The Conditional Nature of Credit Constraints

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Abstract

Credit constraints are conditional because they can occur at different stages. Borrowers might not apply for credit because they are discouraged, borrowers who apply might be rejected, and approved borrowers might obtain less favorable credit terms than requested. Using large scale micro-data on small businesses from Europe, I decompose credit constraints into these three conditional stages. I document their prevalence and investigate how firm, bank, and country characteristics affect their likelihood of occurrence. I find that credit constraints vary with the bank lending environment beyond firm risk. Tighter lending standards lead to higher discouragement and rejection rates, but conditional on approval, tight lending standards make unfavorable loan terms to the borrowers less likely. The effect is mainly due to higher loan volume rather than lower loan rates. I find evidence that credit constraints occur at the firm level and are consistent across various credit instruments. The evidence suggests that the conditional nature and stage-specific differences in the determinants should be considered in economic policies that aim at reducing credit constraints.

Keywords: bank loans, credit constraints, bank lending standards, small and medium-sized enterprises, loan terms

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1. Introduction

Credit constraints continue to pose significant obstacles to economic growth and productivity. Due to greater informational asymmetries, credit constraints are more pronounced for small and medium-sized enterprises. Credit constraints occur at the firm-level and at the bank level at different stages of the loan granting process. Borrowers might not apply for a loan in anticipation of rejection. Borrowers who apply might be rejected by the bank or obtain unfavorable credit terms. The outcome at each stage is affected by firm, bank, and country characteristics. In spite of the established evidence of the importance of SME credit, the conditional nature of credit constraints is not well understood. In this paper I decompose credit constraints into three conditional stages and investigate differential impacts of firm- and bank-level factors.

Credit constraints vary across countries and firms. Large cross-country variation occurs due to differences in legal and information environment (Djankov et al., 2007; La Porta et al., 1998; Pagano & Jappelli, 1993), financial and banking systems (Beck et al., 2004; Beck, Demirgüç-Kunt, & Maksimovic, 2008; Levine, 1998), economic activity and monetary policy (Jiménez et al., 2012, 2014). Across firms, smaller and informationally more opaque borrowers face higher barriers to operations and access to finance (Beck, Demirgüç-Kunt, et al., 2005). Empirical studies typically focus on formally rejected firms. But discouraged or informally rejected firms constitute an important group of constrained firms (e.g. Popov & Udell, 2011; Cole, 2008; Brown et al., 2012). There is little evidence about credit constraints that arise due to unsatisfied loan demand of approved borrowers. It is unclear how individual stages of credit constraints depend on firms, banks, and their alternative financing options. Open questions remain about transmission channels through which bank lending standards affect credit constraints.

In this paper I provide a more complete picture of the occurrence of credit constraints in a cross-country context. I document how credit constraints relate to firm risk and bank lending standards. I investigate strategic behavior of borrowers and banks, and show possible trade-offs that firms and banks make during the application process. I classify borrowers into three conditional stages. First, discouraged borrowers are firms that need credit, but do not apply because they expect that they will be rejected. Second,

rejected borrowers apply for credit but are rejected by a bank. Third, borrowers with unfavorable terms are firms whose loan application is approved by the bank but they obtain insufficient amount or refuse the loan due to high cost. The three stages of the constraints consist of non-overlapping sets of outcomes, but they are conditional because each outcome depends on the result of the previous stage.

Discouragement and refusal of the loan by the borrower occur at the firm level. Loan rejection and unfavorable loans occur at the bank level. Firms and banks have different incentives with respect to the provision and repayment of credit. While firms have incentives to minimize the cost of obtaining and servicing the loan, banks have incentives to minimize the risk and maximize the income from providing the loan. In the presence of market frictions and information asymmetries, the occurrence of credit constraints depends on the lending stage and the lending party that makes the choice about the outcome in the given stage. Due to these differences it is therefore likely that the key firm and bank determinants have differential impact on loan provision. I examine three sets of factors related to credit constraints: firm, bank, and country characteristics. I investigate the impact of bank lending standards, individually and jointly, on the occurrence of conditional credit constraints. Because firms have options to apply for different credit instruments at different times, it is possible that borrowers time their applications and trade-off demand for different credit instruments. I examine whether credit constraints are specific to a credit instrument, or whether credit constraints exist at the firm level regardless of credit instrument requested. I check the consistency of credit constraints across different instruments and estimate the probability of loan application timing in response to the expectations of credit availability. At the bank level, I analyze the spillover effect of bank lending standards to different credit instruments. In the last step, I investigate the impact of non-bank competition and the availability of market financing to firms and banks. In all analyses I control for the structure of the economic environment and the structure of the banking sector in a country.

The empirical analysis is based on microdata of over 58,000 firm-level observations from 14 Euro-area countries from the period 2009-2013. The empirical methods take into account the conditionality of credit constraints and correct for sample selection bias.

My key findings are as follows. Stages of credit constraints vary with the bank lending environment beyond firm risk. I show that the stages of credit constraints have differential relationship with firm, bank, and country characteristics. I find that tight bank lending standards are associated with more discouraged borrowers and higher rejection rates. Approved borrowers are likely to obtain more favorable credit terms in spite of tight standards. The effect is mainly due to larger loan volume, rather than lower interest rates. While loan covenants are associated with increased constraints at all three stages, the requirements on collateral have an opposite effect. I find that discouragement and rejections are more likely in countries with higher risk in the banking system.

Second, I find that credit constraints exist at the firm level and are consistent across various credit instruments. Individual stages of credit constraints are strongly related to the stages of credit constraints reported for other credit instruments. Bank lending standards applied for bank loans tend to spill over to other credit instruments

Third, I show in further analyses that borrowers are not likely to time their bank loan applications strategically according to their expectations of the availability of external finance. However, I find evidence that borrowers trade-off bank loans and trade credit applications in the expectation of changes in their availability in the future. Market financing contributes to the effect of lending standards on the stages of credit constraints. On the demand side, borrowers are less likely to be discouraged and rejected in spite of higher lending standards, if the availability of market finance is high. On the supply side, availability of market finance to banks facilitates higher loan volume for approved borrowers.

Overall, the evidence suggests that lending standards may induce inefficient lending. Banks with high lending standards excessively reject (and discourage) borrowers, but approved borrowers obtain higher loan volume. This implies a possibility of a distorted loan allocation whereas banks substitute higher rejection rates at the application stage with higher loan volume for approved borrowers.

The rest of the paper is organized as follows. Section 2 provides an overview of the related literature. Section 3 describes data and empirical strategy. Section 4 presents the results and robustness checks, and section 5 concludes.

2. Related literature

Access to finance is an important factor related to economic activity (e.g. Demirgüç-Kunt & Maksimovic, 1998). In many economies, SMEs account for a large share of the economy, which contributes to employment and economic growth (Ayyagari et al., 2003; Beck, Demirguc-Kunt, et al., 2005), although the causal link is not established. SMEs consistently face higher barriers to operations and access to finance (Beck, Demirgüç-Kunt, et al., 2005; Berger & Udell, 1998). The main firm-level factors for higher barriers are higher information asymmetries, less favorable economies of scale, and higher entry costs (Beck, Demirguc-Kunt, et al., 2005; Beck, Demirgüç-Kunt, & Maksimovic, 2008; Klapper et al., 2006). The literature on financing constraints takes into account multiple financing instruments and analyzes the overall outcome. Among various financing options, bank loans represent an important instrument for SMEs (Beck, Demirgüç-Kunt, et al., 2005). Bank lending to SMEs is specific in resolving information asymmetries, loan granting process, but also exhibits potential negative externalities that arise due to the hold-up problem and moral hazard (Berger & Udell, 1995a; Boot, 2000; Petersen & Rajan, 1994). Credit rationing of SMEs is further related to information and incentive problems (Kirschenmann, 2014). This paper focuses on credit constraints specifically related to bank lending. Controlling for firm-level characteristics, I provide a more complete analysis of the three conditional stages of credit constraints: discouragement, rejection, and unfavorable terms. This approach allows me to document the prevalence of individual stages of credit constraints and offer new evidence on the differential impact of factors that influence the outcome at each stage.

Large variation exists in access to SME finance across countries (Djankov et al., 2007). Firm characteristics alone do not fully explain the cross-country differences. Financial and legal institutions play

an important role in reducing the barriers for SMEs to access finance (e.g. Beck & Demirgüç-Kunt, 2006; Demirgüç-Kunt & Maksimovic, 1998; La Porta et al., 1998; Rajan & Zingales, 1998). SMEs in both developed and developing countries face higher obstacles to access external finance (Berger & Udell, 1998). Legal environment affects the enforceability of financial contracts and influences the provision of credit. Countries with weak legal environment and low protection of property rights are less likely to experience SME growth and new business creation (Beck, Demirguc-Kunt, et al., 2005; Demirguc-Kunt et al., 2006). Efficiency of legal environment determines the availability of tools that banks can deploy to provide credit, such as collateral, covenants, or personal recourse (Berkowitz & White, 2004; Sharpe, 1990). More efficient bankruptcy laws and higher debt enforcement improves the availability of credit and facilitates the development of credit markets (Djankov et al., 2008). Another important factor is the information environment. Sound accounting standards and credit sharing systems reduce the cost of resolving information asymmetries (Kallberg & Udell, 2003; Miller, 2003). Empirical evidence confirms that credit information depth helps to increase access to finance (Jappelli & Pagano, 2000, 2002; Love & Mylenko, 2003). Regulatory environment affects the availability of finance by imposing restrictions on financing activities and potentially distorting capital allocation in favor of specific stakeholders or financing instruments (Altman, 2005; Berger, 2006). Overall, the cross-country evidence confirms the importance of institutional environment for SME finance availability. Many of the above studies is concerned with the finance-growth nexus, especially in the developing economies. However, the problems of SMEs to access finance remains acute in the developed countries. The problem is pronounced in the European bank-based systems where most of the external SME financing is provided by the banking sector. A detailed nature of credit constraints that covers the conditional loan granting process is not well understood. My focus is on explaining the credit constraints and the transmission mechanism of the factors that contribute to their occurrence. I extend this strand of literature by analyzing bank lending data in Euro-area countries in the post-crisis period 2009-2013, which is marked by dislocations in the credit markets.

Access to credit is related to the structure of the banking sector and bank regulation (Berger & Udell, 2006). There is conflicting evidence about the role of bank competition and the availability of credit (Berger et al., 2004). Studies find positive (Boot & Thakor, 2000), negative (Petersen & Rajan, 1995), or U-shaped relationship (Degryse & Ongena, 2005; Elsas, 2005; Presbitero & Zazzaro, 2011) between credit availability and bank competition. Recent studies uncover more complex implications of bank competition for bank loan provision through complex oligopoly and differential impact on loan terms (Heffernan, 2006; Voordeckers & Steijvers, 2006). The effects of bank competition also depend on institutional development (Beck et al., 2003). Regarding the bank regulation, most studies report overall positive effects of imposing fewer restrictions. For instance, Berger & Udell (1995b) and Ramirez (1995, 2002) show that fewer restrictions are associated with lower cost of capital and lower cash-flow constraints. Beck, Demirgüç-Kunt, & Martinez Peria (2008) find that countries with more restrictions also experience higher barriers to banking services. Credit constraints decrease after the liberalization takes place (Gelos & Werner, 2002; Laeven, 2003). Low efficiency of the banking system may signal unwarranted managerial perquisites and market power. Barth, Caprio, et al. (2008) find that private monitoring is associated with greater bank efficiency. This paper contributes to the literature by offering insights on the role of bank lending standards. Bank lending standards represent a direct expression of bank lending policy. Therefore, they serve as an important determinant of bank lending outcomes. I investigate the transmission mechanism through which bank lending standards relate to the stages of the credit constraints.

