,082	2,082	2,082	2,082
female	mean	72.01	6.12	9.74	2.39	2.67	7.07
owned firms	std dev	39.37	22.15	25.70	12.13	12.43	21.97
	N	795	795	795	795	795	795
Total	mean	69.40	5.06	12.36	2.17	2.73	8.29
	std dev	40.10	19.49	27.87	12.02	13.05	23.25
	N	2,877	2,877	2,877	2,877	2,877	2,877

Notes: (1) Internal funds or retained earnings, (2) Owners' contribution or issued new equity shares, (3) private banks, (4) state owned banks, (5) Purchases on credit from suppliers and advances from customers, *i.e.* trade credit (6) Other (moneylenders, friends, relatives, non-banking financial institutions etc.), *i.e.* informal credit. N is the number of observations.

In BEEPS firms are asked to report the financial source for the percentage of the fixed asset investments in the year preceding the survey. We summarize the answers of the enterprises in Table 4.6. Our findings are in line with Haines et al (1999) which indicate lower ratios of debt finance for female owned businesses. We see that on average the share of retained earnings and owners' contribution or issued new equity shares in fixed asset investment is higher in female-owned firms, 72.01% versus 68.40% and 6.12% versus 4.65% respectively. The female owned enterprises tend to have a smaller fraction of private bank credit as compared to men 9.74% versus 13.35%. However this gap is decreases in the fraction of state owned bank financing. Finally we see that the female owned enterprises have lower fractions of trade credit and informal credit usage.

Before presenting results of the multivariate analysis we should emphasize that previous literature is critical about the omitted variables while testing the effect of gender on financial constraints as the presence of discrimination are vulnerable to omitted-variable bias. Accordingly we include as many as possible variables provided by BEEPS to account for the creditworthiness of the firms and country level differences.

the results.

4.4 Regression results

Table 4.7 reports the results of probit models for the three dependent variables. We run two sets of regressions. The difference between them is the inclusion of interaction between *CR* and *FEMALE*. Market conditions in a country may be important in determining the severity of discrimination. In his seminal work Becker (1957) argues that discriminatory firms may forgo profits as they have a taste of discrimination. A firm that operates in a competitive environment gets lower profits and in order to survive in tough market conditions, is likely to leave its discriminatory behaviour. Accordingly the firms that operate under competitive pressure are less likely to discriminate against certain demographic groups. As the competition in lending markets gets tougher, lenders have much less incentives to discriminate against a certain group of borrowers. Following Berkovec et al. (1998), Cavalluzzo et al. (2002), Muravyev et al. (2009) the interaction between *CR* and *FEMALE* allows us to test whether the level of banking concentration affects the gap between male and female entrepreneurs in obtaining credit.

As presented in descriptive statistics the results of univariate analysis indicate some evidence for disadvantage of female entrepreneurs, when the disadvantage is measured by *DISCOURAGED.* The coefficient estimate for *FEMALE* becomes only statistically significant at 10% when *DISCOURAGED* and *LOAN* are dependent variables which indicate a disadvantage for female entrepreneurs in loan markets.

However female ownership has no effect on loan rejections, as the coefficient estimate of *FEMALE* is statistically insignificant on *REJECT*. As seen in Table 4.7, this disadvantage vanishes when the other factors are controlled in addition to country, year and industry dummies as we find no evidence in favour of presence of a discrimination or disadvantage against female entrepreneurs as measured by the coefficient estimate of *FEMALE*. The statistical insignificance of the coefficient estimate for *FEMALE* increases as we include the interaction term between *CR* and *FEMALE* which again indicate no evidence in favour of

discrimination for female entrepreneurs and the insignificance of discrimination gets stronger in the regressions where we include the interaction between *CR* and *FEMALE.*

Table 4.7 Baseline Probit Results

	REJECT	*DISCOURAGED*	*LOAN*	*REJECT*	*DISCOURAGED*	*LOAN*
FEMALE	0.058	0.113	-0.109	-0.066	-0.081	0.063
	(0.132)	(0.088)	(0.089)	(0.388)	(0.264)	(0.266)
SIZE	-0.004**	-0.007***	0.007***	-0.004**	-0.007***	0.007***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
AGE	-0.018*	0.000	0.007	-0.018*	0.000	0.007
	(0.007)	(0.004)	(0.005)	(0.007)	(0.004)	(0.005)
OVERDUE	-0.270	-0.329	0.242	-0.267	-0.324	0.237
	(0.252)	(0.220)	(0.201)	(0.252)	(0.221)	(0.201)
QUALITY	-0.130	-0.314*	0.268	-0.131	-0.313*	0.268
	(0.209)	(0.151)	(0.146)	(0.209)	(0.151)	(0.146)
CITY	0.099	-0.036	-0.028	0.098	-0.036	-0.027
	(0.144)	(0.095)	(0.096)	(0.144)	(0.095)	(0.096)
CRIME	0.012	-0.219*	0.176	0.014	-0.220*	0.177
	(0.139)	(0.100)	(0.100)	(0.139)	(0.100)	(0.100)
INNOV	-0.270*	-0.442***	0.462***	-0.272*	-0.446***	0.465***
	(0.121)	(0.081)	(0.081)	(0.121)	(0.081)	(0.081)
EXPORTER	-0.219	-0.283*	0.336**	-0.218	-0.285*	0.337**
	(0.165)	(0.123)	(0.117)	(0.165)	(0.123)	(0.117)
LNGDPPC	-0.382	-1.800***	1.435**	-0.373	-1.802***	1.434**
	(0.921)	(0.480)	(0.471)	(0.923)	(0.480)	(0.472)
CR	-0.270	-0.371	0.432	-0.344	-0.494	0.536
	(0.755)	(0.439)	(0.436)	(0.782)	(0.466)	(0.467)
CRXFEMALE				0.191	0.300	-0.267
				(0.569)	(0.392)	(0.396)
Pseudo R^2	0.16	0.23	0.24	0.16	0.22	0.23
N	830	1432	1435	801	1399	1402

Notes: Moldova, Serbia, Montenegro and Tajikistan are excluded in the regressions due to lack of observation. All regressions include constant terms, country, industry and year fixed effects. Robust standard errors are clustered at firm level and reported in parentheses. *, **, and *** indicate statistical significance at the 5%, 1% and 0.1% levels, respectively. N is the number of observations.

As for the control variables we see that larger, innovative, exporter firms and the firms that have internationally recognized quality certifications are less likely to be discouraged from applying credit as compared to smaller, non-innovative, non-exporter and to the firms that do not have internationally recognized quality certifications. Although coefficient estimate for *LNGDPPC* is statistically insignificant in the regressions where *REJECT* is the dependent variable, it yield

significant estimates in the regressions where *DISCOURAGED* and *LOAN* are dependent variables. That is to say, the sole proprietorship firms are less likely to be discouraged from applying credit and more likely to get credit as *LNGDPPC* increases. This result suggests in favour of presence a reduction in financial constraints due to the possible occurrence of credit expansion. We observe that being an exporter firm doesn't have a statistically significant effect on the probability of a loan being rejected. But having a rejected loan and being an innovative firm as captured by *INNOV,* are negatively related. Although we do not report in order to save space, all regressions in Table 4.7, include country, industry and year dummies and we have the 2005 as the base year. Regression in Table 4.7, yield significantly positive coefficient estimates for the 2008 and 2009 dummies, which indicate a positive association between being a discouraged firm and financial crisis experienced after 2007. The coefficient estimate for 2009 is smaller than the coefficient estimate for 2008 year. This result shows that effect of the recent crisis on financial constraint is decreasing, as it is lower in 2009 as compared to 2008.

4.4.1 Robustness checks

Although a firm is solely owned by a female, its top manager can be another person, *i.e.* a male. In Table 4.8 in order to see the disadvantages in loan markets faced by female entrepreneurs that have female top managers[74] we employ *FEMALE2*, (*FEMALE* multiplied by a dummy variable, which equals to 1 if the top manager of the firm is female, zero if the top manager is male[75]) as our independent variable of interest. Along 2005-2009 waves of the BEEPS 1450 sole proprietorship firms provide an answer to the question: *"Is the Top Manager*

[74] The owner herself can also be the manager.

[75] However in 2005 wave of the BEEPS firms are asked answer to the following question if the largest shareholder is an individual or family member, *"Is this individual or family member also the manager/director of this firm?"*. Following Muravyev et al. (2009), we multiply this dummy variable with *FEMALE* and obtain information on the gender of a sole owner who is also the top manager. As we add this relevant information in 2005 wave of the BEEPS, number of observations grows. However we choose not to report these results in the main text as Muravyev et al. (2009) presents a complete analysis of the issue for year 2005. Table 4.D in appendix presents the pooled regression results for the years 2005, 2008 and 2009.

female?" and these answers show that 24% of this firms have a female top manager while 29.6% of the firms have a female owner. We are interest in the sole proprietorship firms, and they tend to be small in size as compared to companies[76]. The correlation between having a female top manager and havig a female owner is calculated as 67% for the whole sample of sole proprietorship firms. This correlation increases to 78% for the micro sized firms that have less than 11 full time employees. Only 5% of the firms have more than 100 full time employees. SMEs are more likely to be have their owners as the top manager. This valuable information on the gender of the top manager is not available for firms surveyed in 2005 wave of the BEEPS (except in Turkey 32 firms provide an answer to this question) and the response rates for the gender of the top manager is not high. This is why we observe a huge fall in the number of observations in Table 4.8.

Along regressions in Table 4.8, we observe the enterprises that have a sole female owner–who is also the top manager of the firm–are more likely to be disadvantaged than their male counterparts when the disadvantage is indicated by $LOAN$ and $DISCOURAGED$ as the coefficient estimates of *FEMALE2* are at least statistically significant at 10%. Our results in Table 4.8 are in line with Muravyev et al. (2009) who uses 2005 BEEPS, the same variable (*FEMALE2*) to address female entrepreneurship and different control variables than ours. As we include observations from 2008 and 2009 waves of BEEPS we can say that the disadvantaged position of female entrepreneurs are not affected largely from the recent financial crisis. As for the control variables we see that the larger and innovative firms are less likely to be disadvantaged in loan markets where $LOAN$ and $DISCOURAGED$ are the dependent variables. When $LOAN$ is the dependent variable, the coefficient estimate of CR[77] is found to be negative. These results show that probability of getting credit for a sole proprietorship firm decreases as the banking industry become more concentrated. This result indicates more severe financial constraints for firms where the share of the three largest banks is higher.

[76] See Figure 4.A in the Appendix for the distribution of sole proprietorship firms with respect to their size.

[77] Statistically significant at 10%.

However we fail to confirm this relationship in the rest of the regressions.

