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# Does Corruption Influence the Self-Restraint Attitude of Women-led SMEs towards Bank Lending?<sup>1</sup>

Emma Galli, Danilo V. Mascia, and Stefania P.S. Rossi<sup>2</sup>

## Abstract

In this paper we address the question of whether the perceived level of corruption in a country may influence women's inclination in self-refraining from applying for bank loans. Using a sample of 60,058 observations – drawn from the ECB-SAFE – related to SMEs chartered in 11 Euro-area countries during the period 2009-2014, we first investigate whether female-led businesses are more likely, than male-led ones, to refrain from applying for bank credit. Finally, we assess whether corruption actually matters in the women's decision not to relying on the bank-lending channel. Our results – robust to various model specifications – highlight that women-led SMEs face a higher probability to self-refrain from applying for loans *vis-à-vis* their male counterparts. In addition, although corruption appears strongly correlated to the self-restraint attitudes of firms, our empirical analysis reveals that women-led SMEs generally tend to refrain from applying for loans, more than men, regardless of the quality of the surrounding environment.

**Keywords:** Demand for bank credit, SMEs, gender, corruption

**JEL classification codes:** G20, G30, G32, J16

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## 1. Introduction

Corruption is an important dimension of the quality of institutions. In reducing the level of trust, corruption makes economic transactions more costly and inefficient and, consequently, affects social development and economic growth.<sup>3</sup> The level of corruption is generally different in industrialized, emerging, and developing countries. However, the picture of the gravity of the phenomenon is quite diversified also in the euro area, where Greece and Italy appear as the most corrupt economies, while Finland and the Netherlands as the least corrupt ones.<sup>4</sup> At aggregate level, data highlight that countries characterized by greater degrees of corruption are also those where the gender gap is higher. If we look at the worldwide data on gender gap,<sup>5</sup> significant gender inequalities – especially in economic participation and political empowerment – emerge even across European countries. Moreover, the individual level data – such as the ones provided by the survey of the Global Barometer of Corruption (Transparency International, various years) – show that women, on average, are less likely to engage in corrupt activities than men (Wängnerud, 2012; Agerberg, 2014).

An interesting bulk of the literature has investigated the impact that institutional factors may have on the credit market. Notably, evidence shows that the efficiency of institutions, the enforcement of legal rights – namely, creditor rights protection and judicial enforcement (La Porta et al., 1997; Qian and Strahan, 2007; Djankov et al., 2008; Moro et al., 2016; Galli et al., 2017a) – and the competitiveness of the banking market (Cavalluzzo et al., 2002) affect the behaviour of SMEs in regards to their propensity to apply for loans. However, little research has been done, so far, to investigate the effects that corruption may exert on the inclination of firms to access bank credit (see Galli et al., 2017b).

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<sup>3</sup> For a recent survey, see Dimant and Tosato (2017).

<sup>4</sup> See the Freedom from Corruption Index and the Corruption Perception Index at the following links, respectively: [www.heritage.org/index/freedom-from-corruption](http://www.heritage.org/index/freedom-from-corruption) and [www.transparency.it/corruption-perceptions-index](http://www.transparency.it/corruption-perceptions-index).

<sup>5</sup> See the Global Gender Gap Index, by country, at the following link: <http://reports.weforum.org/global-gender-gap-report/rankings/>.

Another strand of the literature has widely debated, with regards to a variety of countries, whether gender disparities arise in the bank-firm relationship – provided that the access conditions to bank credit play a decisive role in the survival and development of female-led SMEs (see, among others, Aristei and Gallo, 2016; Brush et al., 2001; Marlow and Patton, 2005; World Bank, 2011). The well-known problems faced by the SMEs, in general, in entering equity markets (Ayadi and Gadi, 2013; Kremp and Sevestre, 2013; Vermoesen et al., 2013) and in producing high quality collaterals (Öztürk and Mrkaic, 2014; Vos et al., 2007) have not surely helped firms during the recent financial crisis when the difficulties in the access to bank credit further sharpened. This is particularly evident if we look at the latest data from the Survey on the Access to Finance of Enterprises (SAFE). As a matter of fact, during the last years in Europe female-led firms, on average, have resorted less frequently to bank loans than their male counterparts – 30% and 37%, respectively (SAFE, various years).

Interestingly, several contributions have shown that, on the demand side, women-led firms tend to self-refrain from applying for bank credit either because they anticipate a denial from the lender (inter alia, Freel et al., 2012; Moro et al., 2017) or because they own sufficient internal funds or resort to families and other social ties (inter alia, Guiso et al., 2004; Coleman and Robb, 2009; Alesina et al., 2013). Finally, some contributions have focused on the role played by the level of social capital<sup>6</sup> in the functioning of the credit market highlighting that a higher level of it may reduce the asymmetric information that characterizes the credit contract. This, in turn, facilitates the access to bank loans, especially for those, like women-led SMEs, who generally rely on informal financing channels (see, inter alia, Guiso et al., 2004; Albertazzi and Marchetti, 2010; Alesina et al., 2013; Guiso et al., 2013; Moro and Fink, 2013). In this respect, social capital in the credit market supposedly stimulates the opposite mechanisms generated by corruption (Uslaner, 2013).

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<sup>6</sup> Social capital can be defined as the benefits obtained by individuals as members of a community or social network. For an illustration of the different dimensions of social capital see Coleman (1994) and, more recently, De Blasio et al. (2012).