Availability of non-bank financing influences the financing choice of borrowers. Larger participation in market finance leads to smaller banking sector (Diamond, 1997). On the other hand, banks and stock markets tend to develop together (Demirgüç-Kunt & Levine, 1996). Rajan & Zingales (2003) suggest that more market-oriented financing system should be beneficial in Europe. Smaller firms are more likely to obtain larger share of alternative informal finance (Beck, Demirgüç-Kunt, & Maksimovic, 2008). It is unclear how stages of credit constraints depend on the availability of non-bank competition and market finance. I conduct analyses to estimate how alternative finance influences the credit constraints.

Several studies recognize that observed loan rejections do not represent fully the extent of credit constraints (Brown et al., 2011; Cavalluzzo & Wolken, 2005; Cole, 2008; Cox & Jappelli, 1993; Léon, 2014; Popov & Udell, 2012). Observed loan applicants may consist of a systematically truncated subsample of all firms, which may result into biased estimates. In other words, in a full sample, a discouraged borrower and a borrower who does not need a loan are observationally identical. Empirical evidence shows that discouragement represents a sizeable component of credit constraints, but the level of discouragement varies across economies (Brown et al., 2011; Ongena et al., 2013; Popov & Udell, 2012; Popov, 2013). The literature above recognizes discouragement as the first stage of credit constraints and rejection as the second stage. I extend the literature by introducing the third stage of credit constraints, which corresponds to unfavorable terms. Borrowers whose application is approved, but who receive unfavorable terms are effectively credit constrained. With unsatisfied loan demand these borrowers cannot fully undertake their intended investment projects. Without accounting for the third stage of credit constraints, the borrowers with unfavorable terms are observationally identical to approved borrowers. Little evidence is available on unfavorable loan terms in the context of credit constraints. In this paper I investigate all three stages of credit constraints and account for conditionality of the occurrence of each stage.

3. Data and empirical strategy

3.1. Data sources

The empirical strategy is based on a sample of 58,845 semi-annual observations of firms located in 14 Euro area countries in the period 2009-2013. The data comes from two main sources.

First, ECB SAFE (Survey on the access to finance of enterprises) contains firm-level micro-data on SME access to finance. The survey covers micro, small, and medium-sized and large firms. The firms are selected randomly from Dun & Bradstreet database. The selection is stratified by firm size, economic activity, and country. Data is collected at semi-annual frequency (ECB, 2014a).

Second, ECB BLS (Bank lending survey) contains country-level data on Euro area supply and demand conditions in the credit markets, bank lending standards of the banks, and factors that affect the bank lending standards. The survey is addressed to senior loan officers and covers a representative sample of approximately 90-140 banks from all Euro area countries (ECB, 2014b). Data from the survey is available as diffusion indices collected at quarterly frequency and aggregated across the banks per each country. Following Euro area countries are not available in the dataset: Belgium, Greece, and Finland. I merge the dataset with ECB SAFE firm-level data. Further data on country-level banking sector and economic environment comes from World Bank Global Financial Development Database and other sources as indicated in Appendix Table A1.

3.2. Main variables

This study focuses on credit constraints related to bank loans (both new loans and renewals). It does not include credit lines or overdrafts. The main dependent variables are the three conditional stages of credit constraints. Each stage is represented by a binary variable, which takes the value of 1 if the firm is constrained. The first stage of credit constraints represents discouraged lending. The conditioning information is the need of the firm for a loan. A firm is considered to be discouraged if it needs a loan, but did not apply because of possible rejection. A firm is considered to be in need of a loan if it does not belong to a group of firms that did not apply because of sufficient internal funds or did not apply for other reasons. The survey does not provide further information about the latter group of firms and the reasons why these firms do not apply. Using the consistency check of credit constraints across credit instruments, I confirm that this group of firms is not likely to be constrained. Unlike credit constrained firms, there is no significant relationship with stages of credit constraints of other credit instruments. These firms are not considered to be in need of a loan. This group represents only 0.9% of all observations.

The second stage of credit constraints represents loan rejections. The conditioning information is a loan application submitted by the firm. A firm is rejected if it applied for a loan, but the bank rejected the application.

The third stage of credit constraints represents unfavorable terms of an approved loan application. The conditioning information is the approval of the loan application. There are two possible outcomes from the approval: a) firm obtained favorable terms (the firm obtained 75% or more of the requested amount and accepted the loan terms and conditions); b) firm obtained unfavorable terms. In case of unfavorable terms, the survey provides information on two outcomes. Either the firm obtained only a limited part of the loan amount requested (up to 74% of the requested amount), or the firm refused the loan because of unacceptable cost or terms and conditions. There is a slight semantic nuance in these two outcomes. According to survey design, a firm with insufficient loan volume accepts the loan, whereas firm with high cost refuses the loan. In both cases the firms are considered credit constrained in the third stage. There are two cases that do not fall into this category. First, firms that accept the loan in spite of unfavorable terms are not considered credit constrained because the acceptance of the terms implies a rational choice of the firm that the terms are acceptable. Second, firms that refuse the loan due to insufficient loan amount are not observed, however, they can fall into a small group of non-applicable responses that represent less than 1% of observations in the third stage. These two cases are not expected to have an influence on the overall outcome.

All three stages relate to the bank loan experience within the past 6 months. I exclude observations where the outcome from the lending stage is not applicable or is invalid.

[Insert Figure 1 here]

To explain the variation of stages of credit constraints across countries, I use three sets of explanatory variables: firm, bank, and country-characteristics. Firm-level survey data allow me to observe indicators that are relevant to the extent of information asymmetries, firm risk, economic activity of the firm, and credit demand. I separate firm-level credit demand factors from bank loan supply factors.

Firm-level explanatory variables include number of employees, age, annual turnover, industry, ownership, gender of the owner/director, and individual firm outlook. Firm size is related to the extent information asymmetries and higher obstacles in accessing credit. Although sample consists mainly of SME firms up to 250 employees, there are marked differences within this size classification. I control for the age

as the overall level of publication information about the firm and the proxy for information asymmetries. Annual turnover represents the extent of current activity of the firm. Ownership status reflects different legal forms with potential implications for financial contracting. Limited liability protection, or the absence of it, influences the level of implicit collateralization of bank financing, and thus affects the credit access. Gender of the owner of director controls of unobserved firm heterogeneity related to gender gap in SME financing. Overall credit risk of the firm is measured by the change in credit history over the past 6 months. All firm characteristics are measured as categorical variables.

Bank-level supply-side factors are represented by bank lending standards. (ECB, 2014b) defines bank lending standards as "the internal guidelines or criteria which reflect a bank's loan policy". Bank lending standards encompass lending terms and conditions, as well as written and unwritten practices and criteria for granting a loan. In the empirical analyses I implement three sets of bank lending standards. First, an overall measure of bank lending standards. Second, I decompose bank lending standards by loan terms into interest margins, loan size, maturity, collateral, covenants, and non-interest margins. Third, I decompose the standards by factors that affect their overall variation due to the availability and accessibility of non-bank finance for firms and banks. Bank lending standards are set by the bank and are measured as diffusion indices at a country-level. The diffusion indices are derived from survey questions that use 5-point scale to estimate the extent of the change in the standards from "tightened considerably" to "eased considerably". Each observation covers the period over the past 6 months (I aggregate the observations over two quarters). A limitation of diffusion indices is that there is no reference level. This limitation affects the interpretation of the results. Instead of estimating the effect of different levels of lending standards across countries, I can estimate the marginal effect of the relative differences in changes in lending standards across countries (e.g. increase in lending standards in Germany vs. decrease in France). In my empirical analyses I interpret bank lending standards in their literal sense. Veer & Hoeberichts (2013) propose a solution to estimate a level of lending standards, but the solution is de-based to a unitless scale within a country. This means that it is less applicable in an international context. Another concern is raised

by Del Giovane et al. (2011) who note that questions in the survey collect data about the change in the degree of tightness to some (undefined) benchmark in the preceding period, but not specifically about the change in lending standards relative to the previous period. This might influence longitudinal analyses, but in my empirical setting I do not analyze the longitudinal dimension. Instead, I exploit cross-sectional variation in relative changes in lending standards.

Country variables include proxies to capture the heterogeneity of the banking sector and the economic environment across countries. Bank concentration is used as a proxy of competitiveness of the banking sector. I measure bank concentration by assets of the three largest commercial banks to the share of total commercial banking assets. I consider alternative proxies for bank competition and market power in the robustness checks. Bank z-score and bank returns on assets approximate the strength of the banking sector in the economy. I measure the efficiency of the banking segment by net interest margin (efficiency of financial intermediation) and by bank overhead costs over total assets (efficiency of bank operations).

I model the differences in the economic environment by the development of the financial system (share of private credit to GDP, stock market capitalization), expected aggregate credit demand (expected economic activity), legal system and property rights (overall property rights index), information environment (credit information depth index), regulation (composite business regulation index), and macro-economic environment (level of GDP, inflation).

3.3. Empirical strategy

The aim of the empirical strategy is to investigate the occurrence of conditional stages of credit constraints. My empirical analysis proceeds in two steps. First, I quantify the prevalence of the stages of credit constraints across countries. Next, I explain the occurrence of the constraints in a multivariate setting. I focus on the role of bank lending standards and investigate the transmission mechanism of the effect of lending standards on credit constraints.

In the empirical setup I address two econometric issues. First, the loan granting consists of a sequential selection process. In each stage, the sample is a non-random sub-sample from the previous step (e.g. sample of firms that need a loan is a non-random sample of all firms; sample of firms that apply for a loan is a non-random sample of those firms that need a loan, etc.). This is a case of an incidental truncation (Greene, 2003). The problem is that there might be some underlying systematic factors that drive the sample selection. To address this issue, I implement standard Heckman procedure (Heckman, 1979). A good identification requires at least one exclusion restriction at each stage. At the first stage (discouraged lending), the exclusion restriction should affect the need for a loan directly, but only indirectly affect the firm's decision to apply. I use firm's changes in the *need for fixed investment*. I assume that firms base their need for fixed investments primarily by their business operations. It is not likely that the firm's application considerations would drive the need for fixed investment. At the second stage (rejection), the exclusion restriction should directly affect the firm's decision to apply, but only indirectly affect the bank's decision to approve the loan. For identification I use *regulation* index. Higher obstacles to business operations might negatively influence the decision of a firm to apply for a loan. However, a bank is not likely to base its decision to approve the loan directly on the level of regulation. Finally, at the third stage (unfavorable terms), the exclusion restriction should directly affect the bank's loan terms, but only indirectly affect the firm's decision to accept the unfavorable terms or refuse the loan. At this stage the exclusion restriction is *bank overhead costs / total assets*. The level of bank efficiency is likely to influence the loan terms or the service, but this information does not seem as the primary reason for firms to make a decision about the loan terms.

A related concern is that changes in bank lending standards may be endogenously determined with credit demand. For example, given a limited funding liquidity of a bank, an increase in lending standards might be determined by an increase in existing or expected credit demand (this pattern is not present in the sample). In response to this problem, I assert that there is a causal link between lending standards and credit constraints. In fact, the purpose of lending standards is to define the terms, conditions, and rules that directly

affect the decision of a bank to approve a loan. Alternatively, it is possible that there is a feedback effect between lending standards and lending outcomes. If lending standards are not effective (as observed by the lending outcomes), banks may respond to the situation by changing its bank lending standards. Although such relationship is sequential, in such case bank lending standards are not fully independent from lending outcomes within a given time period. The solution lies in isolating the endogenous component of the credit demand effect. In this case the common underlying problem is the same as for the sample selection bias because the endogeneity of the relationship is rooted in the same latent variables that drive the sample selection.

Second econometric issue relates to the distinction between credit supply effect, credit demand effect, and the repricing of credit risk. The composition of borrowers varies with the business sample. Further, firms are likely to demand different levels and composition of external finance throughout the business cycle. In economic downturns, agency costs of firms and banks increase at the same time (Gertler & Gilchrist, 1994; Popov, 2013). To address this issue I include in the model separate firm-level factors of credit demand and credit composition, bank-level lending standards, and country-level indicators of economic activity.

A limitation of the data is that it does not allow for bank-firm matching. Taking this limitation into account, the empirical findings can be interpreted at the aggregate country level.