Table 4.8 Probit regression results for female top managers

	REJECT	*DISCOURAGED*	*LOAN*	*REJECT*	*DISCOURAGED*	*LOAN*
FEMALE2	0.194	0.286	-0.281	0.676	0.756	-0.914*
	(0.226)	(0.154)	(0.152)	(0.660)	(0.432)	(0.449)
SIZE	-0.002	-0.005**	0.005***	-0.002	-0.005**	0.005***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
AGE	-0.023*	-0.001	0.009	-0.023*	-0.001	0.009
	(0.010)	(0.007)	(0.007)	(0.010)	(0.006)	(0.007)
OVERDUE	0.172	-0.620*	0.147	0.181	-0.620*	0.147
	(0.320)	(0.314)	(0.290)	(0.316)	(0.313)	(0.287)
QUALITY	-0.007	-0.098	0.037	0.005	-0.108	0.042
	(0.269)	(0.203)	(0.194)	(0.271)	(0.202)	(0.194)
CITY	-0.173	-0.143	0.209	-0.173	-0.142	0.208
	(0.228)	(0.151)	(0.149)	(0.229)	(0.152)	(0.150)
CRIME	0.194	-0.448**	0.243	0.198	-0.443**	0.234
	(0.207)	(0.164)	(0.158)	(0.208)	(0.164)	(0.157)
INNOV	-0.286	-0.615***	0.561***	-0.27	-0.601***	0.544***
	(0.191)	(0.124)	(0.122)	(0.187)	(0.125)	(0.124)
EXPORTER	0.264	-0.148	0.021	0.27	-0.137	0.009
	(0.236)	(0.195)	(0.190)	(0.236)	(0.194)	(0.189)
LNGDPPC	-0.224	0.86	-1.843	-0.179	0.848	-1.893
	(1.839)	(1.042)	(1.792)	(1.837)	(1.047)	(1.815)
CR	0.598	5.561	-7.796	0.819	5.665	-8.105
	(4.730)	(3.567)	(4.713)	(4.727)	(3.592)	(4.785)
CRxFEMALE2				-0.682	-0.662	0.887
				(0.895)	(0.586)	(0.597)
Pseudo R^2	0.15	0.24	0.23	0.15	0.24	0.24
N	339	624	634	339	624	634

Notes: Moldova, Serbia, Montenegro and Tajikistan are excluded in the regressions due to lack of observation. All regressions include constant term, country, industry and year dummies. Robust standard errors are clustered at firm level and reported in parentheses. *, **, and *** indicate statistical significance at the 5%, 1% and 0.1% levels, respectively. N is the number of observations.

Table 4.9 presents probit regression results for each year separately. Our variable of interest is *FEMALE* among the independent variables, as it is in Table 4.7. We again have insignificant coefficient estimates for the effect of female ownership on financial constraints faced by sole proprietorship firms. We see the effect of firm size is statistically significant only in 2005 and 2008, while the age of the firm gains statistical significance in 2009. The coefficient estimates for these two variables are in line with our expectations. The effect of *QUALITY* is

strongest in year 2005, while this effect vanishes in 2008 and 2009. In line with the results presented in Table 4.7 and 4.8, we observe innovative firms to be more likely to get loans, and to be less likely to be discouraged from applying for a loan.

Table 4.9 Probit regressions by year

	2005			2008			2009		
	REJECT	*DISCOURAGED*	*LOAN*	*REJECT*	*DISCOURAGED*	*LOAN*	*REJECT*	*DISCOURAGED*	*LOAN*
FEMALE	0.325	0.137	-0.157	-0.137	0.08	-0.003	0.027	0.096	-0.13
	(0.217)	(0.130)	(0.136)	(0.327)	(0.183)	(0.190)	(0.277)	(0.182)	(0.179)
SIZE	-0.011*	-0.013***	0.018***	-0.003	-0.011***	0.008***	-0.002	-0.003	0.003
	(0.004)	(0.003)	(0.005)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)
AGE	-0.017	-0.003	0.006	-0.006	0.001	-0.001	-0.064**	-0.012	0.029**
	(0.011)	(0.007)	(0.007)	(0.011)	(0.009)	(0.009)	(0.023)	(0.010)	(0.011)
OVERDUE	-0.802	0.008	0.274	.	0.082	0.313	0.451	-0.915*	0.024
	(0.579)	(0.306)	(0.308)	.	(0.507)	(0.528)	(0.416)	(0.389)	(0.379)
QUALITY	-0.76	-0.984**	0.969**	-0.47	0.013	0.155	0.083	-0.201	0.091
	(0.524)	(0.299)	(0.314)	(0.451)	(0.322)	(0.308)	(0.406)	(0.274)	(0.255)
CITY	0.62**	0.215	-0.331*	-0.543	-0.258	0.47*	-0.131	-0.032	0.147
	(0.229)	(0.139)	(0.139)	(0.369)	(0.210)	(0.207)	(0.328)	(0.220)	(0.222)
CRIME	0.001	-0.025	0.034	0.732*	-0.289	-0.017	-0.091	-0.592**	0.403
	(0.213)	(0.132)	(0.135)	(0.366)	(0.264)	(0.254)	(0.280)	(0.223)	(0.211)
INNOV	-0.27	-0.297*	0.327**	-0.261	-0.694***	0.581**	-0.385	-0.557**	0.492**
	(0.185)	(0.116)	(0.119)	(0.365)	(0.182)	(0.184)	(0.268)	(0.174)	(0.174)
EXPORT	-0.429	-0.228	0.263	0.909*	0.209	-0.403	-0.405	-0.219	0.294
	(0.257)	(0.178)	(0.172)	(0.361)	(0.280)	(0.275)	(0.368)	(0.278)	(0.271)
LNGDPPC	0.285	-0.264	0.165	-0.893**	-0.480**	0.736***	0.468	0.859	-1.999
	(0.388)	(0.325)	(0.303)	(0.344)	(0.172)	(0.176)	(1.924)	(1.085)	(1.729)
CR	-0.176	-1.723	1.304	-0.786	-0.604	0.865	1.799	5.392	-7.755
	(1.464)	(0.932)	(0.928)	(0.784)	(0.449)	(0.457)	(4.890)	(3.691)	(4.541)
Pseudo R^2	0.32	0.28	0.33	0.29	0.27	0.26	0.23	0.25	0.27
N	452	794	794	153	293	297	175	322	332

Notes: Moldova, Serbia, Montenegro and Tajikistan are excluded in the regressions due to lack of observation. All regressions include constant term, industry and country dummy variables. Robust standard errors are clustered at firm level and reported in parentheses. *, **, and *** indicate statistical significance at 5%, 1% and 0.1% levels, respectively. N is the number of observations.

Table 4.10 Regressions results with sample selection

	REJECT	*REJECT*	*REJECT*	*REJECT*
FEMALE	0.037	-0.047		
	(0.143)	(0.395)		
FEMALE3			0.111	0.139
			(0.176)	(0.439)
SIZE	-0.004	-0.003	-0.003	-0.003
	(0.004)	(0.004)	(0.004)	(0.004)
AGE	-0.019**	-0.019**	-0.019*	-0.019*
	(0.007)	(0.007)	(0.007)	(0.007)
OVERDUE	-0.216	-0.196	-0.191	-0.185
	(0.313)	(0.311)	(0.315)	(0.314)
QUALITY	-0.106	-0.093	-0.103	-0.098
	(0.255)	(0.254)	(0.250)	(0.249)
CITY	0.096	0.097	0.101	0.103
	(0.145)	(0.146)	(0.146)	(0.146)
INNOV	-0.216	-0.198	-0.200	-0.191
	(0.239)	(0.240)	(0.242)	(0.243)
EXPORTER	-0.159	-0.144	-0.148	-0.143
	(0.221)	(0.222)	(0.218)	(0.218)
LNGDPPC	-0.458	-0.375	-0.489	-0.462
	(1.184)	(1.184)	(1.158)	(1.159)
CR2	-0.396	-0.418	-0.367	-0.343
	(0.771)	(0.807)	(0.773)	(0.798)
CRXFEMALE(3)		0.122		-0.049
		(0.595)		(0.667)
INVMILLS	-0.161	-0.224	-0.194	-0.217
	(0.680)	(0.680)	(0.670)	(0.670)
Pseudo R^2	0.158	0.158	0.156	0.156
N	820	820	818	818

Notes: Moldova, Serbia, Montenegro and Tajikistan are excluded in the regressions due to lack of observation. All regressions include constant term, industry and country dummy variables. Robust standard errors are clustered at firm level and reported in parentheses. *, **, and *** indicate statistical significance at 5%, 1% and 0.1% levels, respectively. N is the number of observations.

We check if our estimations are affected by the sample selection in Table 4.10. As the discouraged firms do not apply for loans we can't know what would be the potential result of their loan application. We see that *CRIME* doesn't have a statistically significant effect on *REJECT*, but has statistically significant effect on the *DISCOURAGED* as presented the baseline regression results in Table 4.7. Based on these results we included *CRIME* in the selection equation where

DISCOURAGED is the dependent variable. Our dependent variable in the main equation is *REJECT*. In the first two columns of Table 4.10, our variable of interest is *FEMALE*, *i.e.* gender of the owner. In the third and fourth columns our variable of interest is *FEMALE3*, *i.e.* gender of the top manager. As we compare the results in Table 4.7 and Table 4.D in the appendix with Table 4.10, we see that neither gender of the owner nor gender of the top manager affects the probability of having a rejected loan application.

Table 11 Regressions by size of the firms

	micro sized firms			other sizes		
	loan	discouraged	reject	loan	discouraged	reject
FEMALE	0.031	0.026	-0.072	-0.063	0.040	-0.063
	(0.117)	(0.113)	(0.193)	(0.156)	(0.156)	(0.219)
SIZE	0.115***	-0.125***	-0.037	0.005***	-0.005***	-0.002
	(0.022)	(0.021)	(0.033)	(0.001)	(0.002)	(0.001)
AGE	-0.004	0.007	-0.005	0.016*	-0.006	-0.030**
	(0.008)	(0.007)	(0.009)	(0.007)	(0.007)	(0.012)
OVERDUE	0.057	-0.226	-0.116	0.348	-0.454	-0.331
	(0.276)	(0.286)	(0.415)	(0.325)	(0.322)	(0.444)
QUALITY	0.020	0.088	-0.148	0.371	-0.461*	-0.255
	(0.260)	(0.252)	(0.424)	(0.202)	(0.222)	(0.285)
CITY	-0.146	-0.029	0.360	0.121	-0.032	-0.112
	(0.138)	(0.131)	(0.212)	(0.156)	(0.163)	(0.245)
CRIME	0.242	-0.230	-0.096	0.102	-0.300	0.316
	(0.135)	(0.129)	(0.203)	(0.173)	(0.185)	(0.240)
INNOV	0.539***	-0.397***	-0.552**	0.440**	-0.594***	-0.100
	(0.112)	(0.109)	(0.174)	(0.138)	(0.142)	(0.215)
EXPORTER	0.091	-0.002	-0.142	0.306	-0.278	-0.213
	(0.191)	(0.196)	(0.292)	(0.170)	(0.181)	(0.250)
LNGDPPC	0.579	-0.885	0.292	2.122**	-2.628***	-1.659
	(0.625)	(0.679)	(1.419)	(0.724)	(0.712)	(1.341)
CR	-0.119	0.190	0.114	0.158	-0.144	-0.280
	(0.543)	(0.533)	(0.919)	(0.899)	(0.991)	(1.254)
N	770	770	367	648	619	320

Notes: All regressions include constant term, industry and country dummy variables. Robust standard errors are clustered at firm level and reported in parentheses. *, **, and *** indicate statistical significance at 5%, 1% and 0.1% levels, respectively. N is the number of observations.