In light of the aforementioned strands of the literature, we argue that corruption may modify both firms' expectations about their possibility of being successful in demanding credit, and the level of trust required in the bank-firm relationship. We expect that this effect may be even greater for women-led firms, which may face more difficulties in managing their business and perceive corruption worse than men. All in all, in this paper we investigate whether in a less (more) corrupt environment, women-led SMEs face a lower (higher) probability to self-refrain from applying to bank credit compared to men-led peers.

Using a sample of 60,058 observations – drawn from the ECB-SAFE – related to SMEs chartered in 11 Euro-area countries during the period 2009-2014, we first tackle the issue of gender bias in credit markets by employing multinomial logit models. Second, we address the possible endogeneity affecting the relation between the manager's gender and the non-application reasons. This problem may arise because the choice of appointing a female manager could be driven by unobservable factors, such as a particular corporate culture characterizing the firm (Adams and Ferreira, 2009; Liu et al., 2014; Sila et al., 2016; Mascia and Rossi, 2017), rather than being exogenous. Therefore, to solve the potential endogeneity we employ a two-step approach with the use of an instrumental variable similarly to Cumming (2008), and Heger and Tykvová (2009). Third, in order to test our main hypothesis, we introduce an interaction term between the firm's gender and corruption, thus to verify whether the surrounding environment affects the female firms' propensity to demand bank credit.

Our results show that female-led firms behave, more than male-led ones, as discouraged borrowers in the access to bank credit – as they anticipate a denial from the lender. Corruption (and conversely social capital) seems to have a negative (positive) impact on the access to bank credit, provided that firms are less confident about a positive outcome for their requests when corruption is higher. These findings are robust to various model specifications and are confirmed even after addressing endogeneity. As regards the link between the social environment and the enterprise's gender, we find that corruption does not seem to drive the behaviour of firms with

regards to their propensity to avoid bank loans applications. This might be due to an intrinsic attitude of women in generally being more risk-averse and less confident about their entrepreneurial capabilities than men (Booth and Nolen, 2015; Caliendo et al., 2015; Carter et al., 2015; Crosetto et al., 2015).

The paper is organized as follows. In Section 2, we offer a review of two main strands of the literature. In Section 3, we illustrate the data and the methodology. The empirical results are discussed in Section 4, whereas Section 5 concludes.

## **2. Related Literature**

### **2.1 Corruption, credit access and gender**

Corruption<sup>7</sup> is an important dimension of the quality of the institutions as most of the economic literature and institutional reports consider it as a major obstacle to social development and economic growth (see, among others, Myrdal, 1989; Andvig and Moene, 1990; Shleifer and Vishny, 1993; Mauro, 1995; La Porta et al., 1999; Li et al., 2000; Gyimah-Brempong, 2002; Tanzi and Davoodi, 2002; Blackburn and Sarmah, 2008; World Bank, 2007, 2011).<sup>8</sup>

Corruption is harmful for competition, reduces the incentives to invest both domestically and from abroad and negatively misallocates public resources affecting the efficiency of public investments (Mauro, 1998; Tanzi and Davoodi, 2002; Gupta et al., 2001). Moreover, corruption reduces the level of trust in the institutions and among people (Rothstein and Uslaner, 2005; Uslaner, 2013) and produces uncertainty, thereby making the economic transactions more costly and inefficient, and negatively affecting the business environment (see, among others, Shleifer and Vishny, 1993; Mauro, 1995; Blackburn and Sarmah, 2008; Hunt, 2005; Hunt and Laszlo,

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<sup>7</sup> Corruption is defined as the abuse, by a public officer, of his power to obtain a private gain (Rose-Ackerman, 1975).

<sup>8</sup> On the contrary, another strand of literature argue that corruption conveys the market response to the inefficiencies of the public sector working as “grease” rather than “sand in the wheels”. This literature empirically predicts a non-linear relation between corruption and economic growth at low levels of corruption incidence (see, among others, Lui, 1985; Klitgaard, 1988; Acemoglu and Verdier, 1998; Shleifer and Vishny, 1993).

2005). In a highly corrupt environment, corruption damages especially the small and medium firms because of their limited financial resources, lower bargaining power, and more informal structure. Those features, indeed, make it very difficult for them to resist to the payment of bribes, whose burden per output is greater than for large firms (Svensson, 2003; Campos et al., 2010; Gbetnkom, 2012; Seker and Yang, 2012; Van Vu et al., 2016; Galli et al., 2017b).

In the literature on the determinants of corruption, gender is also considered a relevant issue. There is not a unanimous consensus about the link between gender and corruption; indeed, different perspectives are offered (see, in this regard, Agerberg, 2014; Wängnerud, 2014). Part of the literature (Dollar et al., 2001; Swamy et al., 2001; Alatas et al., 2009; Melnykovska and Michailova, 2009; Esarey and Chirillo, 2013) develops the so-called gender differences perspective and argues that women, being more pro-social and risk-averse, are less inclined to engage in corrupt practices, perceive general corruption levels as worse, and are less tolerant towards the phenomenon. Moreover, in highly corrupt environments, women appear more socially vulnerable compared to men and face lower opportunities of business (Goetz, 2007). According to other studies (Sung, 2003, 2012), instead, liberal democracies favour both higher female participation in the political and economic life of a country and lower corruption. Therefore, no casual relation between gender and corruption can be assumed (the so-called liberal democracy perspective). Finally, some papers support the so-called opportunities perspective arguing that women are less likely to engage in corrupt practices because they still have fewer opportunities compared to men. In other words, in most countries women earn less money and have fewer responsibilities in public issues, as well as in business, which make them less likely to be involved in bribery (Alhassan-Alolo, 2007; Bjarnegård, 2013).