I estimate the results with probit models where the dependent variable is the stage of the credit constraint. All models are estimated with industry and year fixed effects. I report results using robust standard errors. The results are similar when I use standard errors clustered at the country level. However, because the number of clusters is low and the observations within the clusters are unbalanced, these estimates are likely to be less efficient.

4. Empirical results

4.1. Cross-country evidence on credit constraints

In the first step I assess the prevalence and the composition of credit constraints. Figure 2 provides an overview of absolute and relative levels across countries. The figure shows a large variation across the 14 Euro area countries. Lowest absolute levels of constraints are reported in Malta and Austria (~5% of all firms), largest in Ireland and Spain (19% and 16% respectively). In most countries discouragement is the most important component of the overall credit constraints, but the relative composition of individual stages varies across countries. On average, the discouragement proportion is about twice as large as each, rejections and unfavorable terms.

[Insert Figure 2 here]

The sample period 2009-2013 is marked by turbulent events in the credit markets. Figure 3 shows the development of the stages of credit constraints over time. It also shows the changes in bank lending standards and demand for loans. Throughout the whole period, banks constantly tightened their bank lending standards, whereas the demand for loans mostly declined. The largest contrast is apparent in the crisis year 2009. These developments are likely related to the macro-economic conditions and the policy measures, which incetivized banks to decrease their risk exposure amidst declining credit demand (Wehinger, 2013). The composition of credit constraints is relatively stable over time with the exception of year 2009, when the rejection rates increased and unfavorable terms decreased. The overall level of credit constraints remained at the same level of around 10% (not reported). The figure documents the importance of separating credit demand and supply factors. For example, high level of rejections may be a manifestation of low credit supply, or high demand. In 2009, the effect is likely to be supply-driven. The figure also shows that in the sample the changes in bank lending standards are not positively correlated with changes in credit demand.

[Insert Figure 3 here]

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Figures 2 and 3 raise a number of questions, which I address in the subsequent analyses. What drives the large cross-country variance? How do credit demand and supply factors influence the outcome, and how do country's institutions and the structure of the financial markets affect the occurrence of credit constraints?

Table 1 presents the summary statistics of the main variables. Firms included in the survey are mainly SMEs. 90% of all firms have less than 250 employees and 70% have annual turnover up to €10 million. A stylized typical company in the sample is a private, family-owned small firm with around 30 employees, older than 10 years with turnover of €12 million. During the sample period most firms reported neutral or negative economic outlook, but at the same time, their credit history improved or remained unchanged.

[Insert Table 1 here]

Country-level summary statistics, reported in Table 1, Panel B, show that the average level of credit constraints is 11%, but a large variation exists (standard deviation of 32%). On unconditional basis, the overall constraints consist of 5.9% discouragement, 2.8% rejections, and 2.7% unfavorable terms. Bank lending standards increased on average during the sample period, especially for long-term loans where the lending standards increased by 76% more compared to short-term loans. Banks tightened all components of lending standards. Largest tightening occurred (in the order of magnitude) in interest margins, collateral, and maturity, reflecting the increased risk-aversion of banks. Least increase occurred in non-interest margins and covenants. Change in capital position of the banks contributed most to the increase in lending standards. Bank competition is the only supply factor that helped to loosen the overall lending standards. Regarding the landscape of the banking sector, the three largest commercial banks account for 70% of assets across the countries (ranging from 30% in Luxembourg to 99.64% in Estonia). Banks made small loss of -0.02% ROA throughout the period, but maintained bank z-score at relatively healthy level of 14.48. Mean net interest margin charged by banks was 1.34%. The banks held moderately optimistic outlook on the expected economic activity.

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Table 2 breaks down the aggregate level and composition of credit constraints by countries. The table distinguishes between unconditional and conditional relative frequencies. The former measure reports the ratio of constrained firms relative to all firms, the latter takes into account the conditionality of the stages of credit constraints. Largest levels of discouragement are reported in Ireland and the Netherlands. 46% of firms needing a loan are discouraged in Ireland and 40% in the Netherlands. There is a large variation across countries in the prevalence of rejections and unfavorable terms. The relative outcome depends on the conditionality of the measurement. 26% of firms that applied are rejected in Estonia and 22% in the Netherlands, compared to only 1.5% in Luxembourg and 2% in Malta. Of all approved firms, 22% received unfavorable terms, but only 6% in France. Clearly, there is a considerable heterogeneity across the countries in terms of the firm risk, structure and the development of the banking sector and the economic environment. In addition, these statistics imply that there are regional differences in the propensity of firms to apply and the conditional likelihood of banks to approve the loan or offer favorable loan terms. Taking into account the conditionality of occurrence of credit constraints in all three stages increases the accuracy of estimated true credit constraints.

[Insert Table 2 here]

To gain further insights on the firm-level relationship between the firm risk and the stages of the credit constraints, I sort firms into 4 groups by annual turnover and plot the distribution of firms against the stages of credit constraints (Figure 4). The distribution represents relative proportion of credit constraints by country. I select the annual turnover because it contains information about firm size, risk, and economic activity. The figure shows that the stages of credit constraints are related to firm turnover, but the relationship depends on the stage. There is a clear inverse relationship between firm turnover and the relative level of discouragement. Smaller and more risky borrowers are more likely to be discouraged. On the other hand, the relationship is opposite for unfavorable terms. Larger borrowers are more likely to obtain unfavorable terms. Rejection rates are relatively constant across the levels of turnover, but in some countries larger companies experience more rejections. The figure shows that, in addition to country-level variables,

firm characteristics are important considerations in explaining cross-sectional variation in credit constraints, but it is necessary to distinguish among the individual stages.

[Insert Figure 4 here]

4.2. Differential determinants of the stages of credit constraints

In this section I explain the occurrence of stages of credit constraints in a multivariate setting. The main goal is to disentangle the differential impact of key determinants on individual stages. Table 3 reports the baseline results. In models (1-3) the dependent variable is a binary indicator corresponding to each stage. In models (4-5) I break down the third stage, unfavorable terms, into two outcomes, insufficient amount, and high cost of the loan. All of the specifications correct for sample selection bias. The first stage function estimates the loan demand. The procedure is recursive in subsequent stages.

I find that credit constraints vary with the firm, bank, and country characteristics, but the direction and the magnitude of the effect depends on the stages of the credit constraints. Firm characteristics explain a large part of the overall variation. The largest effect is due to the firm credit history. Firms with negative changes in credit history over the past 6 months are more likely to be discouraged or rejected. This implies that banks screen applicants by information in the credit history and that borrowers anticipate this screening. Another significant factor is the individual firm outlook. This variable is a joint proxy for firm risk and business prospects. As firm outlook deteriorates, the firm is more discouraged or rejected. The effect of both credit history and firm outlook does not translate into worse loan terms. In both cases, firms with negative changes, are less likely to obtain unfavorable terms. While I cannot observe further details, it is possible that this is due to the role of the lending relationship (or a bank's expertise in borrower screening) as banks resolve information asymmetries using tools that go beyond hard information contained in the credit history. Another possibility is that discouragement in the first stage eliminates some of the borrowers who would otherwise qualify for favorable terms in the third stage. Conversely, lower discouragement may induce adverse selection in the second stage as low quality borrowers attempt to pool with high quality borrowers. Smaller firms, measured both by the number of employees and by annual turnover, are more

likely to be discouraged or rejected, but only high turnover firms tend to obtain insufficient amount if they are approved. This is likely because these firms also request larger loan amounts, which might not be fully accommodated by banks. I detect a potential indication of a hold-up problem, assuming that firm age correlates with the length of the lending relationship. Young firms are less discouraged or rejected, but older firms obtain less favorable terms. The relationship appears to follow an upward sloping concave curve. The contrast is largest between the youngest firms (up to 2 year old) and medium-aged firms (2-5 years), but less pronounced for the older group of firms relative to the medium-aged firms. Firm ownership is not significant, but there is an indication that female owners/directors tend to be more discouraged.

On the supply side, I find that increased bank lending standards are related to more discouraged borrowers and higher rejection rates. However, approved borrowers are less likely to obtain unfavorable terms. This effect is mainly due to larger loan volume, rather than lower cost of the loan or other terms and conditions. Lower credit constraints in the second and third stage are observed in countries with higher bank z-score, and in countries with optimistic economic outlook and lower interest margins. There is a positive association between the stock market capitalization and the level of discouragement. This finding points to a possibility of a substitution effect between bank and market finance, but the relationship appears to be more complex. In further analyses below I examine this relationship in further detail. Regarding the information environment, the results indicate that larger scope of information in credit registries is associated with higher discouragement and higher likelihood of obtaining high cost of the loan. This findings raises two conjectures. On one hand, deep credit information reduces adverse selection in the first stage since lower quality borrowers do not apply if they are aware of their poor credit record. On the other hand, the existence of detailed credit information may lead to bank's over-reliance on hard information, which results to relatively more costly loans to firms in countries with detailed information relative to countries where this information is not available and where the banks rely more on their own hard information or lending relationships. As a proxy for financial system development I use variable private

credit to GDP. This proxy also reflects the supply of credit in the market. Surprisingly I find no evidence that the amount of private credit relative to GDP is related to any of the stages of credit constraints.

[Insert Table 3 here]

Overall, I find that higher discouragement and rejection rates are associated with higher firm risk, tighter lending standards, and weaker banking sectors. Discouragement and rejections generally show similar patterns. This is likely due to the fact that banks are effective in screening the borrowers and the firms are likely to correctly anticipate the screening outcome. Conditional on approval, the borrowers obtain more favorable terms when lending standards are high. The loan terms effect observed in the third stage is realized through loan volume. These findings point to a possibility of an inefficient lending. The inefficiency arises from the frictions in the conditional progression through the stages of the loan application process. The logic is as follows. For a marginal increase in lending standards, banks tend to reject more borrowers. But approved borrowers obtain larger loan. If banks realize the changes in their lending policy and risk exposure through loan rejections rather than the loan terms, then they may exclude from lending some borrowers that would otherwise qualify for a loan. In this sense the bank substitutes higher rejection rates in the second stage with higher loan volume in the third stage. As a secondary, effect higher lending standards (and rejections) lead to higher discouragement in the first stage, further exacerbating the problem. This process might lead to a distorted loan allocation. As a counterfactual, a more efficient outcome would be if I observed non-significant or positive relationship between the tightness of lending standards the unfavorable terms (as measured by the loan volume or the cost of the loan). Such result would indicate that, for a given level of bank risk aversion, banks reject an optimal level of borrowers (non-significant outcome), or that banks adjust lending terms in line with their lending standards (significant positive coefficient). From the bank's perspective, it might be easier (and less costly) to set and approve only high quality borrowers and over-allocate credit to this group of borrowers.

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To investigate further the effect of bank lending standards, I decompose the standards by individual loan terms. Loan terms in the sample are interest margins, loan size, maturity, collateral, covenants, and non-interest margins. The purpose of this analysis is to examine how loan terms relate to the stages of credit constraints and to examine the transmission through which banks implement the changes in their lending policy.

[Insert Table 4 here]

Table 4 shows that the transmission effect operates mainly through collateral requirements and covenants. The two components have opposing sign across the stages. The finding is in line with borrower signaling. If collateral requirements increase, borrowers are less likely to self-select themselves for application (most likely due to available collateral) and subsequently they are less likely to be rejected. However, approved borrowers obtain insufficient loan amount. Since the survey results are self-reported, it is possible that this outcome is due to differing views on the collateral value or risk between the lender and the borrower. Unfortunately, I cannot observe this information directly. In contrast, the relationship between covenants and credit constraints is opposite. Higher covenants lead to more discouragement and rejection, but post-approval, higher covenants are related to lower likelihood of unfavorable terms. Tighter lending standards for obtaining loans with longer maturity lead to borrower discouragement. Surprisingly, interest margins are not significant. In line with the previous results, when controlling for changes in standards for loan size I find that coefficients are consistent with the occurrence of unfavorable terms from the previous results. Loan size is negatively related to unfavorable terms (both insufficient amount and high cost). This might imply that banks may be trading-off stricter standards on loan size with the cost of loans.