In order to evaluate the effect of female ownership on the financial constraints for different sizes of firms we run separate regressions for micro and firms of other sizes. We define the firms with less than 11 full time employees as micro firms and

observe that the non-effect of the female ownership on financial constraints is valid for both micro and other sized firms as presented in Table 11.

4.5 Conclusion

The aim of this paper is to examine the financial constraints faced by female owned sole proprietorship firms in loan markets. We address this question by using a firm-level data on 27 countries in Eastern Europe and Central Asia from 2005 to 2009 and examining the issue for sole proprietorship firms *i.e.* the firms that have female owner versus the firms that have male owner. We define financial constraints via probability of a firm getting loan. We also take into account the firms those are discouraged from borrowing and the available information on firms' perception on difficulty degree of access to finance. Female and male owned enterprises have the same perception on difficulty of accessing finance as the descriptive statistics show that firms suffering from access to finance do not vary extensively with respect to gender categories.

In our sample the percentage of discouraged enterprises and the percentage of enterprises that have no demand for loan is slightly higher for female entrepreneurs as compared to their male counterparts. Although we observe higher mean values of rejection rates for female firm owners, this difference is not statistically significant. As we control for the firm and country level differences in the multivariate analysis, the significance of financial constraints for female owned firms mostly disappears. We also take into account the effect of top manager's gender in order to examine the existence of financial constraints in loan markets faced by sole proprietorship firms that have female top managers. We have some evidence in favour of the fact that the enterprises that have a female top manager are more likely to be discouraged from loan application than their male counterparts. Encouraging policies for female entrepreneurs in lending markets should be implemented in order to facilitate higher firm growth rates and accordingly economic growth in less-developed countries. To this end less-developed countries will be able to catch up with the developed economies.

Before closing we should mention about the limitations of our study. First BEEPS doesn't provide all necessary information that lenders may require to evaluate the creditworthiness of borrowers. In order reduce concerns of omitted variables bias we take into account all available information provided in BEEPS. Second the structure of BEEPS doesn't allow us to know the share of female owners. So it would be a more complete analysis of financial constraints by gender, if we had available information to compare three groups of firms: firms that only have female entrepreneurs, only have male entrepreneurs, and firms that have both male and female owners. A comparison between these groups of firms in other countries can be a direction future research topic as well as comparisons between developed, less-developed, developing, and/or transition economies.

4.6 References

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4.7 Appendix

Table 4.A Female entrepreneurship by countries

Country	Number of male owned firms	Number of female owned firms	Total	% of female owned firms	Number of firms with male top manager	Number of firms with female top manager	Total	% of female managed firms
Georgia	51	45	96	46.9	34	14	48	29.2
Ukraine	191	164	355	46.2	147	68	215	31.6
Romania	14	12	26	46.2	2	1	3	33.3
Kazakhstan	127	109	236	46.2	13	11	24	45.8
Latvia	46	39	85	45.9	5	4	9	44.4
Hungary	71	46	117	39.3	1	2	3	66.7
Belarus	100	63	163	38.7	53	20	73	27.4
Moldova	80	47	127	37	31	10	41	24.4
Poland	378	206	584	35.3	96	37	133	27.8
Bulgaria	226	118	344	34.3	52	18	70	25.7
Kyrgyzstan	61	30	91	33	11	3	14	21.4
Bosnia	113	55	168	32.7	45	12	57	21.1
Russia	145	70	215	32.6	3	6	9	66.7
Lithuania	70	33	103	32	36	12	48	25
Slovakia	62	27	89	30.3	23	8	31	25.8
Estonia	8	3	11	27.3	1	0	1	0
Czech Republic	154	54	208	26	49	14	63	22.2
Slovenia	42	14	56	25	10	1	11	9.1
Tajikistan	103	34	137	24.8	17	5	22	22.7
Uzbekistan	176	58	234	24.8	90	14	104	13.5
Montenegro	65	17	82	20.7	61	9	70	12.9
Serbia	200	48	248	19.4	107	12	119	10.1
Croatia	275	62	337	18.4	14	3	17	17.6
FYROM	102	22	124	17.7	20	0	20	0
Turkey	98	18	116	15.5	106	10	116	8.6
Azerbaijan	252	44	296	14.9	97	5	102	4.9
Armenia	214	34	248	13.7	13	6	19	31.6
Albania	115	14	129	10.9	7	1	8	12.5
Total	3,539	1,486	5,025	29.6	1,144	306	1,450	21.1

Table 4.B Female entrepreneurship by country groups

	Number of male owned firms	Number of female owned firms	Total	% of female owned firms	Number of firms with male top manager	Number of firms with female top manager	Total	% of female managed firms
European Union	1,071	552	1,623	34	275	97	372	26.1
Southeastern Europe	870	218	1,088	20	254	37	291	12.7
Middle income CIS	563	406	969	41.9	216	105	321	32.7
Low income CIS	937	292	1,229	23.8	293	57	350	16.3
Turkey	98	18	116	15.5	106	10	116	8.6
Total	3,539	1,486	5,025	29.6	1,144	306	1,450	21.1

Notes: European Union countries included in the sample are Poland, Hungary, Romania, Lithuania, Slovakia, Slovenia, Bulgaria; Southeastern Europe countries are Bosnia, FYROM, Croatia, Montenegro, Albania, Serbia; Middle income CIS countries are Belarus, Ukraine, Russia, Kazakhstan; Low income CIS countries are Georgia, Tajikistan, Uzbekistan, Moldova, Azerbaijan, Armenia, Kyrgyzstan.

Table 4.C Sectoral composition by gender

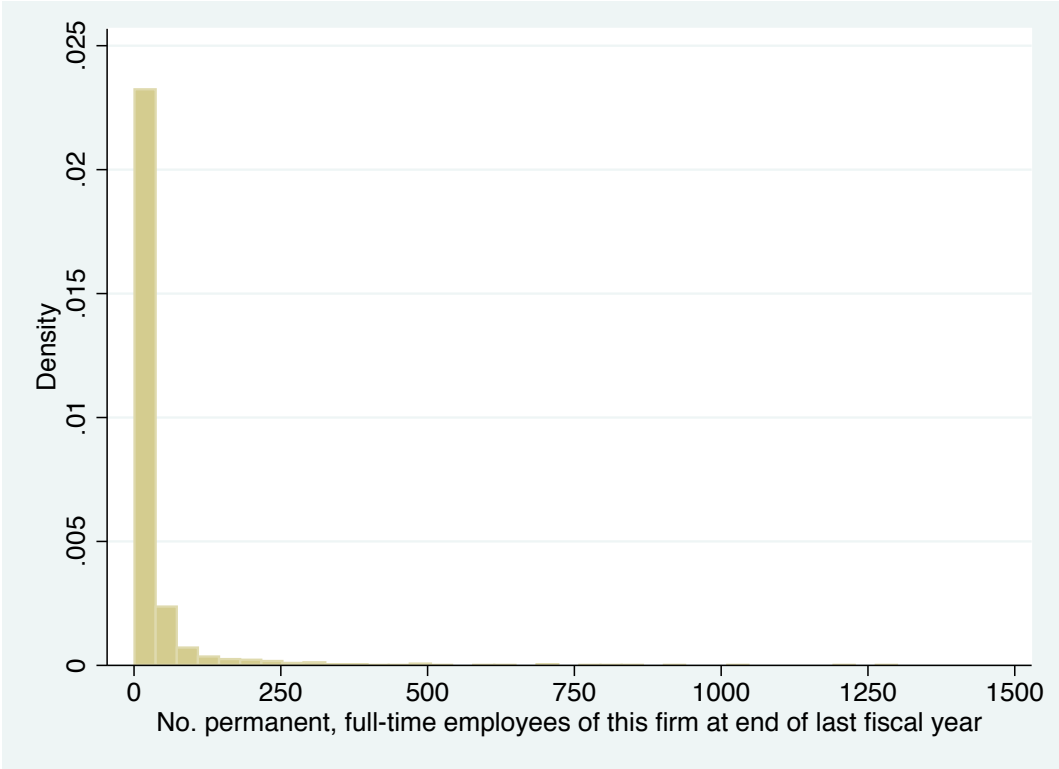
	number of male owned firms	number of female owned firms	Total	% of male owned firms	% of female owned firms	% of female owned firms in the sector
Other manufacturing	246	61	307	7.01	4.11	19.87
Food	433	138	571	12.34	9.31	24.17
Textiles	77	26	103	2.19	1.75	25.24
Garments	154	196	350	4.39	13.22	56.00
Chemicals	28	9	37	0.80	0.61	24.32
Plastics and rubber	44	6	50	1.25	0.40	12.00
Non metallic mineral	56	23	79	1.60	1.55	29.11
Basic metals	23	5	28	0.66	0.34	17.86
Fabricate metal production	247	37	284	7.04	2.49	13.03
Machinery and equipment	101	26	127	2.88	1.75	20.47
Electronics	12	3	15	0.34	0.20	20.00
Construction	308	52	360	8.77	3.51	14.44
Other services	355	207	562	10.11	13.96	36.83
Wholesale	279	81	360	7.95	5.46	22.50
Retail	705	477	1182	20.09	32.16	40.36
Hotel and restaurants	210	85	295	5.98	5.73	28.81
Transportation	200	37	237	5.70	2.49	15.61
IT	32	14	46	0.91	0.94	30.43
Total	**3,510**	**1,483**	**4,993**	**100**	**100**	