Additionally, there is a branch of the literature that focuses on the role that social capital plays in the credit market whose functioning is based, among other things, on credibility and trust. By increasing the level of trust and reducing the asymmetric information characterizing credit contracts, social capital improves the credit conditions for firms – thereby easing their access to

bank loans (Uzzi, 1999; Guiso et al., 2004; Moro and Fink, 2013; Mistrulli and Vacca, 2015) – and facilitates the collection of soft information, which in turn reduces adverse selection and moral hazard phenomena. Consequently, a higher level of social capital facilitates the access to bank loans – especially for people and firms, like women-led ones, that generally use informal channels of finance (see Guiso et al., 2004; Alesina et al., 2013; Guiso et al., 2013).

## **2.2 Gender and bank credit access**

Several studies have investigated whether the gender of the firm’s manager/owner affects the access conditions to credit. The empirical evidence is mixed and mostly driven by the country-context. Part of the literature argues that women’s perception about the difficulties in access to bank credit explains their lower propensity to apply for external funding (Coleman, 2000; Cole and Mehran, 2011). Affecting the risk-taking behaviour, this perception itself may result in self-restraint attitudes, by women-led firms, from applying for bank credit (see, *inter alia*, Robb and Walken, 2002; Babcock and Laschever, 2003; Roper and Scott, 2009; Carter et al., 2015; Malmström et al., 2017). Some studies, instead, attribute the existence of gender-based differences to the circumstance that women-led firms generally tend to be of small and medium size, operate in more traditional sectors such as the services, and are characterized by lower business management experience, resistance to provide collateral guarantees, and inclination in utilizing personal funds, retained earnings, home equity loans, and family loans to finance their businesses (Haines et al., 1999; Coleman, 2000; Treichel and Scott, 2006; Coleman and Robb, 2009; Moro and Fink, 2013; Cole and Mehran, 2011; Sena et al., 2012).

On the supply side, the literature investigates whether women-led firms face lower credit availability and/or worse cost conditions and provides mixed evidence.<sup>9</sup> While some studies find that women-led enterprises have greater difficulties than man-led ones in obtaining bank loans

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<sup>9</sup> Please mind that the literature has also investigated other aspects of discrimination (such as the ethnic one) in the access to bank credit. See Aldén and Hammarstedt (2016) for an extensive review of the literature.

(Marlow and Patton, 2005; Becker-Blease and Sohl, 2007; Muravyev et al., 2009; Bellucci et al., 2010; Kwong et al., 2012; Wu and Chua, 2012; Alsos and Ljunggren, 2016; Mascia and Rossi, 2017), others exclude gender discrimination and attribute the differences in cost conditions to economic and financial factors such as credit history, assets, sales, and years in business (Cavalluzzo et al., 2002; Blanchflower et al., 2003). A few papers find that women-led firms face more unfavourable loan contract terms than male firms, motivated by the fact that the formers are less inclined to grow (Fabowale et al., 1995).

Few papers have specifically addressed the issue of gender in credit markets utilizing European data. Stefani and Vacca (2015) investigate whether gender affects SMEs' access to credit in the four largest European countries – Germany, France, Italy and Spain. They find that female firms face more difficulties than their male counterparts in accessing bank credit mostly because of their characteristics (firm size, age and sector of activity) rather than because of gender-discrimination. Moro et al. (2017) find that, on the demand side, women-led firms tend to apply less often than male-led ones, as they seem to be less confident about the outcome of their applications; on the supply side, banks mostly allocate loans according to the creditworthiness of the firm and do not seem to be gender-biased.

In this paper we focus on the demand side of the European credit market to investigate whether the quality of the institutional environment differently affects female and male-led firms' behaviour. Based on the abovementioned strands of the literature we enquire whether, in a less corrupt environment, female-led firms show lower discouragement in applying for bank loans than male-led ones. Therefore our research hypothesis is as follows:

*H1: In a less corrupt environment, women-led SMEs face a lower probability to self-refrain from applying to bank credit compared to men-led peers.*

### 3. Data and Methodology

#### 3.1 Data description

Our main source of data is represented by the SAFE,<sup>10</sup> run on behalf of the European Commission (EC) and the European Central Bank (ECB) every six months (via the so-called waves), since 2009. It collects micro-data about firms' financial needs, their experience in the access to finance, as well as a series of financial and other firm-level characteristics through a survey of companies chartered in Europe and randomly selected from the Dun & Bradstreet business register.<sup>11</sup> Firms in agriculture, public administration, and financial services are intentionally excluded. Moreover, the sample is stratified by country, firm's size and activity.

Our analysis is limited to 9 waves of the survey (i.e., from the second to the tenth – corresponding to a period spanning from July 1, 2009, to March 31, 2014), because the key variable employed for our tests (i.e., the gender) is only available for those rounds. We restrict our study to the eleven largest Euro-area economies (i.e., Austria, Belgium, France, Finland, Germany, Greece, Italy, Ireland, The Netherlands, Portugal, Spain)<sup>12</sup> – as they are also the ones for which the related firms' observations are always available throughout the period of our investigation. In addition, it is worth noting that these countries, although belonging to the same currency area, are characterized by heterogeneities in terms of the micro and macroeconomic features, as well as in regards to the social-institutional environment.