This analysis suggests that collateral and covenants are the main factors that influence, in the opposing direction, the occurrence of credit constraints in all three stages. Table 4 reports results with all loan terms included simultaneously in the regressions. I also estimate the results using nested models and including one loan term at a time. I find consistent results. One concern is that the loan terms and the lending outcomes are determined simultaneously. However, evidence on this topic is mixed (Brick & Palia, 2007;

Dennis et al., 2000). Studies on the banking practice document that the process of loan term determination is sequential (Bharath et al., 2009; Kirschenmann & Norden, 2012; Standard & Poor's, 2011). My empirical model helps to disentangle the sequential stages in loan term determination in the second and third stage. The loan terms are measured at an aggregate country-level.

4.3. Do credit constraints exist at the borrower level or loan level?

Bank loan is one of several credit instruments available to a firm. Accordingly, a firm that needs external finance may choose to apply for different instruments or adjust its financing mix in response to varying determinants specific to a given instrument. It is not clear whether credit constraints are specific to a credit instrument or whether they exist at the firm-level consistently across different credit instruments. In the latter case, an analysis of credit constraints in the context of bank loans would have limited interpretation. This analysis checks the consistency of credit constraints across 4 credit instruments: bank loans, credit lines, trade credit, and other loans including loans from friends, family, or other company.

I also check the consistency of bank lending policies. Bank lending may affect borrower choice of the credit instrument. If credit constraints arise at the loan level independently from other credit instruments, then lending standards will have a differential impact on the occurrence of credit constraint of a particular credit instrument. In contrast, if credit constraints arise at the borrower level, then lending standards will have joint impact on stages of credit constraints of other instruments.

To address this question, I add to the regression models credit constraints of other instruments as explanatory variables. The results in Table 5 confirm the consistency of credit constraints across credit instruments. The results are reported in reference to firms who applied for a given credit instrument. Credit constraints of other instruments are consistently positively related to the bank loan credit constraints. The relationship holds at each stage. These results imply that firms and banks use consistent set of criteria in evaluating financing options and determining the lending outcomes. I also find an association between stages of credit constraints across different instruments. For example, as expected, firms with rejected credit line application are more likely to be discouraged from applying for a bank loan and vice versa. However,

firms with rejected trade credit application are more likely to apply for a bank loan. The effect of bank lending standards remains significant in the second and third stage, which implies a spillover effect. It is not significant at the discouragement stage. Because the discouragement occurs at the firm level, this result is in line with the notion that firms submit their loan application strategically in the context of availability of other instruments. I confirm the results using nesting models.

[Insert Table 5 here]

Firms plan their external financing in accordance with their capital needs and economic outlook. While the previous analyses use backward-looking information, it is not known whether firms take into account the future outlook of availability of financing. Controlling for macro-economic environment, banks might react to borrower expectations by adjusting future bank lending standards. The presence of strategic behavior from both firms and the banks might obscure the true occurrence of credit constraints and the effect of bank lending standards, since firms may time their loan applications. The following analysis examines the relationship between the firm expectations of future availability of various credit instruments and the stages of credit constraints.

To control for the availability of other credit instruments, I include in the models expectations of availability of 7 sources of financing: bank loans, internal finance, credit line, trade credit, equity, debt securities, and other loans. I decompose lending standards into forward and backward looking values. The time horizon of the expectations are 6 months. In the following table I also report the estimation of loan demand. The dependent variable is the categorical indicator of change in loan demand. While the actual loan application (or discouragement) is a manifestation of the firm's intent to obtain external finance, the underlying cause is the demand for loan. Table 6 reports the results.

[Insert Table 6 here]

I do not find evidence that firms time strategically their loan demand or loan applications according to their expectations of future bank loan availability. Firms are discouraged when they expect less bank

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loan availability in the future. They are even more discouraged when they expect increase in bank lending standards. The results indicate that at the application stage, firms trade-off bank loans with trade credit. If borrowers expect less availability of trade credit in the future, they are more likely to apply for a bank loan now. They are also more likely to apply if they do not have a credit line. Effects of firm expectations are less pronounced at the bank application stage, likely because they are not observable by the bank. However, there is an indication that firms that expect less future bank loan availability are more likely to be rejected, suggesting a presence a signaling information content of firm expectations. Firms are less likely to be rejected if they do not have other credit instruments. As in the previous analysis I check the robustness of the results by nesting the models.

4.4. Credit constraints and the availability of alternative finance

Presence of non-bank financing options might affect the occurrence of credit constraints and influence the transmission of bank lending standards. Greater availability of non-bank finance may reduce the overall financing constraints, but the effects of the relationship depends on a number of factors, such as the type and the composition of borrowers, risk levels, and the strategic choices of the borrowers. In the following analysis I investigate the impact of non-bank financing options through the effect of bank lending standards. The main explanatory variables represent the variation in lending standards due to the changes in the availability of non-bank finance. I examine separately the effect of non-bank competition, and market finance. Non-bank competition represents all non-bank financing options that compete with bank lending services. I further decompose market finance into two components. First, bank market finance represents the ability of a bank to obtain market financing. Second, firm market finance represents the availability of market financing to firms. Table 7 presents the results.

[Insert Table 7 here]

I find that greater non-bank competition is associated with lower discouragement, but I do not observe significant association with other stages of credit constraints. There is an opposing effect of bank market finance and firm market finance in the first and second stage. Higher bank lending standards due to

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the availability of market financing are related to lower discouragement and lower rejection rates. I surmise that the effect is likely driven by the demand side. On one hand, the availability of market financing might exert some disciplining effect on the prospective borrowers or improve the bargaining position of the borrower vis-à-vis the bank. In contrast, higher bank lending standards due to the ability of banks to obtain market finance are related to higher discouragement and higher rejection rates. This is likely driven by the supply-side. Ability of banks to obtain market financing facilitates larger loan volumes (lower likelihood of obtaining insufficient credit).

4.4. Tests of robustness

In this section I summarize additional empirical tests. First, I estimate the sensitivity of my results to the specification of the sample period. Within the available period, year 2009 is marked by ongoing financial crisis. Figure 3 above shows that in 2009 the relative proportion of loan rejections is higher compared to the unfavorable terms, whereas the increase in lending standards is largest. In all previous specifications I use time-fixed effects. In the additional tests, I separate the sample into observations from 2009 and post-2009 periods. I find that in the crisis year firm level factors are strongly associated with credit constraints. Borrowers are likely to be more discouraged in this period, but credit constraints in second and third stages do not exhibit significant relationship with lending standards. This is in contrast with the post-2009 sample, which is in line with the main results. It is interesting to note, that explanatory power of the model is higher in the crisis year, driven mainly by the firm-level characteristics.

In another set of tests, I examine the role of foreign bank presence. Foreign banks might exert differential effect on credit constraints through their differences in business models, tendencies to risk-taking in foreign markets, regulation and domestic supervision (Barth et al., 2004; Laeven & Levine, 2009; Ongena et al., 2013). If regulation in the foreign bank's home country is strict, the bank might have incentives to increase its risk exposure by lowering lending standards abroad. Unfortunately I do not have matched data on individual foreign banks that operate in particular markets, but I can observe the aggregate effect of all foreign banks. Controlling for foreign bank presence (as a percentage of all bank assets), I

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confirm the main results. This implies that, holding other factors fixed, the effect of lending standards on credit constraints is consistent regardless of the structure of the banking sector by bank origin. In addition, I find that larger presence of foreign banks is associated with significantly larger discouragement. I further examine whether foreign banks apply differential lending standards by including an interaction terms between foreign bank assets and lending standards. I find that borrowers in countries with more foreign banks and higher lending standards are associated with less likelihood of unfavorable terms. Particularly, borrowers in these countries obtain larger credit volume. Because foreign banks might be less likely to lend to small local borrowers (Berger et al., 2001), I estimate the models with two-way interactions between foreign ownership, lending standards, and firm size. I find that relative to large firms, smaller firms (10-50 employees) are more likely to obtain unfavorable terms in countries with higher presence of foreign banks, but this effect is reversed if the bank lending standards are high.

I further investigate the spillover effect of bank lending standards across credit instruments. Table 5 shows the consistency of the occurrence of credit constraints. I estimate whether lending standards influence the outcomes of the stages of credit constraints of credit lines and trade credit. I find positive relationship between lending standards and the first and second stage of credit constraints for trade credit. For credit lines the relationship holds for the first stage. These results suggest that bank lending standards implemented for bank loans spill over to credit lines and trade credit through first or second stage, but do not affect the terms applied for the other instruments.

I conduct additional analyses to study the robustness of the results to alternative definitions of country-level proxies. Specifically, I estimate the models by using alternative proxies for bank concentration (Lerner index, H-statistic), bank efficiency (bank cost to income ratio), bank interest margins (bank lending-deposit spread), market capitalization (turnover ratio), legal system and property rights (rule of law index), banking system development (bank deposits to GDP).

Conclusion

In this paper I investigate the conditional nature of credit constraints in a cross-country context. Credit constraints occur in sequential stages. The stages of credit constraints are conditional because they depend on the outcome of the previous stage. I define three stages: discouragement, rejection, and unfavorable terms. I estimate the prevalence of credit constraints at each stage and examine whether and how likelihood of occurrence of credit constraints depend on firm, bank, and country characteristics. I base the analysis on a micro-data of over 58,000 SMEs in the Euro area in the period 2009-2013.

First, I find that credit constraints vary with the firm, bank, and country characteristics, but the direction and the magnitude of the effect depends on the stages of the credit constraints. Firms are more likely to be discouraged or rejected if they are smaller, more risky, or if they are based in the economies where the banking sector is more risky. Discouragement and rejection rates are higher if bank lending standards are high. But conditional on approval, borrowers are less likely to obtain unfavorable loan terms. The effect is mainly due to higher loan volume, but not due to lower cost of the bank loan. I show evidence that the transmission channel of bank lending standards to credit constraints operates mainly through the collateral requirements and covenants. Second, I find that credit constraints exist at the firm level and are consistent across various credit instruments. Individual stages of credit constraints are strongly related to the stages of credit constraints reported for other credit instruments. Bank lending standards applied for bank loans tend to spill over to other credit instruments. Third, I document that borrower expectations do not influence the outcome. Lastly, I show that the availability of market financing for firms is associated with decreased discouragement and rejections while the ability of banks to access market finance is associated with higher loan volume for approved borrowers.

This study has important implications for banks, firms, and policymakers. I provide a more complete picture of credit constraints that includes three conditional stages. This framework represents more fully the extent of credit constraints and allows for differential investigation of firm financing. To put the problem in perspective, in countries with highest constraints, 40% or more of SMEs are discouraged to

apply for a bank loan even though they need credit. In these economies, even if they do apply, 20% are rejected and of those that are approved 20% obtain less favorable terms. These numbers represent a significant portion of the productive economy. As a result, credit constraints account for a potentially large loss of economic output and welfare. It is therefore essential to understand fully and accurately the nature of credit constraints in order to devise appropriate policies to address the problem.

I show that there is a more complex relationship among the key determinants and credit constraints within and across the conditional stages. I find that the direction of key determinants depends on the stage of the credit constraints. Not accounting for these relationships might have ramification for the credit availability and loan allocation. For instance, bank lending policies aimed at increasing credit availability by reducing rejection rates might create unintended consequences of increasing the occurrence of unfavorable terms. Because credit constraints exist at the firm level, strategies aimed at promoting availability of a specific credit instrument need to be formulated in the context of other credit instruments. This study opens questions about the marginal effect that changes of bank lending policies have on the efficiency of loan provision. If banks that increase lending standards substitute higher rejection rates with higher loan volumes, then the overall effect might result into lower credit availability to smaller and more risky borrowers and distorted loan allocation. Finally, I show that the structure of financial markets and the availability of other financing instruments interacts with bank loan provision and the occurrence of credit constraints.