Table 4.D Probit regression results for female top managers

	REJECT	*DISCOURAGED*	*LOAN*	*REJECT*	*DISCOURAGED*	*LOAN*
FEMALE3	0.142	0.204*	-0.213*	0.133	0.08	-0.133
	(0.148)	(0.096)	(0.095)	(0.431)	(0.284)	(0.288)
SIZE	-0.004**	-0.007***	0.007***	-0.004**	-0.007***	0.007***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
AGE	-0.018*	0.000	0.007	-0.018*	0.000	0.007
	(0.007)	(0.004)	(0.004)	(0.007)	(0.004)	(0.004)
OVERDUE	-0.257	-0.336	0.235	-0.257	-0.335	0.234
	(0.251)	(0.222)	(0.200)	(0.251)	(0.222)	(0.200)
QUALITY	-0.132	-0.305*	0.263	-0.132	-0.302*	0.262
	(0.210)	(0.151)	(0.146)	(0.210)	(0.151)	(0.146)
CITY	0.102	-0.042	-0.027	0.102	-0.043	-0.026
	(0.144)	(0.095)	(0.096)	(0.144)	(0.095)	(0.096)
CRIME	0.009	-0.224*	0.181	0.009	-0.224*	0.181
	(0.138)	(0.100)	(0.100)	(0.139)	(0.100)	(0.100)
INNOV	-0.265*	-0.451***	0.464***	-0.265*	-0.455***	0.466***
	(0.122)	(0.081)	(0.081)	(0.121)	(0.082)	(0.082)
EXPORTER	-0.213	-0.274*	0.329**	-0.213	-0.276*	0.330**
	(0.165)	(0.123)	(0.118)	(0.165)	(0.123)	(0.117)
LNGDPPC	-0.444	-1.712***	1.418**	-0.444	-1.718***	1.421**
	(0.926)	(0.484)	(0.472)	(0.925)	(0.484)	(0.473)
CR	-0.251	-0.346	0.411	-0.255	-0.411	0.45
	(0.758)	(0.441)	(0.439)	(0.778)	(0.461)	(0.461)
CRXFEMALE3				0.014	0.199	-0.128
				(0.641)	(0.436)	(0.441)
Pseudo R^2	0.16	0.23	0.24	0.16	0.23	0.24
N	827	1429	1432	827	1429	1432

Notes: Probit regression results for years 2005, 2008 and 2009 include constant term, year, country and industry dummy variables. Robust standard errors are clustered at firm level and reported in parentheses. *, **, and *** indicate statistical significance at 5%, 1% and 0.1% levels, respectively. N is the number of observations.

Figure 4.A Distribution of sole proprietorship firms with respect to their size.



Chapter 5

Market Power and Riskness in the Turkish Banking System[78]

5.1 Introduction

Demirguc-Kunt and Kane (2002) report that banking crises are most costly for developing countries' economies and 93 different countries had systematic banking crises in 25 years between 1975 and 2000. Overall, output losses to GDP associated with 43 banking crises from 1977 to 1998 was 16.9% and average fiscal cost of banking resolution to GDP was 18% from 1997 to 2003 (Carstens et al., 2004).

The U.S. had two systemic banking crises over the last 3 decades, the first 1988, and the second 2007. Profitability of U.S. banks declined by 83.5% from $35.2 in 2006 to 5.8 billion in 2007 (Laeven and Valencia, 2008) and many big financial institutions failed. Frame and White (2004, 2007) highlight the effect of increased competition for Fannie Mae and Freddie Mac. They argue that this competition increased risk-taking behaviours by both enterprises, and reduced their charter value. Both enterprises were taken over by the U.S. Treasury in September 2008 and were placed under control of the Federal Housing Finance Agency (Lockhart, 2009). Leuvensteijn et al. (2007) indicate that between 1994 and 2004 the U.S. had the most competitive loan market compared to the Eurozone countries and UK.

Turkey has also experienced two systemic banking crises over the last 3 decades. In 1982 the fiscal cost of the crisis was 2.4% of GDP and the 2000 crisis had an extremely high fiscal cost (32% of GDP), which caused a 37% output loss in GDP (Laeven and Valencia, 2008). The recent crisis in US and Europe was longer than the crisis in Turkey. The source of the crisis in Turkey was political

[78] This paper is coauthored with Flavio Bazzana. An earlier version of this paper was presented at 2010 Barcelona Empirical Banking Summer School and at Finance and Growth in Central and Eastern Europe Conference 2010 in Zagreb. Another version is published in Elmas Yaldiz and Flavio Bazzana, 2010. Financial Theory and Practice, 34(3) with the title "The effect of market power on bank risk taking in Turkey".

then turned to a financial crisis. The burden of the crises was highest in Iceland, Ireland and Turkey relatively as we compare the fiscal costs of the crises. On the other hand, fiscal cost of the crisis in Turkey was higher than that of the US as can be seen in Table 5.A in the appendix.

Given these high costs of banking crises and the role of competition in the U.S. subprime crisis, it is important to examine the role of banking competition on financial stability. There are two main hypotheses in the banking literature about the relationship between competition and stability: competition-fragility and competition-stability. The competition-fragility hypothesis argues that profits provide a buffer against fragility and provide incentives against excessive risk taking. Competition on the other hand causes banks to be more risky. Thus more concentrated and less competitive banking systems considered to be more stable. In more competitive environments, on the other hand, banks have higher incentives to take more excessive risks, resulting in higher fragility. Moreover Mishkin (1999) underlines that bigger banks that hold market power are more likely to have diversified loan portfolios in different locations thanks to their wider branch network, and this makes bank failures less likely[79].

In contrast, Boyd and De Nicolo's (2005) competition-stability hypothesis suggests that less competitive banking environments cause financial fragility. Since less competitive banking environments allow banks to increase interest rates for loans, it follows that borrowers are more likely to have difficulties in repaying their loans, resulting in a higher nonperforming loans; competitive environments are considered to result in greater stability in banking[80]. Moreover, Mishkin (1999) argues that under the shelter of regulators' *"too big to fail"* policies, bigger banks are more likely to take excessive risks. Consequently, they threaten the stability because failure of a large institution exposes the financial system to systemic risk. Boyd and De Nicolo (2005) assume that the default risk of borrowers (firms) is highly correlated with bank failures. On the other hand, Martinez-Miera and

[79] See also Keeley (1990), Matutes and Vives (2000), Caminal and Matutes (2002), Martinez-Miera and Repullo (2008).
[80] See Boyd et al. (2009) for further discussion.

Repullo (2008) questions the relationship between firm and bank failures and argue that Boyd and De Nicolo's (2005) results may not necessarily be true.

This topic is particularly important for the Turkish banking system for several reasons. *(i)* Although many banks in developed economies were affected negatively in the recent global financial crisis, Turkish banks were not affected to a great extent. *(ii)* Turkey has experienced intensive regulation processes that have led to a decline in the number of banks and, possibly, to changes in the competitive structure, especially after the crisis 2000, which was an important turning point for Turkish banking. *(iii)* Turkey has a bank-based financial structure accordingly banks have important role in achieving financial stability in Turkey[81]. Although there has been a recent increase in the number and size of non-bank financial institutions, the system is still dominated by commercial banks. *(iv)* The relationship between competition and stability in banking has been investigated in many studies for the U.S. and other advanced economies. However, only little empirical evidence exist in this issue for emerging economies.

To the best of our knowledge, there have only been two studies for Turkey. Tunay (2009) uses non-performing loans and crisis year dummy as measures of fragility, while the three-bank concentration ratio, the ratio of privately owned bank assets to total assets of the system, and the ratio of foreign bank assets to total assets of the system as measures of competition for Turkish banking. Employing fixed and random effects models, he estimates the relationship between competition and fragility for the years between 1988 and 2007. Tunay (2009) argues that Turkish banks are operating in a non-competitive environment and finds that there is no statistically significant relationship between concentration and fragility measures. Moreover, foreign banks are found to decrease fragility and domestic banks are found to increase fragility. Employing static and dynamic panel data techniques, Yaldız and Bazzana (2010) obtain the similar results with Tunay (2009). They also argue that banks in Turkey are operating in a non-

[81] Total assets of the banking system account for nearly 90% of total assets of the financial sector and commercial banks held 97% of the total banking system assets in 2008 (Banks Association of Turkey, 2008).

competitive environment and show that the effect of the market power on the risk-taking behaviours of banks is not crystal clear in Turkey after 2000.

In order to understand the effect of banks' market power on loan risk and overall soundness of commercial banks in Turkey, this paper modifies Yaldız and Bazzana (2010) in several ways[82] and adds new observations[83]. This paper employs two different dependent measures to account for financial fragility and soundness: loan risk and Z-index respectively. As proxies for the market power of individual banks from 2001 to 2011, we employ the Lerner index and the ratio of the difference between the total revenues and total cost to the total revenues.

Rest of the paper is organized as follows. The next section describes the methodology. The third section summarizes the data and sample used in the study. The fourth section reports the empirical results. The last section discusses the implications of these results.

5.2 Methodology

In order to test whether the competiton-stability or competition fragility hypotheses are valid for Turkish banks, proper measures for fragility and competition are needed. Empirical studies have considered the fragility from different points of views. Some studies examine it from a macro perspective and take into account systemic banking crises (*e.g.*, Beck et al., 2006 and Schaeck et al., 2006). Other studies consider bank fragility from a micro or managerial perspective. These studies define fragility as the failure of an individual bank (*e.g.,* Bordo et al., 1993 and Fungacova and Weill, 2009) and/or relate it to riskiness of banks using Z-index and/or non-performing loans ratios to measure risk (*e.g.*, Boyd et al., 2006, Jiménez et al., 2008 and Berger et al., 2009) to account for financial fragility.

[82] We separated gross nonperforming loans into two parts as net nonperforming loans and loan loss provisions. We also include one-lagged values of market power proxies as instrumental variables. Year fixed effects are also added in the regressions. For the cost function, the price of labour calculated by the dividing the personnel expenses by the number of personnel, rather than dividing it by the total assets. Finally total assets considered as total output measure of banks in these regressions.

[83] We add years 2010 and 2011.

There is also no consensus about the methods for measuring competition. The structure-conduct performance paradigm explains competitive behaviours of banks via the structural characteristics of the industry and measure competition by the concentration ratios and Herfindahl-Hirshman Index (HHI). Accordingly in more concentrated markets, banks are more likely to behave less competitive, which results in higher price and profit levels. (Claessens and Laeven, 2003; Abbasoglu et al., 2007; Carbo´ et al., 2009). On the other hand the non-structural paradigm focuses on bank behaviour by measuring competition indicators such as Lerner Index, Panzar and Rosse H-stat, net interest margin, etc…

Market power can be defined as the ability to sell products above the marginal cost. The Lerner index is one of the earliest and most popular indices for measuring market power, which it does by calculating the difference between the price and marginal cost over the price[84]. The value of the index ranges from zero to one: in cases of perfect competition, the price equals marginal cost and the value of the index is zero, and as the price is set by the firm above its marginal cost, the value of the Lerner index increases. In other words, the more market power a firm has, the higher is Lerner index. In this study, the Lerner index for bank i in year t is calculated as:

$$lerner_{it} = \frac{price_{it} - mc_{it}}{price_{it}} \quad . \tag{5.1}$$

where $price_{it}$ is the price of bank production, and mc_{it} is the marginal cost of bank production. In this study $price_{it}$ is calculated as the ratio of total revenues to the total assets following the previous studies[85]. The disadvantage of the Lerner index is that the marginal cost function needs to be derived from an estimated total cost function. In this chapter, the total cost function is calculated by using translog functional form:

[84] See Jiménez et al. (2008), Hainz et al. (2008), Berger et al. (2009), Fungacova and Weill (2009) for use of the Lerner index in banking.