Table 1 shows the distribution of our observations by country, with France, Spain, Germany, and Italy displaying the highest values.

– TABLE 1 HERE –

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<sup>10</sup> The survey is available at: <https://www.ecb.europa.eu/stats/money/surveys/sme/html/index.en.html>

<sup>11</sup> For the countries where the Dun & Bradstreet register was not available, other sources were used.

<sup>12</sup> The smallest countries in the Eurozone (Estonia, Cyprus, Latvia, Lithuania, Luxembourg, Malta, Slovakia and Slovenia) represent less than 3% of the total employment in the area. Therefore we have decided to exclude them from the sample.

### 3.2 Dependent variable

The outcome of the SAFE question q7a\_a is employed to create the dependent variable for our study. Specifically, this question detects whether a firm applied for bank loans, as well as a series of reasons why it did not. More precisely, the question is:

“[With regards to bank loans], *could you please indicate whether you: (1) applied for them over the past 6 months; (2) did not apply because you thought you would be rejected; (3) did not apply because you had sufficient internal funds; (4) or did not apply for other reasons?*”

The values from 1 to 4, outlined in parentheses, denote the way each interviewee’s answers were coded. Therefore we employ the qualitative data resulting from such question to generate our dependent variable that we label as “*applying for bank loans*”.

### 3.3 Key variables

#### 3.3.1 Gender

The SAFE collects information about the gender of the owner, director, or CEO of the surveyed firms from the second to the tenth wave (i.e., from July 1, 2009, to March 31, 2014). We thus employ such information to construct a dummy that represents the key part of our empirical analysis. Specifically, we create “*Female*” as a dichotomous variable equal to one if the owner/director/CEO of the firm is female, and zero if it is male. Figure 1 shows the percentage of female firms, in our sample, by country. Interestingly, we note that The Netherlands is the country with the lowest share of female firms (about 9.8%) in the sample. On the other hand, Germany and Portugal present the highest shares of female enterprises – about 14% and 14.6%, respectively. On average, female businesses cover about 12.5% of the sample. Such very modest figure – namely, the low percentage of female-led companies throughout our sample – may be due to the difficulties faced by women in reaching top managerial positions (Bush, 2011; Grosvold, 2011; Moro et al., 2017).

– FIGURE 1 HERE –

### 3.3.2 Corruption

Corruption erodes economic freedom by introducing insecurity and uncertainty into economic relationships. In the literature, two major alternative approaches to measuring corruption are developed: subjective indicators, based on survey data about corruption perceptions and/or experiences, and objective measures, such as the number of corruption-related trials or economic proxies. While the latter are appropriate for single-country analyses, the differences in the national judicial systems justify the use of the formers in case of cross-country studies (as it is our case).

Therefore, for the scope of our investigation, two measures of corruption are alternatively utilized: “Freedom from Corruption” provided by the Heritage Foundation – whose score is primarily derived from Transparency International’s Corruption Perceptions Index (CPI) – and “Control of Corruption” drawn from the “Worldwide Governance Indicators”, available at the World Bank. For both variables, low values of the measure denote high corruption, whereas high values indicate low corruption. Figure 2 and Figure 3 show the degree of corruption by country according to the two indicators, respectively. Here we observe that Greece and Italy are the most corrupt economies, as they present the lowest values of the index. In contrast, Finland and the Netherlands, with the highest values, are the least corrupt countries in our sample.

– FIGURE 2 and FIGURE 3 HERE –

## 3.4 Econometric methodology and control variables

In order to carry out our analyses, we employ multinomial logistic models.<sup>13</sup> Such choice moves from the possibility *i*) to employ a discrete dependent variable that takes more than two outcomes (that have no natural ordering), and *ii*) to use both continuous as well as dichotomous

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<sup>13</sup> Multinomial logistic models are not uncommon in a variety of strands of the literature in business. See, for instance, Badoer and James (2016), Demirgüç-Kunt et al. (2013), Ongena and Şendeniz-Yüncü (2011), Sievänen et al. (2017).

variables as regressors (see, for instance, Gregory et al., 2005). Regressions include time and country dummies or, alternatively, country\*time dummies. Furthermore, we adjust the sample to be representative of the population from which it is extracted by employing calibrated weights (as in Ferrando et al., 2017). Finally, heteroskedasticity-robust standard errors are utilized to remove possible bias in the estimations.

As outlined in H1, our analysis is aimed at investigating whether the different degree of corruption characterizing the countries of our sample plays a role in a female firm’s decision not to apply for bank loans. However, before doing so, we decide to carry out two preliminary steps.