Appendix

Table A1. Variable definitions

Variable name	Definition	Source
Dependent variables	Credit constraints consider only bank loans (new or renewal, excluding overdraft and credit lines), measured at semi-annual intervals	
Discouraged	Dummy variable, equals 1 if the firm needs a bank loan but does not apply due to possible rejection	SAFE
Rejected	Dummy variable, equals 1 if the firm applies for a bank loan but is rejected	SAFE
Unfavorable terms	Dummy variable, equals 1 if the firm applies for a bank loan but obtained only up to 74% of the requested amount (indicated in the analysis as 'small amount', or refused the bank loan due to high cost (indicated in the analysis as 'high cost')	SAFE
Loan demand	Dummy variable, equals 1 if the firm applies for a bank loan or is discouraged	SAFE
Bank lending standards	All variables related to lending standards are measured as diffusion indices at a country level. The measurements are quarterly backward-looking estimates of changes aggregated over semi-annual intervals. The values have theoretical maximum range (-200, +200). The indices are equal-weighted at a bank level, except for France, Malta, and Slovakia, where the indices are weighted by bank size. The diffusion index is defined as the difference between the weighted sum of the percentages of banks responding "tightened considerably" and "tightened somewhat", and the weighted sum of the percentages of banks responding "eased considerably" and "eased somewhat". The diffusion index is weighted according to the intensity of the response, giving lenders who have answered "considerably" a weight twice as high (score of 1) as lenders having answered "somewhat" (score of 0.5) (ECB, 2014b)	
Bank lending standards	Bank's guidelines and criteria regarding the provision of credit. (ECB, 2014b) defines lending standards as the written and unwritten criteria, or other practices related to this policy, which define the types of loan a bank considers desirable and undesirable, the designated geographic priorities, the collateral deemed acceptable and unacceptable, etc. In the survey, changes in written loan policies should be considered together with changes in their application.	BLS
Loan terms	Terms and conditions agreed upon by the lender and the borrower. In this analysis the terms consist of interest margins, loan size, maturity, collateral, covenants, and non-interest margins.	BLS
Non-bank factors affecting lending standards	Diffusion indices measuring the change in impact of availability of non-bank financing for banks, firms, or both. Non-banks are defined as non-monetary financial corporations, e.g. insurance corporations, pension funds, financial auxiliaries, and other financial intermediaries.	BLS
Firm characteristics	All firm characteristics are measured as categorical variables at semi-annual intervals	
Size	Size of the firm measured by the number of employees (full-time or part-time). The company must have at least 1 employee excluding the founders to be included in the survey. Categories: 1-9 employees; 10-49 employees; 50-249 employees; 250 or more employees	SAFE
Age	Number of years from the registration of the firm at the time of taking the survey. Categories: 10 years or more; 5-10 years; 2-5 years; less than 2 years	SAFE
Turnover	Annual turnover of the firm in the previous year in millions €. Categories: up to €2m; €2m-€10m; €10m-€50m; more than €50m	SAFE
Ownership	Majority owners of the firm. Categories: public shareholders (listed company); family or entrepreneurs; other firms or business associates; venture capital firms or business angels; a natural person (one person only); other; not reported	SAFE
Gender	Gender of the owner/director/CEO. Categories: male; female	SAFE

Table A1. Cont.

Variable name	Definition	Source
Firm outlook	Change in firm-specific outlook over the past 6 months with respect to the firm's sales, profitability, or business plan with respect to the availability of external finance. Categories: improved; remained unchanged; deteriorated	SAFE
Credit history	Change in firm's credit history over the past 6 months. Categories: improved; remained unchanged; deteriorated	SAFE
Banking sector	Variables of banking sector and economic environment are measured annually, unless indicated otherwise	
Bank concentration	Assets of three largest commercial banks as a share of total commercial banking assets. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax assets, discontinued operations and other assets.	Bankscope (via GFDD)
Bank z-score	Probability of default of a country's commercial banking system. Z-score compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns.	Bankscope (via GFDD)
Bank net interest margin	Accounting value of bank's net interest revenue as a share of its average interest-bearing (total earning) assets.	Bankscope (via GFDD)
Bank ROA	Commercial banks' after-tax net income to yearly averaged total assets.	Bankscope (via GFDD)
Bank overhead costs	Bank overhead costs over total assets (%). Operating expenses of a bank as a share of the value of all assets held. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax assets, discontinued operations and other assets.	Bankscope (via GFDD)
Economic environment		
Private credit/GDP	Private credit by deposit money banks and other financial institutions to GDP	International Financial Statistics, International Monetary Fund (via GFDD)
Stock market cap	Total value of all listed shares in a stock market as a percentage of GDP.	Global Stock Markets Factbook and supplemental S&P data, Standard & Poor's (via GFDD)
ln(GDP)	Logarithm of gross domestic product in current prices in $. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates.	World Bank national accounts data, and OECD National Accounts data files. (via GFDD)
Expected economic activity	Diffusion index measuring impact of expected economic activity on the supply of credit. The index is measured semi-annually.	BLS
Inflation	Annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.	World Bank national accounts data
Property rights	Index of the protection of property rights, including financial assets on a continous scale from 1 (low level of property protection) to 10.	World Economic Forum Global Competitiveness Report (via Economic Freedom of the World)

Table A1. Cont.

Variable name	Definition	Source
Credit info depth	Credit depth of information index measures rules affecting the scope, accessibility, and quality of credit information available through public or private credit registries. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions. World Bank, Doing Business Public registry coverage Public registry coverage (% of adults)	World Bank, Doing Business
Regulation index	Composite index of regulation consisting of credit, labor, and business regulation on a continuous scale from 1 (high regulation) to 10 (low regulation)	Economic Freedom of the World

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Figure 1. Conditional stages of the credit constraints

This figure shows the decomposition of the sample into conditional stages of credit constraints. Firms that do not need a loan include those firms that have sufficient internal funds or did not apply for other reasons. The definition of the rest of the variables is in Appendix table A1. The differences in total number of observations are due to missing or invalid responses.
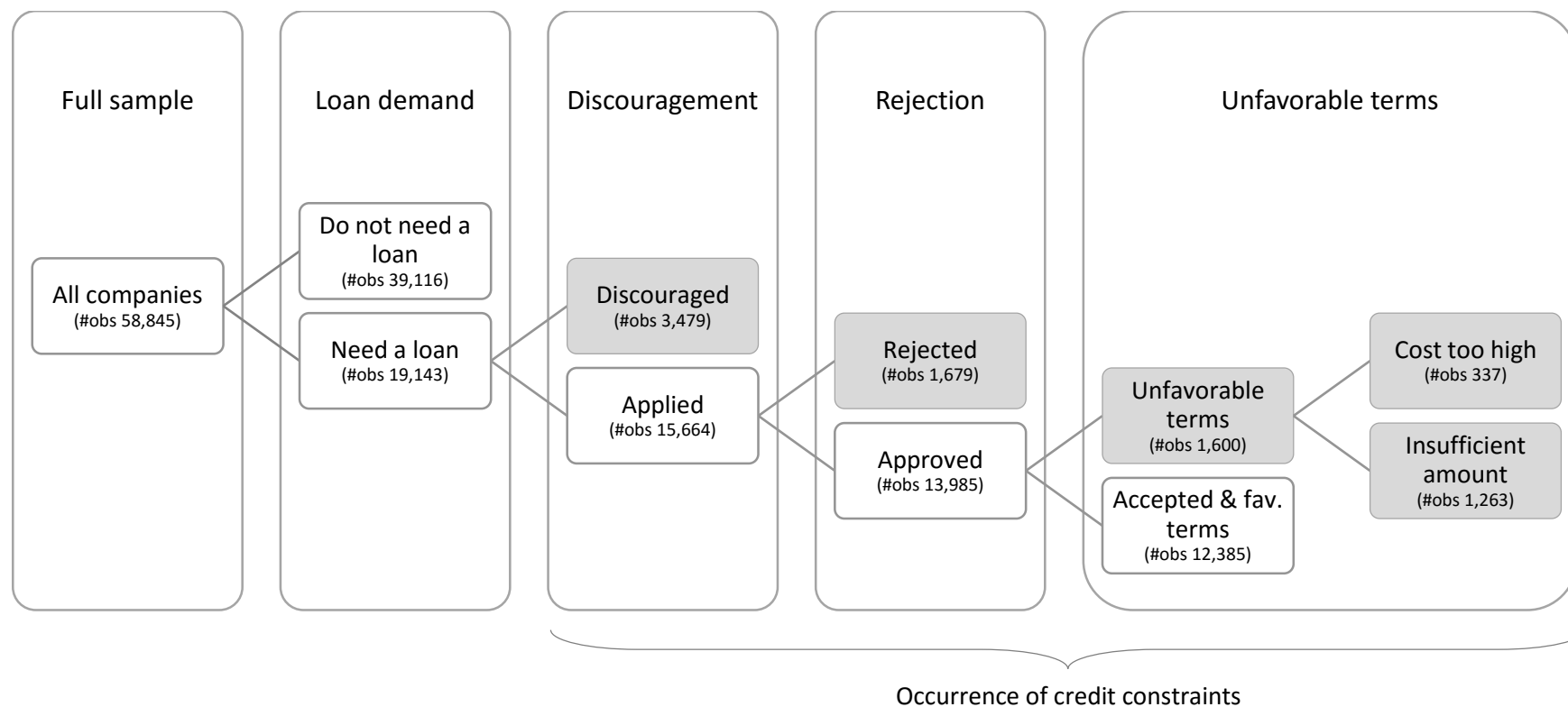
Full sample	Loan demand	Discouragement	Rejection	Unfavorable terms

All companies (#obs 58,845)

Do not need a loan (#obs 39,116)

Need a loan (#obs 19,143)

Discouraged (#obs 3,479)

Applied (#obs 15,664)

Rejected (#obs 1,679)

Approved (#obs 13,985)

Unfavorable terms (#obs 1,600)

Accepted & fav. terms (#obs 12,385)

Cost too high (#obs 337)

Insufficient amount (#obs 1,263)