[85] Namely Jiménez et al. (2008), Berger et al. (2009), Carbo´ et al. (2009), and Fungacova and Weill (2009).

$$\ln tc_{it} = \alpha_0 + \alpha_q \ln q_{it} + \sum_j \alpha_j \ln w_{jit} + \sum_j \alpha_{jq} \ln w_{jit} \ln q_{it} + 1/2[\sum_j \sum_h \alpha_{jh} \ln w_{jit} \ln w_{hit} + \alpha_{qq} (\ln q_{it})^2] \quad (5.2)$$

Cost share equations are derived as:

$$S_{jit} = \frac{d \ln tc_{it}}{d \ln w_{jit}} = \alpha_j + \sum_h \alpha_{jh} \ln w_{hit} + \alpha_{jq} \ln q_{it} \quad (5.3)$$

where tc_{it} is the total cost, q_{it} is the output, w_{jit} input price, and S_{jit} is the cost share of jth input for bank i in year t. In order to estimate the above translog cost function, we need to specify input and output measures. Berger and Humphrey (1997) state that there is no consensus on input and output measures in banking. Nonetheless, there are two dominant approaches: intermediation and production. The production approach evaluates banks as production units that produce services for depositors and borrowers. According to this approach, production factors such as land, labour, and capital are used as inputs to produce banking services and production is measured by the number of transactions or documents processed over a given time period. However, since this information is not easy to obtain, the number of accounts or total assets have often been used as a proxy for bank production in the literature. The intermediation approach on the other hand, considers commercial banks as intermediaries between borrowers and lenders; they collect deposits from depositors and make loans to borrowers, this approach assumes that banks use labour, physical capital and deposits as production factors.

Following Berger et al. (2009), Carbo´ et al. (2009), Turk-Ariss (2010) we use total assets to approximate for total output by banks, while labour, physical capital, and deposits plus borrowed funds are used as inputs. The price of labour is the unit price of labour and it is approximated by the ratio of personnel expenses (including severance payments) to the number of personnel. The price of physical capital is the ratio of other noninterest expenses (excluding personnel

expenses and severance payments) to fixed assets. Finally, the price of funds is the unit price of funds, and it is constructed as the ratio of interest expenses to the total deposit plus borrowed funds.

In order to ensure homogeneity of degree one in factor prices and symmetry properties, the cost function is estimated together with the following restrictions.

$$\alpha_{jh} = \alpha_{hj}$$

$$\sum_{j} \alpha_{j} = 1$$

$$\sum_{j} \alpha_{jq} = 0$$

$$\sum_{h} \alpha_{jh} = 0$$

In a nutshell, the total cost function (equation 5.2) is estimated together with the cost share equations (equation 5.3) as a system of equations by introducing the homogeneity of degree one and symmetry restrictions as seemingly unrelated regressions. The marginal cost is derived from the total cost function as

$$mc_{it} = \frac{tc_{it}}{q_{it}}(\alpha_{q} + \alpha_{qq} \ln q_{it} + \sum_{j} \alpha_{jq} \ln w_{jit}). \qquad (5.4)$$

Calculating a Lerner index as a proxy for market power is complex and possibly subject to many misspecification biases. First, it requires many assumptions about inputs and outputs, and second, it requires many assumptions about the calculation methods of input prices, output and price. Moreover it requires assumptions on the functional form of the cost function. Beyond these assumptions, the number of parameters to be estimated is large[86]. Thus, in order to calculate the market power of each bank in Turkey, we use another measure of market power (*MP*) that does not specify any inputs and outputs, as well as a functional form that is simply the difference between total revenues and total cost to the total revenues. Since, the aim of this paper is to understand whether

[86] See Ray (1982).

competition causes higher risk-taking in Turkish banks, the general empirical model to be estimated is:

Fragility measures of banks = f(market power, control variables)

In order to account for fragility of banks, nonperforming loans over total loans (*NPLN*), provisions over total loans (*PROV*) are employed as ex-post and ex-ante measures of loan risk respectively. We also use Z-index (*Z*) as a measure of bank-level stability. The *Z* is computed as $Z = (NPA+EA)/\sigma(NPA)$, where *NPA* is the net profit to the assets, *EA* is the equity to assets ratio and $\sigma(NPA)$ is the standard deviation of the *NPA*. *Z* increases with higher profitability and capitalization levels, and it decreases with unstable earnings that are reflected by a higher standard deviation of net profits to assets. Thus, there is a trade-off between the *Z* and the bank's probability of failure (Berger et al., 2009; Turk-Ariss, 2010). In other words, the *Z* is a proxy of a bank's soundness and inverse measure of risk as it accounts for overall stability at the bank level.

As a first step to estimate the relationship between market power and risk-taking behaviours of banks we run OLS regressions. However, previous studies show that there is a possible endogeneity problem in modelling market power and risk relationship (Shaeck and Čihák, 2007; Berger et al., 2009). That is to say, causality may go both ways and market power may actually be a function of the level of risk. In case of endogeneity, OLS estimates will be biased. To mitigate concerns of bias due to endogeneity, instrumental variables (IV) for endogenous regressors are used. However Baum and Schaffer (2003) argue that heteroscedasticity cause inefficiency in the 2SLS estimate and suggest generalized method of moments (GMM) instead of the 2SLS[87]. To this end we use an instrumental variable technique with a GMM estimator to address the possible endogeneity problems. Finally *NPLN* and *PROV* can not have negative values and their maximum value can not exceed 100. 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

[87] Results of the Breusch-Pagan/Cook-Weisberg heteroscedasticity test indicate presence of heteroscedasticity in our regressions accordingly GMM is more suitable than the 2SLS.

model for binary data as discussed by Papke and Wooldridge (1996). To estimate regreesions for *NPLN* and *PROV*, we use a generalised linear model (GLM) with a logit link and the binomial family, as suggested by Papke and Wooldridge (1996).

5.3 Data and descriptive statistics

The years from 1999 to 2001 were years of problems for Turkish economy and banking. During these years the Turkish economy was hit by two severe economic crises and by a destructive earthquake in the most industrialized region of the country. For banking, the parliament approved the new Banking Law no. 4389 in 1999. In this new law, the Government guarantee on deposits, which had been set at 100% for the year 1994 was restricted to 100,000 Turkish liras in 2000 and was further restricted to 50,000 Turkish liras in 2001.

The Turkish Banking Restructuring Program was started in 2001. To build a stronger banking system after the two severe crises, this program was conducted under the auspices of the IMF. The aim of these actions was to create a more efficient banking system. However, the restructuring program has turned out to be one of the most costly restructuring programs in the world (Banks Association of Turkey, 2005).

In Turkey, there were 81 banks operating in 1999. Over the following decade this number fell drastically because of bank failures and acquisitions of weaker banks by healthier and stronger ones. As of December 2012, there were only 44 banks operating in Turkey. Of these, 31 are commercial banks and 13 are development and investment banks. Of the commercial banks, 3 are state owned, 11 are privately-owned domestic banks[88], 11 are foreign banks founded in Turkey[89], 6 are foreign banks having branches in Turkey[90], and one operates under the control of Saving and Deposit Insurance Fund (SDIF)[91]. Moreover 5 banks control 61% of the total assets of the system on average, while the top ten banks

[88] They hold 50 % of the commercial banks' total assets in 2011.
[89] They hold 13 % of the commercial banks' total assets in 2011.
[90] They hold 0.8 % of the commercial banks' total assets in 2011.
[91] SDIF is a state institution administered by Banking Regulation and Supervision Agency (BRSA). Main duties of SDIF are insuring saving deposits and resolving insolvent banks.

control 87% of total assets on average. Of the top 5 banks 3 are state-owned, and together they hold 1/3 of the total assets on average. Overall the total assets of banking system account for nearly 90% of the total assets in the financial sector and commercial banks held 97% of total banking system assets in 2009 (Banks Association of Turkey, 2010). Consequently banking has a distinctive place in the Turkish financial system and plays an important role in achieving financial stability in Turkey. Although there has been a recent increase in the number and size of non-banking financial institutions, the system is still dominated by commercial banks.

This study uses manually collected data from the banks' balance sheets and income statements as reported to the Banks Association of Turkey (BAT) on the website of BAT[92]. We have a sample of 30 commercial banks that have been active from 2001 to 2011. We exclude the Birlesik Fon Bankasi which operates under the control of Saving and Deposit Insurance Fund (SDIF). Table 5.1 presents the definitions and summary statistics for the variables used in the empirical analysis.

Table 5.1 Summary statistics

Variable	Definition	N	Mean	Std.Dev.	Min	Max
NPLN	Non-performing Loans (net of provisions)/ Total Loans (%).	330	2.722	9.966	0	100
PROV	Loan Loss Provisions /Total Loans (%).	330	65.238	33.606	0	100
Z	(NPA+EA) /std dev (NPA).	330	1.192	1.038	-1.295	6.004
LERNER	Lerner index (price of output-marginal Cost)/Price of output (%).	329	99.054	0.307	96.08	99.65
MP	(Total Revenues-Total Cost)/Total Revenues (%).	330	22.162	23.623	-188.73	71.0
ASSETSHARE	Asset share in the sector (%).	330	3.054	4.644	0.004	18.68
FOREIGN	Dummy=1 if the bank is a foreign owned bank, zero otherwise.	330	0.533	0.500	0	1
STATE	Dummy=1 if the bank is a state owned bank, zero otherwise.	330	0.100	0.300	0	1

The average Lerner index is 0.9905 for the 2001-2011 period. These results show that the banks in Turkey highly enjoy monopoly rents and they do not operate in a competitive environment. These results are consistent with Abbasoglu et al.

[92] http://www.tbb.org.tr/eng/Banka_ve_Sektor_Bilgileri/Tum_Raporlar.aspx

(2007) that provide evidences for a monopolistic competitive structure in the Turkish banking system from 2001 to 2005. *ASSETSHARE* indicates that nearly 20% of the total banking system assets are hold by Türkiye Cumhuriyeti Ziraat Bankası which is a state-owned bank and 50% of the total banking system assets are hold by the three largest banks.