#### 3.4.1 *Exploring the existence of a causal relation*

Indeed, we first need to check whether women are more or less inclined than men in not-applying for bank loans and whether the level of corruption, at the country level, is significantly correlated to the non-application reasons. To do so, we thus estimate the following model:

$$P_i (\text{applying for bank loans}) = f(\mathbf{Female}, \text{corruption}, \text{country controls}, \text{firm characteristics}) \quad (1)$$

where we expect our ‘*Female*’ dummy to exhibit a positive sign, thus signalling a higher propensity by female-led businesses not to applying for fear of rejection and for other reasons. As specified earlier in Section 3.3.2, ‘*corruption*’ alternatively includes “Freedom from Corruption” or “Control of Corruption” indicators. ‘*Firm characteristics*’ is a vector containing standard controls (i.e., firm’s size, and age), some firm’s financial characteristics (i.e., the change in profitability and in credit history), as well as variations in the enterprise’s credit needs. The use of such controls, together with the dummies accounting for the country and the time effects, should reduce possible endogeneity problems arising from the data. More precisely, the standard controls are likely to reduce the potential cause of endogeneity by capturing the independent impact of firm-level heterogeneity related to size and age. In other words, including such variables in our models

allows us to alleviate potential worries that the possible variations observed in the probability to not applying for bank loans are driven from the firm specific characteristics rather than from the existence of gender disparities. The financial firm controls accounting for the change in profitability, in creditworthiness and in the firm's demand for credit, in the past six months, are also meant to reduce the effect of potential sources of bias that could affect our models. Notably, the change in profit is aimed at capturing variations of the firm profitability. We expect that the firms that improved their income statements in the previous six months are less likely not to applying for bank credit for fear of rejection; conversely, firms that worsened their profitability are more likely to be discouraged from applying. We capture the change in profit by generating the following two dummies: profit up (equal to 1 if a firm declares that the profit has increased over the past six months) and profit down (equal to 1 if a firm declares that the profit has decreased over the past six months). Furthermore, we control for the credit history of the enterprises in our sample. Specifically, we would expect that firms that improved (worsened) their creditworthiness over time might be less (more) likely to refrain from applying for bank loans. Following the procedure described above, we build two dummies accounting for the change in the firms' credit history: creditworthiness up (equal to 1 if the firms declare that the creditworthiness has increased over the past six months) and creditworthiness down (equal to 1 if the firms declare that the creditworthiness has decreased over the past six months). In addition, we control for the variations in the firm's need for credit by including two additional dummies. Namely, we generate: demand up (equal to 1 if a firm declares an increase in the need for bank loans over the past six months) and demand down (equal to 1 if a firm declares a decrease in the need for bank loans over the past six months). Please mind that all these dummies are not capturing the *level* of demand for bank loans, profitability and creditworthiness. Rather, they offer a picture of the perceived *change* of each of them from the interviewee's perspective. Finally, the '*country controls*' include a wide set of variables controlling for the country features. First of all, we include the biannual GDP growth rate – that we compute as averages of quarterly data drawn

from OECD – to account for the general economic conditions. Moreover, our regressions include “Trade Freedom”, which is a variable drawn from the Heritage Foundation, to account for the absence of regulatory barriers to trade. We expect that firms chartered in countries characterized by a higher trade freedom are less inclined in refraining from applying for bank loans. A variable accounting for the quality of contract enforcement and property rights, drawn from the Worldwide Governance Indicators available at the World Bank, is also included and labelled as “Rule of Law”. The idea is that where the confidence in the rules of society is higher, the enterprises are less likely to be discouraged from applying for fear of being credit constrained and to resort to alternative channels. Our specifications also include a control that proxies for the level of reliance of the private sector towards the banking industry. Specifically, we include “Domestic credit to private sector by banks”, which is computed as percentage of GDP and drawn from the World Bank. The Global Gender Gap Index (GGGI),<sup>14</sup> drawn from the World Economic Forum, is also added to our models as a proxy for social capital. We thus expect that the higher the index, the lower the probability that a firm may be discouraged from applying for fear of being credit constrained or to resort to alternative channels of finance. Finally, we include the Herfindahl Index (HI) of bank total assets concentration to account for the competition in the banking industry. The idea is that, when the bank concentration is higher, because of the lower banking competition firms are more likely to behave as discouraged as they anticipate a possible rejection.

Table 2 shows the summary statistics of the variables employed in our analysis. Table A1 in Appendix, instead, provides variables’ description and sources.

– TABLE 2 HERE –

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<sup>14</sup> Low values of the GGGI underline higher gender disparities, whereas high values of the same index underscore higher gender equality.

### 3.4.2 *Addressing endogeneity*

Endogeneity may be a source of concern in our analysis. Indeed, the firm's leadership gender may not be completely exogenous. Either reverse causality – the level of credit rationing may impact on the firm performance and, thus, on the choice of the leader to be hired – or omitted variables – namely, unobservable organizational and managerial skills, or a given corporate culture may push towards a given leader rather than another – can affect our estimates (see, inter alia, Adams and Ferreira, 2009; Liu et al. 2014; Sila et al. 2016; Mascia and Rossi, 2017). If this is the case, we cannot argue that our results are showing the existence of a causal relation between the leader's gender and the probability of non-application to bank credit.

To face such potential issue, similarly to Cumming (2008) and Heger and Tykvová (2009) we utilize a two-step approach. This technique requires us to employ a logit model to study the determinants of our *Female* dummy, in the first stage. Notably, for identification purposes, we need an instrument that is highly correlated with the Female dummy and is not correlated with the error term. A good candidate, in this regard, can be the share of female employment by sector of activity available at Eurostat (see, for instance, Mascia and Rossi, 2017). Therefore, we regress *Female* on the rate of female employment and a variety of firm and country controls from model (1). Afterwards, in the second and final step, we estimate model (1) by employing our multinomial logistic setting where, *in lieu* of the *Female* dummy, we include the predicted values obtained from the first step.

### 3.4.3 *Assessing whether corruption influences women-led firms' decision not to apply*

Once carried out the previous steps, if a causal effect between the leader's gender and the non-application for bank loans has been detected, then we are finally legitimised to test our research hypothesis.