Occurrence of credit constraints

Figure 2. Three stages of the credit constraints

This figure shows the overall credit constraints in the period 2009-2013 by country and the decomposition of the overall credit constraints into the three stages: discouragement, rejection, and unfavorable terms. The values are reported are unconditional and represent a percentage of observations that are constrained relative to all observations in a country. Countries: AT=Austria, CY=Cyprus, DE=Germany, EE=Estonia, ES=Spain, FR=France, IE=Ireland, IT=Italy, LU=Luxembourg, MT=Malta, NL=Netherlands, PT=Portugal, SI=Slovenia, SK=Slovakia.
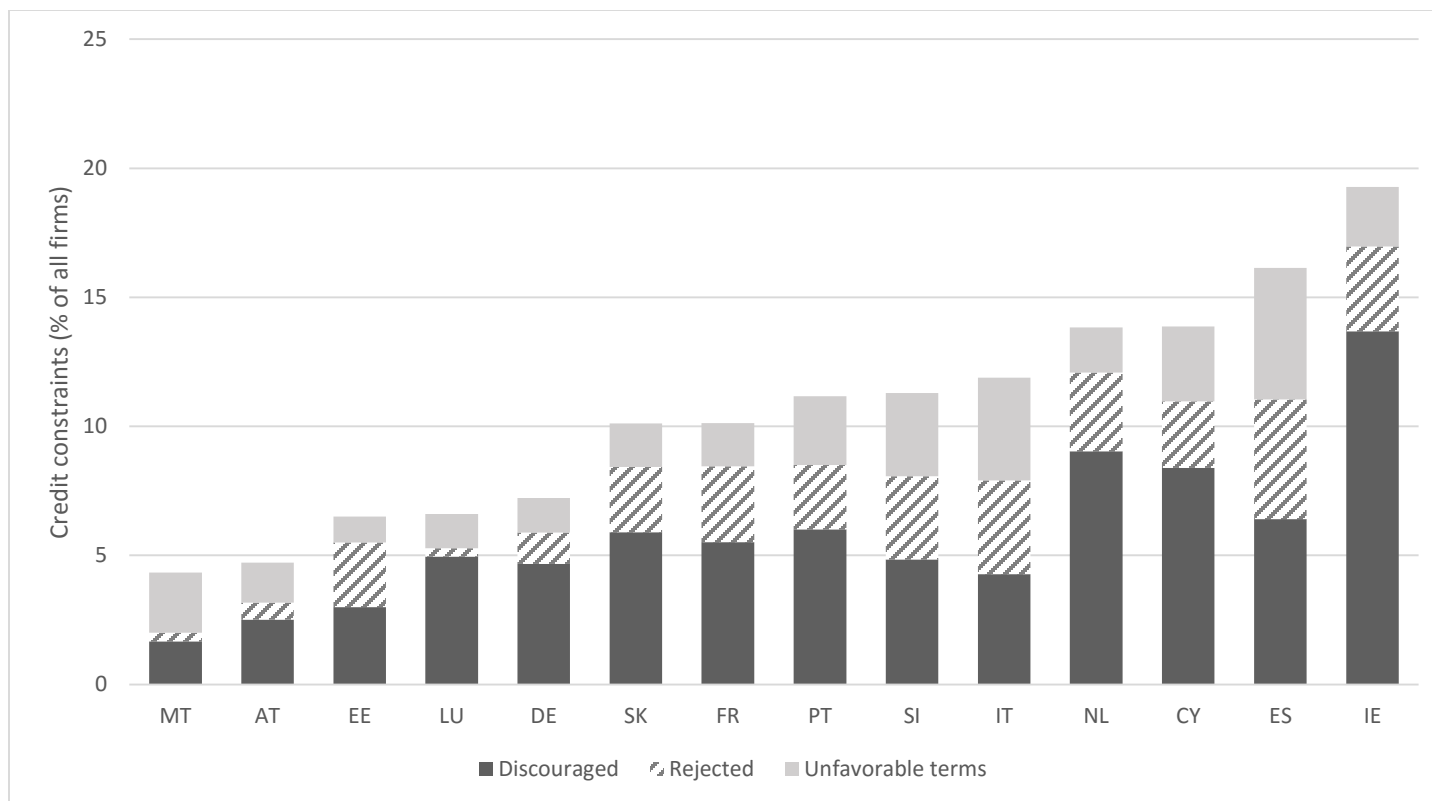
Figure 3. Credit constraints and bank lending over time

This figure shows unconditional credit constraints, changes in bank lending standards, and changes in credit demand over the period 2009-2013 aggregated over all countries in the sample. Bank lending standards and credit demand variables measure the change over the past 6 months.
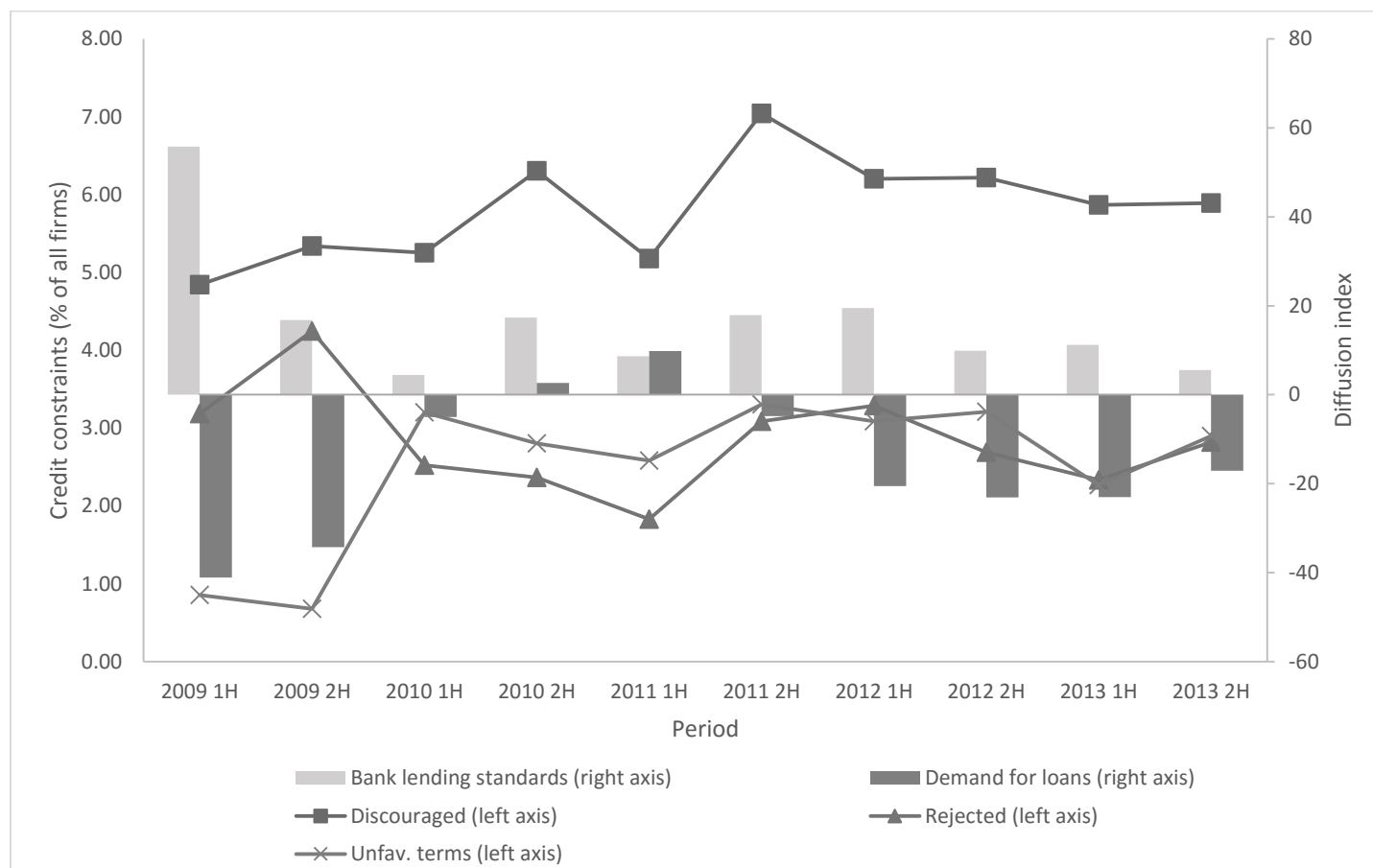
Figure 4. Stages of credit constraints by firm turnover

This figure shows the frequency distribution of observations by the stage of the credit constraints and firm annual turnover. The values are aggregated at the country level. The composition of the stages of credit constraints (left-axis) represents the proportion of the stage of the credit constraints relative to all credit constrained firms per country.

Discouraged
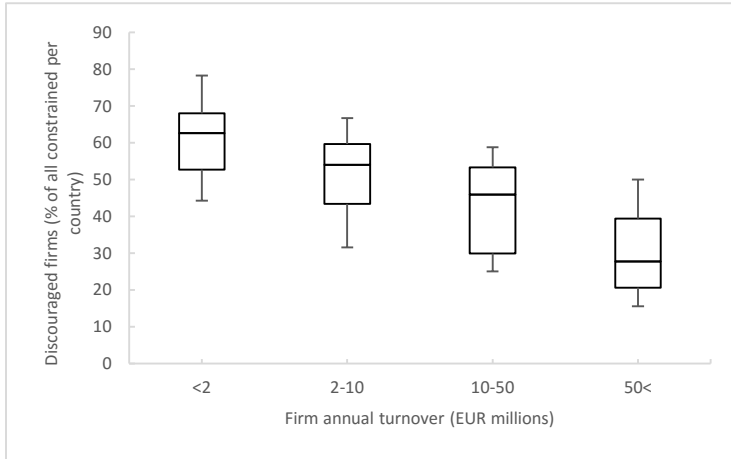
Rejected
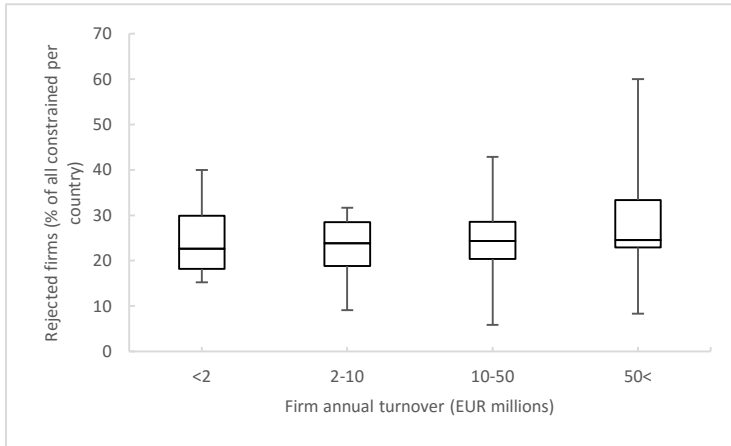
Unfavorable terms
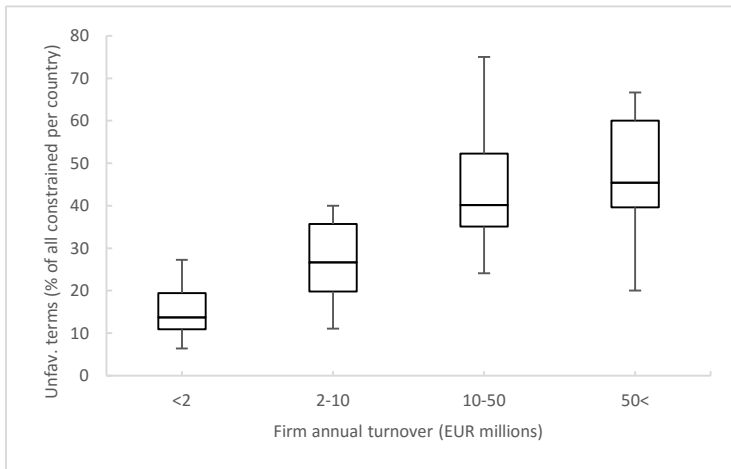
Table 1. Summary statistics

This table represents the summary statistics. Data refers to the full sample of firms from 14 countries in the period 2009-2013. Firm characteristics in Panel A come from the ECB Survey on the Access to Finance of SMEs. Bank lending standards in Panel B come from ECB Bank Lending Survey and are reported as diffusion indices.