Table 5.2 gives the average values of the variables by year. In this table we report the concentration measures in addition to our variables. In this table *CR3* is the total asset share of the three largest banks while *CR5* is the total asset share of the five largest banks in the banking sector. *HHI* refers to Herfindahl-Hirshman Index. This table reveals that both concentration variables and market power proxies increased from 2001 to 2011, which indicates decreasing competition among banks from 2001 to 2011. On the other hand the average *NPLN* kept decreasing by year, while banks had higher *PROV* and *Z* over years. These values show that commercial banks in Turkey behaved more disciplined from 2001 to 2011, as they gain higher market power, which means less competition among them.

Table 5.2 Average values of the variables by year

YEAR	*NPLN*	*PROV*	*Z*	*LERNER*	*MP*	*ASSET SHARE*	*CR3*	*CR5*	*HHI*
2001	10.414	51.097	0.812	98.985	12.518	2.754	36.549	55.684	0.08
2002	3.148	61.427	1.159	99.087	23.446	2.848	38.078	58.428	0.086
2003	4.072	68.497	1.414	99.011	19.083	2.926	40.084	60.27	0.092
2004	4.905	68.31	1.077	99.029	21.645	2.994	39.737	59.165	0.093
2005	1.932	68.36	1.086	99.005	19.078	3.028	41.623	60.831	0.096
2006	0.332	70.787	1.068	99.017	17.678	3.160	40.712	62.607	0.095
2007	0.426	68.657	1.377	99.066	22.946	3.157	40.754	61.881	0.094
2008	0.953	62.283	1.317	99.069	23.297	3.165	41.212	62.375	0.094
2009	1.721	66.463	1.476	99.148	31.948	3.170	42.981	63.001	0.098
2010	1.077	67.023	1.215	99.091	27.366	3.181	42.305	62.885	0.097
2011	0.961	64.72	1.105	99.081	24.774	3.212	40.406	61.225	0.093
Total	2.722	65.238	1.192	99.054	22.162	3.054	40.404	60.759	0.093

5.4 Regression results

Two variables are employed in the study to approximate the market power of Turkish banks. *LERNER* is derived from the marginal cost function and the price

of the bank's production; *MP* is calculated as the difference between the total revenue and total cost divided by the total revenue. Higher values of market power correspond to lower degrees of competition. Thus, a positive (negative) coefficient is expected between market power proxies and *Z* (*NPLN* and *PROV*) according to the competition-fragility hypothesis, while the competition-stability hypothesis expects a negative (positive) relationship between market power proxies and *Z* (*NPLN* and *PROV*).

Tables 5.3 and 5.4 present the results of the empirical models. For each dependent variable the first columns in these tables give the OLS estimation results. For each dependent variable the second columns present the results of instrumental variable (IV) estimations. Finally the third columns give the GLM regression results for *NPLN* and *PROV* variables[93]. Table 5.3 reports the estimation results when *MP* approximates market power.

Table 5.3 Estimation results when *MP* is the market power proxy

	Dep. Var. *NPLN*			Dep. Var. *PROV*			Dep. Var: *Z*	
	OLS	IV	GLM	OLS	IV	GLM	OLS	IV
MP	-0.151*	-0.073	-0.041***	-0.072	-0.289	-0.005	0.0156***	0.0176*
	(0.066)	(0.075)	(0.010)	(0.094)	(0.317)	(0.004)	(0.004)	(0.008)
ASSETSHARE	0.398	0.350	0.050	5.228***	4.521**	0.355***	-0.0755**	-0.0750*
	(0.822)	(0.458)	(0.182)	(1.464)	(1.622)	(0.079)	(0.028)	(0.033)
FOREIGN	-9.910	-16.670	-7.977***	-34.03*	-18.680	-3.686**	-3.597***	-3.053***
	(10.13)	(11.27)	(0.988)	(15.07)	(9.960)	(1.261)	(0.503)	(0.458)
STATE	-16.040	-18.63	-1.111	-99.23***	-27.46	-3.048*	-2.273***	-3.111***
	(17.980)	(12.65)	(1.403)	(24.800)	(14.67)	(1.315)	(0.669)	(0.512)
N	330	300	330	330	300	330	330	300
R^2/Pseudo R^2	0.289	0.288	0.77	0.633	0.935	0.795	0.684	0.864
Endogeneity		0.705			0.726			0.611

Notes: Robust standard errors are presented in parentheses. In each model year and bank dummies are included in order to account for macro level and bank level heterogeneity. Each model contains constant term. In OLS regressions adjusted R^2 is reported. In GLM regressions the Pseudo R^2 is calculated as the correlation between the actual and the predicted values of the dependent variables. The endogeneity test reports p-value of the null hypothesis that the specified *MP* can be treated as exogenous. *, **, and *** indicate statistical significance at 5%, 1% and 0.1%, respectively. N is the number of observations.

As for the relationship between *NPLN* and *MP,* the OLS and GLM regressions in Table 5.3 indicate a negative and statistically significant association; and the

[93] The dependent variables are divided by 100 in order to apply GLM method.

relationship between *MP* and *PROV* is also negative but statistically insignificant. These findings suggest that as market power increases, the financial fragility approximated by the ex-post loan risk (*NPLN*) decreases. This is interpreted, as the banks gain market power become more able to manage their loan risk. Moreover, our OLS results indicate a positive relationship between *MP* and the soundness of banks (*Z*). This finding indicates that the soundness of banks increases with higher degrees of market power. Accordingly these two findings are consistent with the predictions of competition-fragility hypothesis, which suggests a negative association between competition and stability. However this relationship is ambiguous for the models where *PROV* is the dependent variable.

Table 5.4 Estimation results when *LERNER* is the market power proxy

	Dep. Var.: *NPLN*			Dep. Var.: *PROV*			Dep. Var.: *Z*	
	OLS	IV	GLM	OLS	IV	GLM	OLS	IV
LERNER	-11.430	1.052	-2.928***	-10.270	-47.530	-0.677*	0.962**	0.329
	(6.048)	(6.708)	(0.776)	(6.212)	(26.180)	(0.322)	(0.342)	(0.559)
ASSETSHARE	0.392	0.077	0.003	5.464***	5.410**	0.369***	-0.0660*	-0.037
	(0.812)	(0.443)	(0.166)	(1.494)	(1.732)	(0.082)	(0.030)	(0.037)
FOREIGN	-8.506	-19.58	-7.568***	-29.74	-52.25*	-3.517**	-3.577***	-3.146***
	(10.36)	(13.01)	(1.152)	(15.34)	(20.60)	(1.268)	(0.555)	(0.597)
STATE	-11.27	-18.71	-0.353	-39.81**	-16.430	-2.975*	-3.124***	-3.182***
	(12.68)	(13.58)	(1.329)	(14.82)	(17.92)	(1.334)	(0.564)	(0.615)
N	329	299	329	329	299	329	329	299
R^2/Pseudo R2	0.276	0.242	0.770	0.635	0.932	0.796	0.661	0.870
Endogeneity		0.354			0.301			0.605

Notes: Robust standard errors are presented in parentheses. In each model year and bank dummies are included in order to account for macro level and bank level heterogeneity. Each model contains constant term. In OLS regressions adjusted R^2 is reported. In GLM regressions Pseudo R^2 is calculated as the correlation between the actual and the fitted values of the dependent variable. The endogeneity test reports p-value of the null hypothesis that the specified *LERNER* can be treated as exogenous. *, **, and *** indicate statistical significance at 5%, 1%, and 0.1% levels, respectively. N is the number of observations.

Table 5.4 presents the regression results where *LERNER* is employed as a proxy for market power of banks. These results are similar to that of Table 5.3 in terms of the direction of relationship and statistical significance. In addition significantly negative coefficient estimates of *LERNER* in the regressions where the *NPLN* is the dependent variable; we get significantly negative coefficient estimates of *LERNER* in the regressions where the dependent variable is *PROV*.

These results indicate that as market power increases (competition decreases), the financial fragility approximated by both the ex-post loan risk (*NPLN*) and ex-ante loan risk (*PROV*) decreases. The last two columns of Table 5.4 yield positive coefficient estimates for *LERNER*. The OLS coefficient estimate for the *LERNER* show that as market power of a bank increases that bank stability as measured by *Z* increases. This is interpreted as the banks with a higher degree of market power have less overall risk exposure. These findings also provide evidence in favour of the traditional competition-fragility hypothesis for Turkish Banks after the financial crisis and banking regulations in 2000.

As for the effects of bank ownership structure on loan risk and overall stability of banks, foreign banks were found to have less loan risk compared to the domestic banks in the first six columns of both Table 5.2 and 5.3. Moreover foreign ownership (*FOREIGN*) has a statistically significant and negative effect on overall stability as measured by *Z,* which is in line with Tunay's (2009) findings. These results indicate that foreign banks take less loan risk as compared to domestic banks but their overall risk is higher as compared to domestic banks. The same results are also valid for the three state owned banks in Turkey as they have less loan risk but have higher overall risk.

As for the endogeneity between market power proxies and risk measures, the IV regression results—where market power proxies are treated as endogeneous—are broadly in line with OLS and GLM regressions. Following Schaeck and Čihák (2008), we use the one-year lagged value of the market power variables as instruments for the market power variables to address concerns that bank level market power and bank level risk/soundness are jointly determined[94]. The relevance of these instruments are tested in the first stage regressions by an F-statistic of a joint test whether all excluded instruments are significant. As a rule of thumb, the F statistic should be bigger than 10 in order have a relevant

[94] Because a longer lag will reduce any correlation between the instrument and the disturbances in the error term of the original ordinary least squares regression, the longer lags are considered to be better instruments by Murray (2006). Accordingly we re-estimated the IV regressions using the four-year lag and reported the results in Table 5.D in the Appendix. It seems that our results remained unchanged. However this lag is not found to be relevant as it has an F-statistic of 7.63.

instrument. In our regressions we calculated the F-statistic as 15.38 and 11.77 for the regressions where *MP* and *LERNER* reflect the market power respectively. Moreover our instruments are statistically significant in all regressions at least 5% in the first stage regressions in order to support relevance of our instruments. Although our instruments are relevant, the endogeneity test[95] results indicate that endogeneity is not a significant problem as reported in Table 5.3 and 5.4. Acccordingly, we can infer that our results are robust to using solely the exogenous variation in the market power proxies *i.e.* results reflected the true effect of market power on risk or soundness measures.