To do so, we decide to utilize interaction models. Namely, we take model (1) and add an interaction term between our *Female* dummy and one of the alternative proxies for corruption, thus to check whether different degrees of corruption at the country-level may influence women’s discouragement in applying for bank loans. More specifically, in order to avoid multicollinearity between the interaction term and its constituent variables, we mean-centre the corruption measures before including them in our models. By mean centring, we basically transform the original corruption measures into deviations from their mean (see Vallascas and Hagendorff, 2013).

Our expectation is that, in a better environment (i.e., where corruption is lower), female firms are more confident about the success of their applications and tend to refrain less – than it would happen in a more corrupt environment – from applying for bank loans. Alternatively, we may find that women’s discouragement is independent of the surrounding environment and female leaders tend to self-refrain, more than male ones, just because of their intrinsic attitude in being less confident about their entrepreneurial capabilities as well as in being more risk-averse (Booth and Nolen, 2015; Caliendo et al., 2015; Carter et al., 2015; Crosetto et al., 2015).

## **4. Empirical Results**

### **4.1 Baseline specifications**

We now discuss the results of the multinomial logistic model presented in Section 3.4.1. As specified earlier, the use of such methodology is ideal when the dependent variable takes more than two qualitative outcomes with no natural ordering. Additionally, when employing such a method, we need to specify a base outcome against which comparing the remaining outcomes of the dependent variable. For this reason, we decide to compare the motives that lead firms not to apply for bank loans (i.e., non-application ‘for fear of rejection’, ‘for sufficient funds’, ‘for other reasons’) against the base outcome ‘applied’. Table 3 shows the results of three different specifications of model (1) that we carried out utilizing ‘Freedom from corruption’ or ‘Control of

corruption’ as alternative proxies for corruption, in Panel A and Panel B respectively. Starting from the left-hand side of the Table (both Panels), the first test is carried out on a baseline specification that does not include any country-level control apart from the corruption measure. The specification that appears in the centre of the Table, instead, adds all the country-level controls (i.e., GDP growth, Trade freedom, Rule of Law, Domestic credit to private sector by banks over GDP, the GGGI, and the HI of bank concentration) to the previous specification. Finally, in the last Columns of the Table we report a robustness test where, *in lieu* of the country-level variables, we insert country\*time dummies.

Starting from Panel A of Table 3, estimates highlight that the dummy *Female* always presents a positive and significant coefficient, indicating that women-led businesses are more likely than their male counterparts to self-refrain from applying for bank loans due to fear of rejection, to availability of sufficient internal funds, and for other reasons (as they probably prefer to relying on family or friends networks). It is also worthy of note that the marginal effects reported in brackets underscore that women-led businesses appear to be 6.3% more likely than men-led ones to self-refrain from applying to bank credit for fear of rejection. Our results seem to be strongly significant whether we do not employ country-level controls (first specification), or when we include them (second specification), as well as when – to rule out the possibility that our results are driven by the choice of the country controls included – we check the robustness of our findings by dropping the country-level variables and employing country\*time effects (third specification).

As regards the corruption measure, the variable “Freedom from corruption” turns to be significantly and negatively correlated to our dependent variable almost in all specifications, especially with regards to the non-application for fear of rejection. Indeed, this result is stable across the various specifications presented in Table 3. In other words, this finding seems to highlight that in countries characterized by a lower degree of corruption (i.e., higher freedom

from corruption), SMEs appear to be more confident about the success of their loan applications and, therefore, they are less likely to self-refrain from applying to bank credit for fear of rejection.

– TABLE 3 HERE –

As for the other controls included in the various specifications, it is worth mentioning that, consistently with our expectations, the dummies “Profit down” and “Credit down” exhibit positive coefficients in Columns 2, 6, and 10, signalling that firms that have decreased their profit and creditworthiness in the last six months are more likely to self-refrain from applying as they anticipate a rejection from the lender. In contrast, firms that experienced an improvement of the credit history – as proxied by the dummy “Creditworthiness up” – are generally less likely to refrain from applying for credit.

If we then focus on the specification outlined in the centre of the Table, some interesting insights also emerge from the coefficients related to the country-level controls. Indeed, here we find that firms chartered in countries with greater confidence in the rules of society (as proxied by “Rule of law”) and higher trade freedom are less likely to refrain from applying for bank loans for fear of rejection. As regards the bank concentration, in contrast to our expectations this variable exhibits a negative and significant coefficient in Column 6, meaning that, when the bank competition is lower, firms do not appear to anticipate a rejection from the lender and, as such, do not seem to be discouraged from applying for credit. This may be explained by the so-called *information hypothesis*, which argues that, in more concentrated markets, banks have higher incentives to create durable businesses with their borrowers – thus eventually increasing the firms’ confidence towards the banking system (see, for instance, Fungáčová et al., 2017).

Moving to Panel B, here we observe that the previous findings are confirmed even when we employ “Control of corruption” as an alternative proxy for the degree of corruption characterizing the environment. Specifically, the *Female* dummy enters all the specifications with a positive and significant sign, thus confirming the higher likelihood of women-led enterprises, compared to men, to not applying for credit for the variety of reasons investigated. As for the

corruption indicator, we almost find that its coefficient is negatively correlated to the probability of not applying for fear of rejection (see Columns 2, 6, and 10) – which confirms that when corruption is lower firms tend to be less discouraged from applying for credit. Finally, as for the country-level controls, it is worth mentioning that in Column 6 the GGGI enters with a negative and significant sign, suggesting that when the perceived gender disparities are lower (i.e., a country’s social capital is higher), firms seem to be more confident towards the banking system and, as such, are less inclined in not applying to bank credit for fear of rejection.