Panel A. Firm characteristics (frequency distribution)

Size (# emp)		Age (years)		Turnover (€ m)		Ownership		Gender		Industry		Firm outlook		Credit history	
1-9	19,117	10<	43,322	<2	27,190	Shareholders	2,167	M	45,714	Mining	14,209	+	11,628	+	12,329
10-49	18,955	5-10	7,620	2-10	14,896	Family/entrep.	28,597	F	6,713	Constr.	5,680	0	27,149	0	34,820
50-250	15,811	2-5	4,174	10-50	10,251	Other firms	7,012	N/r	6,418	Manuf.	14,004	-	16,957	-	8,449
250<	4,962	<2	1,241	50<	4,812	Venture capital	615			Trade	19,990	N/r	3,111	N/r	3,247
		N/r	2,488	N/r	1,696	One nat. person	13,230			N/r	4,962				
						Other	1,092								
						N/r	592								
Total	58,845		58,845		58,845		53,305		58,845		58,845		58,845		58,845

Panel B. Country characteristics

	Obs	Mean	Std. Dev.	Min.	Max
Credit constraints					
Overall credit constraint indicator	58,845	0.11	0.32	0	1
Discouraged	58,845	0.06	0.24	0	1
Rejected	15,664	0.03	0.17	0	1
Unfavorable terms	13,985	0.03	0.16	0	1
Bank lending standards					
Lending standards SMEs	59,013	16.46	27.94	-40	135
Lending standards LT loans	59,013	23.23	36.62	-40	190
Lending standards ST loans	59,013	13.19	26.48	-42	130
Overall Lending standards	59,013	18.41	30.53	-42	150
Loan supply terms					
Collateral	58,845	14.09	23.57	-32	140
Covenants	58,845	8.75	17.85	-32	120
Interest margins	58,845	20.11	34.26	-50	160
Maturity	58,845	13.31	25.03	-12	160
Non-interest margins	58,845	6.86	15.90	-25	110
Loan size	58,845	10.58	21.28	-20	130
Factors affecting lending standards					
Impact of bank competition	58,845	-4.11	10.88	-44	42
Capital position	58,845	13.29	24.91	0	130
Liquidity	58,845	6.88	24.44	-50	120
Non-bank competition	58,845	0.30	3.06	-10	30
Banking sector					
Bank concentration	34,006	70.10	10.01	29.74	99.64
Bank z-score	34,006	14.48	6.30	-0.005	35.77
Bank net interest margin	34,006	1.34	0.50	0.54	4.50
Bank overhead costs/total assets	34,006	1.14	0.36	0.26	2.55
Bank ROA	34,006	-0.02	0.85	-4.49	4.39
Country-level variables					
Private credit / GDP	34,006	147.48	47.75	48.18	284.62
Stock market capitalization	34,006	47.52	26.08	4.78	169.25
Log of GDP	34,006	27.83	1.13	22.82	28.91
Expected economic activity	58,845	26.01	33.23	-15.14	160
Inflation	46,030	1.73	1.17	-4.48	4.98
Protection of property rights	46,030	7.18	1.11	5.10	8.70
Regulation index	46,030	6.94	0.38	5.4	7.8
Depth of credit information	58,645	5.00	0.82	0.00	6.00

Table 2. Stages of credit constraints across countries

This table reports the break-down of the stages of credit constraints by country. Unconditional relative frequencies represent the proportion of credit constrained firms to all firms. Conditional relative frequencies represent the proportion of credit constrained firms relative to conditioning information from the previous stage as follows: (discouraged|need a loan), (rejected|applied), (unfavorable terms|approved loan application). Countries: AT=Austria, CY=Cyprus, DE=Germany, EE=Estonia, ES=Spain, FR=France, IE=Ireland, IT=Italy, LU=Luxembourg, MT=Malta, NL=Netherlands, PT=Portugal, SI=Slovenia, SK=Slovakia.

								Credit constraints						
			# of firms					Unconditional relative frequencies (%)				Conditional relative frequencies (%)	
Country	All firms	Need credit	Disc.	Applied	Appr.	Rej.	Unfav. terms	Disc.	Rej.	Unfav. terms	Total	Disc.	Rej.	Unfav. terms
AT	4,136	1,031	104	927	853	27	64	2.51	0.65	1.55	4.71	10.09	2.91	7.50
CY	310	98	26	72	55	8	9	8.39	2.58	2.90	13.87	26.53	11.11	16.36
DE	10,018	2,863	468	2,395	2,089	121	135	4.67	1.21	1.35	7.23	16.35	5.05	6.46
EE	200	25	6	19	13	5	2	3.00	2.50	1.00	6.50	24.00	26.32	15.38
ES	10,022	4,003	642	3,361	2,508	465	510	6.41	4.64	5.09	16.13	16.04	13.84	20.33
FR	10,025	3,635	553	3,082	2,642	294	168	5.52	2.93	1.68	10.12	15.21	9.54	6.36
IE	3,813	1,127	522	605	403	125	88	13.69	3.28	2.31	19.28	46.32	20.66	21.84
IT	10,015	3,767	428	3,339	2,693	364	399	4.27	3.63	3.98	11.89	11.36	10.90	14.82
LU	303	82	15	67	62	1	4	4.95	0.33	1.32	6.60	18.29	1.49	6.45
MT	300	55	5	50	42	1	7	1.67	0.33	2.33	4.33	9.09	2.00	16.67
NL	4,337	981	392	589	360	132	76	9.04	3.04	1.75	13.83	39.96	22.41	21.11
PT	4,344	1,166	261	905	681	108	116	6.01	2.49	2.67	11.16	22.38	11.93	17.03
SI	310	135	15	120	99	10	10	4.84	3.23	3.23	11.29	11.11	8.33	10.10
SK	712	175	42	133	107	18	12	5.90	2.53	1.69	10.11	24.00	13.53	11.21
Total	58,845	19,143	3,479	15,664	12,607	1,679	1,600							
Mean								5.78	2.38	2.35	10.51	20.77	11.43	13.69

Table 3. Differential impact of key determinants on the stages of the credit constraints

This table reports the results of probit regressions to estimate the probability of the occurrence of credit constraint. The dependent variable is a binary indicator of credit constraints equal to 1 if the firm is constrained. In models (1-3) the dependent variable corresponds to the conditional stages of credit constraints. Models (4-5) decompose the third stage of credit constraints (unfavorable terms) into insufficient amount and high cost of a loan. Omitted category variables are as follows: size=1-9 employees, age>10 years, turnover<2m, owners=shareholders, gender=male, firm outlook=improved, credit history=improved. Each specification accounts for sample selection. All regressions include time fixed effects and industry fixed effects. Z-values are based on robust standard errors, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. Variable definitions are in the Appendix table A1.

Dep. var.:	(1) Discouraged Coeff.	z	(2) Rejected Coeff.	z	(3) Unfav. terms Coeff.	z	(4) Unfav. terms (small amt) Coeff.	z	(5) Unfav. terms (high cost) Coeff.	z
Bank lending standards										
Bank lending standards	0.0034**	(2.01)	0.0049**	(2.26)	-0.007**	(-2.53)	-0.011***	(-3.54)	0.0030	(0.65)
Firm characteristics										
Size=10-49emp	-0.18***	(-3.84)	-0.23***	(-3.23)	0.041	(0.38)	0.12	(1.00)	-0.077	(-0.50)
Size=50-249emp	-0.13**	(-1.97)	-0.21**	(-2.35)	0.038	(0.33)	0.11	(0.86)	-0.085	(-0.52)
Age=<2y	0.095	(0.83)	0.15	(1.00)	0.11	(0.63)	-0.018	(-0.080)	0.23	(1.01)
Age=>2y & <5y	0.30***	(4.93)	0.48***	(5.50)	-0.40*	(-1.87)	-0.48**	(-2.00)	-0.13	(-0.41)
Age=>5y & <10y	0.073	(1.43)	0.25***	(3.86)	-0.37***	(-2.91)	-0.40***	(-2.81)	-0.25	(-1.33)
Turnover=>2m & <10m	-0.32***	(-6.39)	-0.14*	(-1.66)	0.11	(1.39)	0.23***	(2.58)	-0.20*	(-1.65)
Turnover=>10m & <50m	-0.57***	(-7.59)	-0.41***	(-3.11)	0.26	(1.56)	0.44**	(2.32)	-0.13	(-0.51)
Turnover=>50m	-0.85***	(-5.26)	-0.63***	(-2.87)	0.71***	(2.65)	0.93***	(3.17)	0.11	(0.28)
Owners=Fam/entrep	-0.11	(-0.96)	-0.077	(-0.54)	0.013	(0.084)	0.067	(0.35)	-0.087	(-0.39)
Owners=Other firms	-0.047	(-0.39)	0.047	(0.31)	-0.083	(-0.49)	-0.0094	(-0.046)	-0.26	(-1.07)
Owners=VC/angels	0.14	(0.74)	0.56**	(2.50)	-0.47	(-1.34)	-0.60	(-1.48)	-0.087	(-0.18)
Owners=One nat person	-0.012	(-0.10)	0.14	(0.97)	-0.20	(-1.17)	-0.17	(-0.81)	-0.23	(-0.97)
Owners=Other	0.021	(0.12)	0.055	(0.24)	-0.20	(-0.82)	-0.023	(-0.085)		
Owners=Na	0.34	(0.43)	1.64***	(2.79)						
Gender=Female	0.17***	(3.29)	0.083	(1.13)	-0.14*	(-1.66)	-0.16*	(-1.71)	-0.057	(-0.48)
Firm outlook=Unchanged	-0.082	(-1.60)	-0.14**	(-2.16)	0.0012	(0.013)	0.039	(0.41)	-0.066	(-0.50)
Firm outlook=Deteriorated	0.13***	(2.58)	0.14**	(1.96)	-0.030	(-0.34)	-0.070	(-0.71)	0.029	(0.21)
Firm outlook=Na	-0.20*	(-1.66)	0.078	(0.57)	-0.18	(-1.18)	-0.42**	(-2.20)	0.30	(1.52)
Credit hist=Unchanged	0.18***	(3.71)	0.24***	(3.15)	-0.22**	(-2.02)	-0.27**	(-2.19)	-0.10	(-0.60)
Credit hist=Deteriorated	0.45***	(7.18)	0.68***	(7.84)	-0.38	(-1.36)	-0.58*	(-1.87)	0.039	(0.098)
Credit history=Na	0.35***	(3.20)	0.60***	(3.58)	-0.40	(-1.35)	-0.58*	(-1.79)	-0.072	(-0.16)
Banking sector										
Bank concentration	-0.0029	(-0.64)	0.0067	(1.15)	0.0063	(1.17)	0.010*	(1.65)	-0.0069	(-0.81)
Bank z-score	-0.036***	(-5.46)	-0.03***	(-3.22)	0.020	(1.33)	0.042**	(2.57)	-0.028	(-1.27)
Bank net interest margin	0.13	(1.08)	0.53***	(3.71)	-0.77***	(-2.80)	-1.14***	(-3.65)	0.18	(0.43)
Bank ROA	-0.023	(-0.57)	-0.085	(-1.61)	-0.10	(-1.62)	-0.089	(-1.30)	-0.11	(-1.22)
Bank overhead costs	-0.18	(-1.24)	-0.49**	(-2.43)						
Economic environment										
Private credit/GDP	0.00039	(0.26)	0.00054	(0.33)	0.00013	(0.061)	-0.00069	(-0.26)	-0.0005	(-0.21)
Stock market cap	0.0061**	(1.98)	0.0023	(0.58)	-0.0028	(-0.63)	-0.0061	(-1.20)	0.0093	(1.54)
ln(GDP)	-0.11*	(-1.86)	0.039	(0.53)	-0.13	(-1.47)	-0.18*	(-1.69)	-0.045	(-0.42)
Expected econ act	-0.0038**	(-2.14)	-0.0035	(-1.55)	0.00020	(0.10)	0.00078	(0.32)	-0.001	(-0.33)
Inflation	0.077*	(1.68)	-0.037	(-0.68)	0.39***	(4.29)	0.44***	(3.49)	0.16	(1.35)
Property rights	0.090	(1.55)	-0.031	(-0.40)	-0.22***	(-2.99)	-0.32***	(-3.88)	0.042	(0.41)
Credit info depth	0.19***	(3.02)	0.11	(1.38)	0.016	(0.19)	-0.084	(-0.80)	0.26**	(2.21)
Regulation index	-0.19**	(-2.11)								
Inverse Mills ratios										
IMR (need credit)	0.58***	(7.52)								
IMR (discouraged)			0.18	(0.89)						
IMR (rejected)					-1.41***	(-2.73)	-1.75***	(-3.03)	-0.38	(-0.51)
Constant	1.69	(0.82)	-3.22	(-1.30)	6.27*	(1.67)	5.50	(1.24)	-0.98	(-0.20)
Observations	7,581		6,056		5,370		5,370		5,278	
Pseudo R2	0.12		0.11		0.10		0.13		0.074	
Time fixed effects	Yes		Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes		Yes	

Table 4. Decomposition of lending standards by loan terms

This table reports the results of probit regressions to estimate the effect of individual loan terms on the probability of the occurrence of credit constraint. The dependent variable is a binary indicator of credit constraints equal to 1 if the firm is constrained. In models (1-3) the dependent variable corresponds to the conditional stages of credit constraints. Models (4-5) decompose the third stage of credit constraints (unfavorable terms). Components of the lending standards are changes in loan terms measured as diffusion indices. Each specification accounts for sample selection. All regressions include firm and country characteristics time fixed effects and industry fixed effects. Z-values are based on robust standard errors, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. Variable definitions are in the Appendix table A1.