5.5 Conclusion

The aim of this paper is to examine the relationship between the market power and risk-taking behaviours of banks in Turkey between 2001 and 2011. To account for loan and overall risk, nonperforming loans over total loans, provisions over total loans and Z-index are employed respectively. In order to account for market power Lerner index is calculated. However, calculation of the Lerner index is subject to many misspecification biases in banking where the output and input measures are not obvious and especially when information about price of output and input are extracted from financial account data, as we did in this study. Consequently, a second measure—which does not specify any restriction on inputs and outputs or a cost function to estimate the marginal cost—is also used: the difference between the total revenues and total cost over the total revenues.

Some evidence is found to support competition-fragility hypothesis in the empirical part. Both market power proxies are found to have a positive (negative) and significant effect on the (non-performing loan ratios) Z-index. This finding suggests that market power increases banks' soundness, which is consistent with the competition-fragility hypothesis.

Regarding the ownership structure and risk-taking behaviours of banks, there is evidence supporting the idea that foreign banks have less loan risk than the domestic banks supporting Tunay's (2009) findings. On the other hand their

[95] We use Hausman test statistic as explained in Baum et al. (2003).

overall risk is higher as compared to domestic banks. The financial soundness as measured by Z-index is higher for the state owned banks.

Some policy suggestions can be derived from the empirical part of the study. First of all, as market power of individual banks increases, the loan risk of banks decrease and overall soundness of banks increase. Thus it is important to have banks to have a less competitive environment in order to have a more stable banking system. Although many banks in developed economies was affected negatively in the recent global financial crisis, Turkish banking were not affected due to its strong structure after the establishment of Banking Regulation and Supervision Agency which lead to an intensive regulation processes as Bredenkamp et al. (2009), BRSA (2009), and Afsar (2011) reports. On the other hand, since banks in Turkey operate nearly in a non-competitive environment, the disadvantages of having less competition for higher investment levels, macroeconomic growth goals, and *"too big to fail"* policies in banking are especially important for an emerging economy like Turkey.

This paper can be extended in several ways. First of all this paper employs non-performing loans, provisions and the Z-index to approximate for bank level fragility and soundness. However individual bank failures can be considered as a more direct indicator of individual bank distress. Turkish banking sector experienced nine bank failures just before the 2000 crisis, after this year only one bank[96] failed. Accordingly bank failures can be a better measure of fragility for other countries that experience more frequent bank failures. Secondly this paper employs proxies of market power that varies both in bank and in time dimensions. Other competition measures such as the Panzar and Rosse's H-stat, Boone (2008) index, and HHI can also be used in line with Structure Conduct hypothesis. However employment of these measures as competition indicators requires a wider data set. Because these measures are not both time and bank varying, that is to say they either reflect competitive structure of the market that is same for each banks in the system or reflect the market power of an individual bank during a

[96] ImarBank failed in 2003.

time period. An alternative approach to measure market power can be to use Tobin's q, which can only be calculated for the banks that have market values, *i.e.* have publicly traded stocks. Of the 45 banks in Turkey, 13 publicly traded stocks in Istanbul Stock Exchange market, these stocks account for 20% of the total banking system assets.

5.6 References

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5.7 Appendix

Table 5.A Comparison of the Recent Crises in Turkey, Europe, and US.

Country	Start	End	Output loss	Fiscal costs	Peak liquidity	liquidity support	peak NPLs	Increase in public debt
Turkey	2000	2001	37	32	20.5	15.2	27.6	15.3
United States	2007	...	31	4.5	4.7	4.7	5	23.6
Greece	2008	...	43	27.3	44.3	42.3	14.7	44.5
Germany	2008	...	11	1.8	11.5	3.6	3.7	17.8
Italy	2008	...	32	0.3	7.7	5.7	11	8.6
Ireland	2008	...	106	40.7	20	16.3	12.9	72.8
Denmark	2008	...	36	3.1	20.1	11.4	4.5	24.9
Belgium	2008	...	19	6	19.7	14.1	3.1	18.7
Austria	2008	...	14	4.9	11.7	7.7	2.8	14.8
Iceland	2008	...	43	44.2	21.2	16.8	61.2	72.2
Hungary	2008	...	40	2.7	1.4	1.3	13.3	-0.3
Netherlands	2008	...	23	12.7	5.9	3.7	3.2	26.8
UK	2007	...	25	8.8	9	5.6	4	24.4
Sweden	2008	...	25	0.7	13.2	13	2	11.1
Switzerland	2008	...	0	1.1	4.6	3	0.5	-0.2

Source: Leaven and Valencia (2012)

Notes: 1) Output loss is expressed as percent of GDP and is computed as the cumulative sum of the differences between actual and trend real GDP over the period [T, T+3], expressed as a percentage of trend real GDP, with T the starting year of the crisis.

2) Fiscal cost is expressed as percent of GDP. Fiscal costs are defined as the component of gross fiscal outlays related to the restructuring of the financial sector. They include fiscal costs associated with bank recapitalizations but exclude asset purchases and direct liquidity assistance from the treasury.

3) Peak Liquidity is measured as the ratio of central bank claims on deposit money banks and liquidity support from the Treasury to total deposits and liabilities to non-residents.

4) Peak NPLs is expressed as percentage of total loans. NPLs data come from IMF Staff reports and Financial Soundness Indicators.

5) Increase in public debt is expressed as percentage of GDP. The increase in public debt is measured over [T-1, T+3], where T is the starting year of the crisis. For the 2007-2009 crises, it is computed as the difference between pre- and post-crisis debt projections.

Table 5.B Average values by banks

Bank name	*NPLN*	*PROV*	*Z*	*LERNER*	*MP*	*ASSET SHARE*	*FOREIGN*	*STATE*
Adabank	17.366	93.609	3.815	98.636	2.011	0.03	0	0
Akbank	0.012	99.327	1.037	99.287	36.517	11.751	0	0
Alternatif Bank	4.834	55.127	0.474	98.98	12.809	0.483	0	0
Anadolubank	0.603	84.464	0.754	99.028	19.544	0.537	0	0
Arap Türk Bankası	1.234	96.827	1.477	99.002	31.665	0.12	1	0
Bank Mellat	0.223	56.382	0.963	99.394	50.202	0.084	1	0
Citibank	2.272	63.418	1.099	99.12	28.349	0.719	1	0
Denizbank	1.816	74.391	0.774	99.075	23.132	2.326	1	0
Deutsche Bank	0	3.245	2.542	99.224	31.745	0.144	1	0
Eurobank Tekfen	1.95	72.718	0.765	98.963	13.874	0.332	1	0

Table 5.B continued

Fibabanka	0.696	42.364	1.139	98.33	-28.65	0.122	1	0
Finans Bank	1.334	87.955	0.823	99.139	26.49	3.214	1	0
Habib Bank Limited	8.027	55.673	2.718	99.346	50.037	0.01	1	0
HSBC Bank	0.995	80.964	1.208	99.148	31.04	1.847	1	0
ING Bank	0.907	44.945	0.777	98.991	15.164	1.993	1	0
JPMorgan Chase Bank	0	0	3.152	99.323	43.61	0.074	1	0
Şekerbank	4.689	71.745	0.651	99.027	20.252	1.048	0	0
Société Générale (SA)	0.658	19.945	0.906	98.898	11.701	0.085	1	0
Tekstil Bankası	1.348	48.709	0.741	98.891	9.382	0.454	0	0
The Royal Bank of Scotland	2.919	87.382	1.674	99.137	31.885	0.153	1	0
Türk Ekonomi Bankası	1.029	58.964	0.674	99.018	19.129	1.707	0	0
Turkish Bank	0.839	82.664	1.011	98.963	14.875	0.125	0	0
Türkiye Cumhuriyeti Ziraat Bankası	4.02	76.991	0.709	99.168	26.783	16.173	0	1
Türkiye Garanti Bankası	1.926	62.882	0.77	99.136	24.535	10.837	0	0
Türkiye Halk Bankası	0.628	92.7	0.742	99.154	25.864	7.711	0	1
Türkiye İş Bankası	3.421	88.155	0.969	99.126	27.542	13.394	0	0
Türkiye Vakıflar Bankası	3.499	88.718	0.668	99.113	22.767	7.317	0	1
Turkland Bank	4.964	68.909	1	98.887	11.132	0.117	1	0
WestLB AG	0.003	27.145	0.991	99.064	19.434	0.11	1	0
Yapı ve Kredi Bankası	9.446	70.836	0.723	98.979	12.036	8.604	0	0
Total	2.722	65.238	1.192	99.054	22.162	3.054	0.533	0.1

Table 5.C Translog cost function estimation results

Coefficients	Estimates	(std. errors)
α_q	1.020***	(0.023)
α_{qq}	-0.001	(0.008)
α_{kq}	-0.020	(0.017)
α_{fq}	0.027*	(0.011)
α_{lq}	-0.007	(0.016)
α_{kk}	-0.126***	(0.036)
α_{ff}	-0.062**	(0.024)
α_{ll}	-0.061	(0.064)
α_{kl}	0.062	(0.049)
α_{kf}	0.064*	(0.030)
α_{lf}	-0.001	(0.031)
α_l	0.312***	(0.057)
α_f	0.648***	(0.046)
α_k	0.041	(0.050)
α_0	8.281***	(0.088)
N	329	

Table 5.C continued

Notes: Dependent variable is the logarithm of total costs. *, **, and *** denote statistical significance at 10%, 5%, and 1% respectively. Robust standard errors are reported in pharantheses. N is the number of observations.

Table 5.D Correlation matrix

	NPLN	*PROV*	*Z*	*LERNER*	*MP*	*ASSET SHARE*	*FOREIGN*	*STATE*	*CR3*	*CR5*
PROV	-0.099	1.000								
Z	-0.061	-0.095	1.000							
LERNER	-0.288	-0.061	0.197	1.000						
MP	-0.280	-0.001	0.323	0.969	1.000					
ASSETSHARE	0.006	0.307	-0.231	0.183	0.102	1.000				
FOREIGN	-0.104	-0.318	0.188	0.054	0.106	-0.538	1.000			
STATE	-0.001	0.207	-0.156	0.100	0.041	0.528	-0.356	1.000		
CR3	-0.225	0.099	0.122	0.081	0.142	0.023	0.006	-0.002	1.000	
CR5	-0.261	0.101	0.124	0.082	0.132	0.025	0.007	-0.002	0.928	1.000
HHI	-0.239	0.117	0.115	0.066	0.127	0.023	0.007	-0.003	0.972	0.932

Table 5.E IV estimation results when four-year lag is the instrumental variable

	Dep.Var.: *NPLN*	Dep. Var.: *PROV*	Dep. Var.: *Z*	Dep. Var.: *NPLN*	Dep. Var.: *PROV*	Dep. Var.: *Z*
MP	-0.059	0.502	0.004			
	(0.087)	(0.383)	(0.011)			
LERNER				-5.733	23.02	0.422
				(7.912)	(29.53)	(0.895)
ASSETSHARE	0.347	-3.546	0.003	0.388	-2.376	-0.003
	(0.550)	(2.948)	(0.072)	(0.573)	(2.357)	(0.068)
FOREIGN	0.710	-106.0***	-3.945***	2.419	-109.6***	-4.080***
	(1.371)	(7.640)	(0.305)	(3.515)	(12.85)	(0.436)
STATE	-1.652	17.170	-4.313***	-0.279	5.375	-4.399***
	(3.174)	(20.160)	(0.497)	(2.061)	(12.620)	(0.396)
N	210	210	210	209	209	209
Uncentered R^2	0.372	0.865	0.921	0.363	0.970	0.922
Endogeneity	0.796	0.217	0.338	0.669	0.372	0.561

Notes: Robust standard errors are presented in parentheses. In each model year and bank dummies are included in order to account for macro level and bank level heterogeneity. The endogeneity test reports p-value of the null hypothesis that the specified *MP* or *LERNER* can be treated as exogenous, the test statistic is distributed as chi-squared with degrees of freedom equal to the number of regressors tested. The joint F-statistics for the significance of the excluded instruments 7.63 and 5.00 for the regressions where *MP* and *LERNER* approximate the market power of banks. *, **, and *** indicate statistical significance at 5%, 1% and 0.1% levels, respectively. N is the number of observations.