Overall, our findings show that women-led enterprises tend to self-refrain, more than men, from applying for credit. Additionally, results seem to highlight that a higher quality institutional environment – as measured in terms of lower corruption – helps firms to gain confidence about their abilities in being successful in case of a loan application is filed, thus reducing their potential discouragement. For this reason – after addressing (in the next Section) potential endogeneity problems affecting our estimates –, in the subsequent Section we decide to further explore this issue and test whether, eventually, the external environment actually influences the behaviour of female-led firms with regards to their inclination in applying for bank loans.

## **4.2 Addressing endogeneity**

As anticipated in Section 3.4.2, endogeneity may be a source of concern in our investigation. To address this issue we employ a two-step approach in a similar fashion to Cumming (2008), and Heger and Tykvová (2009). More specifically, such an approach requires us to first identify an instrument for our *Female* dummy. In this regard, the share of female employment by sector of activity appears to be a good candidate for our purpose. However, because some of the observations within the SAFE refer to firms that are not classified within any sector of activity, when implementing such methodology we face a minor drop of observations that leads us to a sample of 57,885 rows.

Table 4 reports the results of the final stage of our two-step approach, where we estimate model (1) through the use of a multinomial logistic model that – rather than utilizing the original *Female* dummy – employs the predicted value of Female that we acquire from the first step logistic estimation.<sup>15</sup> As we did in the previous Table, we report the tests carried out utilizing three specifications of model (1) – namely, without country-level controls (left-hand side of the Table), with the inclusion of all the country variables (centre of the Table) and, as a robustness check, with the use of country\*time dummies *in lieu* of the country controls (right-hand side of the Table). Finally, the various specifications reported in Panel A differ from those in Panel B for the different indicator of corruption utilized – “Freedom from corruption” versus “Control of corruption”, respectively.

– TABLE 4 HERE –

Results from both Panels of the Table show that, even after addressing the endogeneity concerns, *Female* enters all the specifications with a significant and positive coefficient, indicating that women-led businesses are more likely than men-led ones to avoid loan applications either for fear of rejection, or for sufficient internal funds, as well as for other reasons, as compared to the base outcome ‘applied’. Such a result does not appear to be driven by the choice of including, or not, the country-level controls, and is also robust to the use of country\*time fixed effects.

Overall, even after modifying our regressions to overcome the possible endogeneity issue affecting our estimates, results confirm the existence of a self-restraint attitude, by women-led enterprises, in demanding credit. Additionally, the negative sign associated to the coefficient of the corruption indicators seems to corroborate the view according to which the better the external environment, the lower the probability that a firm is discouraged from applying for fear of being credit constrained.

All in all, having ascertained that the leadership gender actually matters in the firm’s propensity not to apply for bank loans, we have finally laid the groundwork to test our main

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<sup>15</sup> For the sake of brevity, we do not report the estimates of the first logistic step, where we find that the instrument has a highly significant positive impact (at the 1% level) on the probability of female leadership.

research question. Namely, we are now legitimized to assess whether a better external environment surrounding the firm may possibly help female leaders in reducing their discouragement when they have to deal with credit institutions.

### **4.3 Assessing whether corruption affects women-led firms' decisions**

As described in Section 3.4.3, in order to check whether the institutional environment might influence women's propensity in not applying for bank credit, we add – to model (1) – an interaction term between our *Female* dummy and one of the alternative proxies for corruption. Specifically, in Table 5 we present the results in a similar fashion to what we did in the previous Tables. Namely, we start without including any country-level control apart from the corruption measure (left-hand side of the Table), then we add all the country variables (centre of the Table), finally we check the robustness of our tests by substituting the country controls with the country\*time dummies (right-hand side of the Table). Moreover, Panel A and Panel B only differ for the type of corruption indicator utilized (i.e., “Freedom from corruption” versus “Control of corruption”, respectively). In addition, please remind that both corruption measures are mean-centred to avoid multicollinearity between the interaction term and its constituent variables. All in all, if H1 is corroborated, we should find a significant coefficient for the interaction term, thus signalling that corruption eventually represents an obstacle for the access to bank credit by women.

Table 5 displays the results of our empirical analysis. While we observe that the *Female* dummy always remains positive and highly statistically significant and we note that the corruption measures are negatively correlated to our dependent variable, interestingly – and in contrast to our expectations – the interaction term does not turn to be significant in any of the specifications reported in the Table. This result seems to suggest that women-led SMEs are more likely than men-led ones not to applying for credit regardless of the level of corruption characterizing the country where the firm is chartered. Notably, the evidence emerging from our analysis seems also

to reveal that women's discouragement in applying to bank credit for fear of rejection is mostly driven by the intrinsic attitude of women in being less confident about their abilities in dealing with banks (Carter et al., 2015), rather than by the country's level of corruption. This is particularly unfortunate because, even when the institutional environment does not seem to obstacle firms (as it should be when corruption is low), in holding such a conduct female enterprises preclude themselves the possibility to expand and let their businesses grow. Ideally, female owners/managers should gain more confidence about their bargaining abilities with banks thus to refrain less from applying for credit and eventually being even more successful with their businesses.