Dep. var.:	(1) Discouraged		(2) Rejected		(3) Unfav. terms		(4) Unfav. terms (small amt)		(5) Unfav. terms (high cost)	
	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
Bank lending standards										
Interest margins	0.0012	(0.62)	0.0028	(1.26)	-0.0025	(-0.89)	-0.0046	(-1.40)	-0.00056	(-0.12)
Loan size	0.0029	(0.74)	0.0017	(0.39)	-0.016***	(-3.06)	-0.013*	(-1.93)	-0.013*	(-1.71)
Maturity	0.012***	(3.09)	-0.0012	(-0.24)	0.0076	(1.33)	0.0094	(1.50)	-0.00072	(-0.083)
Collateral	-0.011**	(-2.27)	-0.011*	(-1.80)	0.017**	(2.15)	0.019*	(1.80)	0.0071	(0.60)
Covenants	0.011***	(2.76)	0.017***	(3.47)	-0.024**	(-2.27)	-0.025*	(-1.73)	-0.0082	(-0.52)
Non-interest margins	-0.0060*	(-1.81)	-0.0071	(-1.63)	0.021***	(2.89)	0.0094	(1.20)	0.025**	(2.40)
Observations	7,581		6,056		5,370		5,370		5,278	
Pseudo R2	0.12		0.11		0.10		0.13		0.081	
Correction for sample selection	Yes		Yes		Yes		Yes		Yes	
Controls for firm, country characteristics	Yes		Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes		Yes	

Table 5. Consistency of credit constraints across credit instruments

This table reports the results of probit regressions to estimate the probability of the occurrence of credit constraint. The dependent variable is a binary indicator of credit constraints equal to 1 if the firm is constrained. In models (1-3) the dependent variable corresponds to the conditional stages of credit constraints. Explanatory variables for credit lines, trade credit, and other loan, represent binary lending outcomes for the given credit instrument. The definition of the lending outcomes for these instruments are equivalent to the definitions used for bank loans. Lending outcomes of credit lines, trade credit, and other loans are unconditional. Each specification accounts for sample selection. All regressions include firm and country characteristics time fixed effects and industry fixed effects. Z-values are based on robust standard errors, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. Variable definitions are in the Appendix table A1.

Dep. var.:	(1) Discouraged (bank loan)		(2) Rejected (bank loan)		(3) Unfav. terms (bank loan)	
	Coeff.	z	Coeff.	z	Coeff.	z
Bank lending standards						
Bank lending standards	0.00035	(0.16)	0.0079**	(2.48)	-0.0075**	(-2.33)
Credit line						
Cred line-discouraged	1.82***	(25.5)	0.76**	(2.05)	0.27	(0.98)
Cred line-no need	0.015	(0.22)	0.10	(1.05)	0.068	(0.82)
Cred line-no app other reason	0.17**	(2.36)	0.38***	(3.57)	-0.0064	(-0.046)
Cred line-na	0.43	(1.41)				
Cred line-rejected	0.23**	(2.25)	2.39***	(18.7)	-0.32	(-0.53)
Cred line-unfav.terms	0.15	(1.59)	0.75***	(6.62)	1.10***	(4.72)
Trade credit						
Trade cred-discouraged	0.94***	(9.70)	0.42*	(1.71)	0.16	(0.79)
Trade cred-no need	0.034	(0.45)	0.12	(1.15)	0.016	(0.17)
Trade cred-no app other reason	0.14**	(2.02)	0.22**	(2.07)	-0.0010	(-0.010)
Trade cred-na	0.069	(0.37)	-0.20	(-0.71)	0.25	(1.07)
Trade cred-rejected	-0.35**	(-2.00)	1.28***	(6.05)	-0.38	(-1.01)
Trade cred-unfav.terms	0.13	(1.10)	0.0029	(0.018)	0.89***	(6.94)
Other loan						
Other loan-discouraged	0.70***	(6.97)	-0.0027	(-0.012)	0.33**	(2.13)
Other loan-no need	0.12	(1.54)	-0.40***	(-3.34)	0.15	(0.98)
Other loan-no app other reason	0.024	(0.32)	-0.089	(-0.93)	0.18**	(2.02)
Other loan-na	0.086	(0.48)	0.39	(1.54)	-0.017	(-0.070)
Other loan-rejected	-0.23	(-1.10)	0.81***	(3.75)	0.57*	(1.76)
Other loan-unfav.terms	0.073	(0.43)	0.074	(0.39)	0.68***	(3.47)
Observations	6,284		4,940		4,420	
Pseudo R2	0.41		0.45		0.27	
Correction for sample selection	Yes		Yes		Yes	
Controls for firm, country characteristics	Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes	

Table 6. Firm expectations of availability of external financing

This table reports the results of probit regressions to estimate the effect of firm expectations. The dependent variable in models (1-2) is a binary indicator equal to 1 if a firm needs a bank loan. The dependent variable in models (3-6) is a binary indicator of credit constraints equal to 1 if the firm is constrained. In models (3-6) the dependent variable corresponds to the conditional stages of credit constraints. Lending standards are measured as diffusion indices over the past 6 months (BW) and expectations are measured as diffusion indices for the next 6 months (FW). Firm expectations are measured as category variables with forward-looking period of 6 months where "0" denotes unchanged expectations, "-" denotes firm expectations that the availability of a given instrument will decline. The omitted category is the firm expectation that the availability of a given instrument will increase. Each specification accounts for sample selection. All regressions include time fixed effects and industry fixed effects. Z-values are based on robust standard errors, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. Variable definitions are in the Appendix table A1.

Dep. var.:	(1) Loan demand		(2) Loan demand		(3) Discouraged		(4) Discouraged		(5) Rejected		(6) Unfav. terms	
	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
Bank lending standards												
Bank lending standards BW	-0.00064	(-0.55)			0.0027	(1.21)			0.0059**	(2.12)	-0.0066**	(-2.49)
Bank lending standards FW			-0.0017	(-1.28)			0.0056**	(2.21)				
Firm expectations - bank loan availability												
Bank loans FW 0	-0.088**	(-2.36)	-0.087**	(-2.36)	0.026	(0.37)	0.026	(0.36)	0.11	(1.10)	-0.082	(-0.94)
Bank loans FW -	0.046	(0.95)	0.047	(0.97)	0.17**	(2.02)	0.17**	(1.99)	0.60***	(5.28)	0.025	(0.14)
Firm expectations - availability of other external finance												
Intern funds FW 0	-0.033	(-1.01)	-0.032	(-0.98)	-0.075	(-1.18)	-0.076	(-1.21)	-0.14	(-1.64)	-0.031	(-0.36)
Intern funds FW -	-0.041	(-0.95)	-0.041	(-0.94)	-0.0068	(-0.085)	-0.0067	(-0.084)	-0.19*	(-1.86)	0.10	(0.96)
Intern funds FW na	-0.019	(-0.47)	-0.018	(-0.43)	-0.063	(-0.80)	-0.066	(-0.83)	-0.23**	(-2.15)	0.087	(0.77)
Cred line FW 0	-0.016	(-0.40)	-0.016	(-0.40)	0.043	(0.57)	0.043	(0.57)	-0.024	(-0.24)	-0.14	(-1.52)
Cred line FW -	0.055	(1.07)	0.055	(1.08)	0.082	(0.90)	0.079	(0.87)	-0.044	(-0.38)	-0.062	(-0.57)
Cred line FW na	0.10**	(2.07)	0.10**	(2.06)	-0.27**	(-2.53)	-0.27**	(-2.52)	-0.63***	(-4.00)	0.063	(0.34)
Trade credit FW 0	0.012	(0.26)	0.011	(0.24)	-0.18**	(-2.20)	-0.18**	(-2.19)	-0.089	(-0.74)	-0.17	(-1.57)
Trade credit FW -	0.021	(0.36)	0.020	(0.36)	-0.24**	(-2.50)	-0.24**	(-2.49)	-0.025	(-0.18)	-0.062	(-0.51)
Trade credit FW na	0.14***	(3.03)	0.14***	(3.02)	-0.45***	(-5.07)	-0.45***	(-5.09)	-0.35**	(-2.43)	-0.064	(-0.51)
Equity FW 0	0.056	(1.00)	0.050	(0.90)	-0.020	(-0.18)	-0.0039	(-0.036)	-0.095	(-0.56)	0.31*	(1.83)
Equity FW -	0.084	(1.05)	0.080	(0.99)	0.16	(1.15)	0.17	(1.23)	-0.082	(-0.40)	0.33	(1.48)
Equity FW na	0.073	(1.27)	0.064	(1.11)	-0.21*	(-1.89)	-0.18	(-1.62)	-0.12	(-0.72)	0.30*	(1.84)
Debt sec FW 0	0.10	(0.93)	0.10	(0.94)	0.28	(1.16)	0.28	(1.15)	-0.0015	(-0.0050)	0.94***	(2.68)
Debt sec FW -	0.078	(0.62)	0.078	(0.62)	0.34	(1.30)	0.34	(1.29)	0.041	(0.13)	0.56	(1.44)
Debt sec FW na	0.30***	(2.86)	0.30***	(2.89)	0.38	(1.57)	0.37	(1.53)	0.017	(0.060)	0.91***	(2.66)
Other loan FW 0	-0.042	(-0.89)	-0.042	(-0.88)	-0.075	(-0.87)	-0.075	(-0.86)	-0.20*	(-1.77)	0.016	(0.14)
Other loan FW -	-0.015	(-0.23)	-0.014	(-0.22)	-0.087	(-0.79)	-0.085	(-0.78)	-0.33**	(-2.33)	0.31*	(1.94)
Other loan FW na	-0.059	(-1.25)	-0.057	(-1.22)	-0.20**	(-2.28)	-0.20**	(-2.32)	-0.39***	(-3.50)	-0.0006	(-0.004)
Observations	14,790		14,790		5,702		5,702		4,606		4,131	
Pseudo R2	0.089		0.089		0.15		0.15		0.17		0.11	
Correction for sample selection	Yes		Yes		Yes		Yes		Yes		Yes	
Controls for firm, country characteristics	Yes		Yes		Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	

Table 7. Impact of non-bank alternative finance on credit constraints

This table reports the results of probit regressions to estimate the probability of the occurrence of credit constraint. The dependent variable is a binary indicator of credit constraints equal to 1 if the firm is constrained. In models (1-6) the dependent variable corresponds to the conditional stages of credit constraints. Models (7-8) decompose the third stage of credit constraints (unfavorable terms) into insufficient amount and high cost of a loan. Variables non-bank competition, bank market finance, and firm market finance represent the variation in bank lending standards due to each factor. Each specification accounts for sample selection. All regressions include time fixed effects and industry fixed effects. Z-values are based on robust standard errors, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. Variable definitions are in the Appendix table A1.

| | (1) | | (2) | | (3) | | (4) | | (5) | | (6) | | (7) Unfav. terms (small amount) | | (8) Unfav. terms (high cost) | |
| Dep. var.: | Discouraged | | Discouraged | | Rejected | | Rejected | | Unfav. terms | | Unfav. terms | | | | | |
	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
Non-bank competition	-0.017**	(-2.14)			-0.016	(-1.42)			0.013	(0.79)						
Bank market finance			0.0029*	(1.94)			0.0040*	(1.91)			-0.006**	(-2.30)	-0.011***	(-3.97)	0.0049	(1.15)
Firm market finance			-0.03***	(-4.03)			-0.025**	(-2.43)			0.022	(1.45)	0.010	(0.55)	0.019	(0.90)
Observations	7,581		7,581		6,056		6,056		5,370		5,370		5,370		5,278	
Pseudo R2	0.12		0.12		0.11		0.11		0.100		0.10		0.13		0.076	
Sample sel. correction	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Firm characteristics	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Country characteristics	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	