Chapter 6

Conclusions

As this thesis consists of four papers in different but somehow related topics, each chapter has its own conclusion, policy implications, and future research directions. This part of the thesis underlines the general conclusions of its chapters in addition to policy implications and future research directions. In each chapter our empirical analyses are mainly based on non-developed economies from Central /Eastern Europe and Central Asia. These countries are generally transition and non-OECD countries except Turkey. Financial systems in these economies are generally characterized as bank-based financial systems as equity markets and other financial markets are not well developed. In these types of countries, firms rely on bank credit if they are eligible for credit and the credit conditions are not stringent. Information asymmetries between banks and borrowers constitutes one of the most important problems especially for SMEs in transition economies as banks are more likely to have difficulty in assessing the credibility of the firms and firm level information.

This thesis starts with introduction chapter. In the second chapter we examine the collateral requirements in loans extended to SMEs in less-developed countries. In contrast to previous empirical research on collateral, we not only focus on the presence of collateral in loan contracts but also on the degree of collateral in these contracts as measured by collateral to loan value ratios. Our analysis assesses both borrower characteristics, which have typically been the major focus of previous investigations, and the country–specific factors that affect collateral requirements. In general, our results indicate that country–specific variables rather are more important than firm–specific variables for determining both the presence and the degree of collateral in loan contracts of SMEs. We find that in countries in which lenders have better information about borrowers' repayment history and unpaid debts through public and private credit bureaus, both the probability for the presence of collateral and the degree of that collateral decrease in loan contracts.

Thus, collateral requirements serve as a tool for resolving the problem of asymmetric information about the borrower's quality. In contrast to previous studies we also distinguish between small, medium, and micro enterprises. We present evidence that the determinants of collateral requirements differ for firms of different sizes.

To improve the abilities of SMEs to access finance it appears to be crucial to improve the process of collecting information about the borrower. In this context, lending activity may benefit from entities that are dedicated to the information collecting process, such as mutual guarantee societies (MGSs). By improving the risk analysis and the information sharing level of a country, MGSs can help ensure that scarce public resources are used more effectively by providing an indication of the adequate level of guarantees for various enterprises.

In the third chapter we examine the determinants of borrowing from informal credit sources, *i.e.* moneylenders, family/friends, and trade credit for SMEs. One four of the SMEs in our sample 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, and the SMEs in our samples mostly use informal credit to finance their working capital expenses; only a very small fraction of the fixed asset investments are financed by informal credit sources. We observe higher percentages of working capital financed by informal sources compared with the percentage of fixed assets financed via informal sources. This result is consistent with the characteristics of informal credit, which primarily includes small and short-term loans. We find that credit-constrained SMEs rely more on informal credit of any type. We find 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). Another explanation is that female entrepreneurs are addressed as better borrowers with lower default rates in the previous literature. This situation may affect women's ability to easily access formal finance.

Our regression results mostly indicate a positive relationship between the legal non-quality and informal credit use, which suggests that informal credit usage in the form of borrowing from family friends and moneylenders is higher in countries where legal procedures take longer. On the other hand the length of legal procedures are found to decrease trade credit use of SMEs. So the obvious policy suggestion of this chapter can be the importance of legal efficiency in limiting the illegal moneylender activities.

In countries with more developed financial markets, firms have many options for financing their projects; thus, they are less likely to use informal credit in the form of family/friends and moneylenders. We find some evidence supporting this hypothesis, *i.e.*, concentrated banking systems lead SMEs to use these forms of 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. Moreover financially distressed SMEs (as approximated by utility arrears) use informal credit in any form more intensively. Accordingly, informal credit plays an important role in alleviating problems of firms regarding credit constraints.

There are several directions for future researches related to this chapter. First, informal credit use has potential effects on a firm's performance and growth, especially for start-up firms. Therefore, *"how does informal credit help 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.

In the fourth chapter we investigate the financial constraints faced by female entrepreneurs. The results of univariate analysis indicate that female entrepreneurs are more likely to be discouraged from applying loan as compared to their male counterparts. As we take into other factors to account for creditworthiness of loan applicants in the regression analysis, the coefficient estimate of the female ownership dummy becomes statistically significant only at ten percent when the dummy variable of being discouraged from applying loan is the dependent variable in the probit regressions. However our results show that female ownership has no effect on loan approvals. These results remained same when we take into account the effect of the top manager's gender.

BEEPS provide information on firms' perception on difficulty of accessing finance. In BEEPS surveys firms are asked to report on a 1 ("no obstacle") to 5 ("very severe obstacle") scale how difficult access to finance (which includes availability and cost, interest rates, fees and collateral requirements) is for the current operations of the firm. The descriptive analysis shows that firms perception of suffering from access to finance do not vary extensively by gender categories. The percentage of the firms that perceive access to finance as a minor and no problem were 51% both for male owned and female owned enterprises. The percentage of the firms that perceive access to finance as a major and very severe were 23% both for male owned and female owned enterprises. We also do not observe statistically significant differences by gender as the t-test results confirm. The results of our study indicate that encouraging policies for female entrepreneurs in lending markets should be implemented in order to facilitate higher firm growth rates and resultantly economic growth in less-developed countries. To this end less-developed countries will be able to catch up with the developed economies.

The structure of BEEPS doesn't allow us to examine the firms that have many female owners. However, future researches can be conducted to compare three groups of firms: firms that only have female entrepreneurs, only have male entrepreneurs, and firms that have both male and female owners. A comparison

between these groups of firms in other countries can be a direction future research topic as well as comparisons between developed, less-developed, developing, or transition economies.

In chapter five, we aim to examine the relationship between market power and risk taking behaviours of banks from Turkey between 2001 and 2011. We employed two measures of loan risk, *i.e.* nonperforming loans over total loans, provisions over total loans, and an overall stability index, *i.e.* Z-index. We measured the market power by Lerner index. We used a second measure that does not specify any restriction on inputs and outputs or a cost function to estimate the marginal cost: the difference between the total revenues and total cost over the total revenues. Some evidence is found to support competition-fragility hypothesis in the empirical part, which suggests that market power increases banks' soundness. Our results show that it is important to have banks with higher market power is associated with lower risk and resultantly a more stable banking system. Although many banks in developed economies was affected negatively in the recent global financial crisis, Turkish banking were not affected due to its strong structure after the establishment of Banking Regulation and Supervision Agency which lead to an intensive regulation processes. On the other hand, since banks in Turkey operate nearly in a non-competitive environment, the disadvantages of having less competition for higher investment levels and *"too big to fail"* policies in banking are especially important for an emerging economy like Turkey.

Chapter five can be extended in several ways. First of all individual bank failures can be considered as a more direct indicator of individual bank distress. Turkish banking sector experienced nine bank failures just before the 2000 crisis, after this year only one bank[97] failed. Accordingly bank failures can be a better measure of fragility not for Turkey for 2001-2011 period but for other countries that experience more frequent bank failures. Secondly other proxies of market power that varies both in bank and in time dimensions can be used. Other

[97] ImarBank failed in 2003.

competition measures such as the Panzar and Rosse's H-stat, Boone index, and Herfindahl-Hirshman index can also be used. However using these measures as competition indicators requires a wider data set. Because these measures are not both time and bank varying, that is to say they either reflect competitive structure of the market that is same for each banks in the system or reflect the market power of an individual bank during a time period. An alternative approach to measure market power can be to use Tobin's q, which can only be calculated for the banks that have market values, *i.e.* have publicly traded stocks. Of the 45 banks in Turkey, 13 have publicly traded stocks in Istanbul Stock Exchange market, these stocks account for 20% of the total banking system assets.

Our study contributes to the limited empirical evidence for less–developed and transition economies and therefore yields important policy implications for SMEs, financial institutions and policy makers. Along the second, third and the fourth chapters in this thesis, we tried to draw attention to the importance of financial constraints. Collateral requirements are more stringent in the less-developed countries as compared to developed economies. We also find that informal credit usage in the form of moneylender and borrowing from family/friends decreases with the development level of the country. As we analyse the effect of firm owners' gender on financial constraints, we see that female entrepreneurs are not discriminated in their loan applications, however they are more likely to be discouraged from applying loans as compared to their male counterparts. These discouragements of female entrepreneurs together with the financial constraints are more important in less-developed and developing economies in order to catch up with the developed economies. To this end, the general policy implication of these three chapters is that in order to foster business activities and resultantly to achieve higher macroeconomic growth rates in less-developed economies, lower collateral requirements together with policies that increase access to finance especially for female entrepreneurs should be implemented. Our results address information sharing as one of the important policy tools to reduce the collateral

requirements for all size of SMEs. In this sense encouraging information sharing among lenders will lead to less stringent collateral requirements.

The policy implication of the fifth chapter seems to favour less competition in banking in order to achieve financial stability in Turkey as a non-developed economy. However in the second and third chapters, we show the disadvantages of having a concentrated banking sector for financial constraints especially for the smallest firms and in non-developed economies[98]. To this end, policy makers should consider the complex associations between banking competition-financial stability and financial constraints simultaneously and balance the degree of competition in banking accordingly. Balancing the level of banking competition is especially important in less-developed economies, as the SMEs in these countries do not have many options of external financing.

[98] As for the effect of banking concentration, we observe a positive association between banking concentration and collateral requirements only for micro sized firms. We also observe that the positive effect of banking concentration on the informal credit use in the form of borrowing from family/friends is valid only in middle income countries as it is not valid for high income countries. These results suggest that the positive effect of banking concentration on financial constraints is important for smallest firms and in non-developed economies.