– TABLE 5 HERE –

Some additional tests have been performed to assess the robustness of our findings. First of all, to rule out the possibility that the vector of country and time dummies that we included in our specifications might generate collinearity with the country-level controls, we have re-run our regressions by excluding such dummies. Additionally, as a further check, we have re-estimated the various specifications of model (1) by including industry effects (i.e., the dummies accounting for the firms' sector of activity). In both cases, results – that we do not report for the sake of brevity – confirm our findings.

## **5. Conclusions**

Accessing formal channels of credit, such as the bank lending one, is pivotal for the successful management of SMEs, given their inability to entry equity markets. In addition, the external environment surrounding the enterprises – in terms of quality of the institutions and social capital – may also play a role in the firms' attitude towards bank credit, thus impacting on their possibility to grow. Notably, we think that corruption may negatively modify firms' expectations about the propensity of banks to finance their projects, thus affecting the level of trust characterizing the bank-firm relationship. These issues are of particular concern for the

enterprises led by women, because they may perceive corruption as an obstacle, more than men do, and consequently feel less confident in managing their businesses.

This paper is thus an attempt to address the question of whether the perceived level of corruption in a country influences women's inclination in self-refraining from applying for bank loans for a variety of motives (i.e., fear of rejection, sufficient funds, other reasons). To this end we utilize a sample of 60,058 observations – drawn from the ECB-SAFE – related to SMEs chartered in 11 Euro-area countries during the period 2009-2014.

Overall, our findings – robust to different model specifications – show that *i*) women-led enterprises seem to self-refrain, more than men, from applying for bank loans and this result still holds even after addressing potential endogeneity problems affecting our estimates; *ii*) the quality of the institutional environment – as proxied by corruption – is significantly correlated to the probability that SMEs do not apply for bank credit (i.e., the better the environment, the lower the probability of non-application); *iii*) the self-restraint attitudes of women-led businesses towards bank credit do not appear to be influenced by the surrounding environment (i.e., although chartered in an ideally better environment, female-led SMEs keep refraining from applying for fear of rejection and other reasons). In other words, our empirical analysis highlights that women-led firms generally tend to refrain from applying for loans, more than men, regardless of the level of corruption in a country. This result confirms theories emphasizing the greater risk-aversion generally characterizing women's behaviour.

Our results suggest that measures addressing women-led businesses may be crucial in helping female leaders in gaining more confidence about their entrepreneurial capabilities and their bargaining abilities with banks, thus to refrain less from applying for credit and eventually ensuring the possibility to grow and being even more successful with their businesses. Moreover, our findings indicate that anti-corruption policies and measures aimed to enhance transparency and reduce information asymmetry in the economy may play a relevant role in reducing the

negative spillovers generated by a low-quality institutional environment on SMEs access to bank credit.

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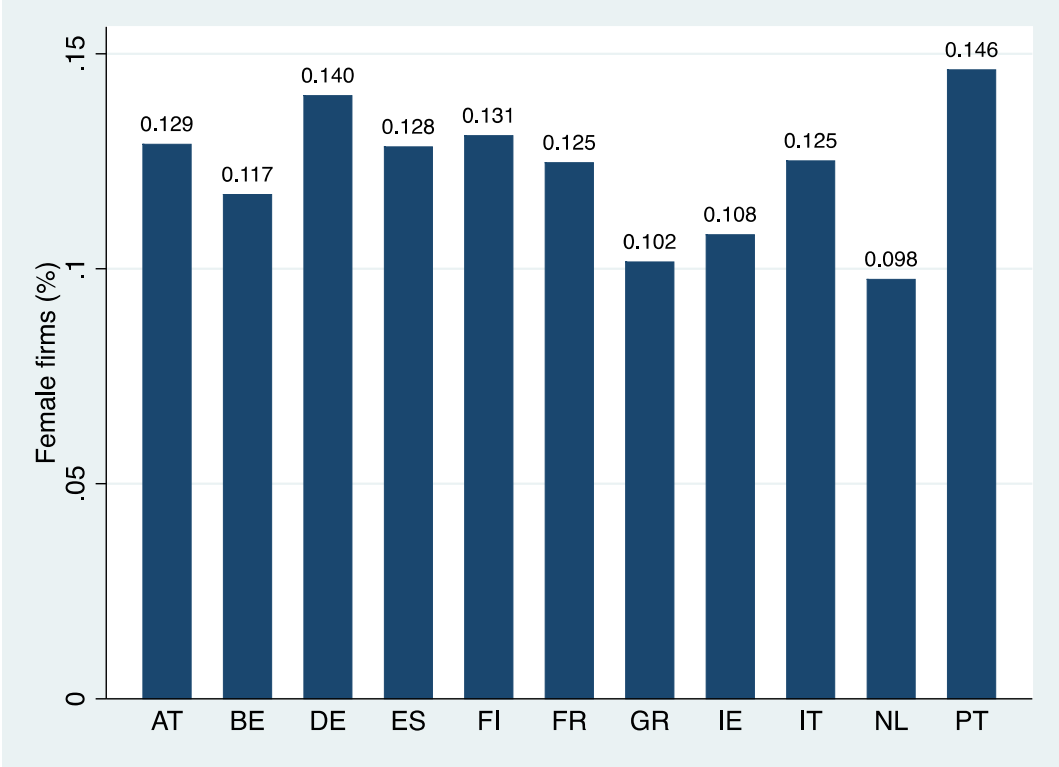
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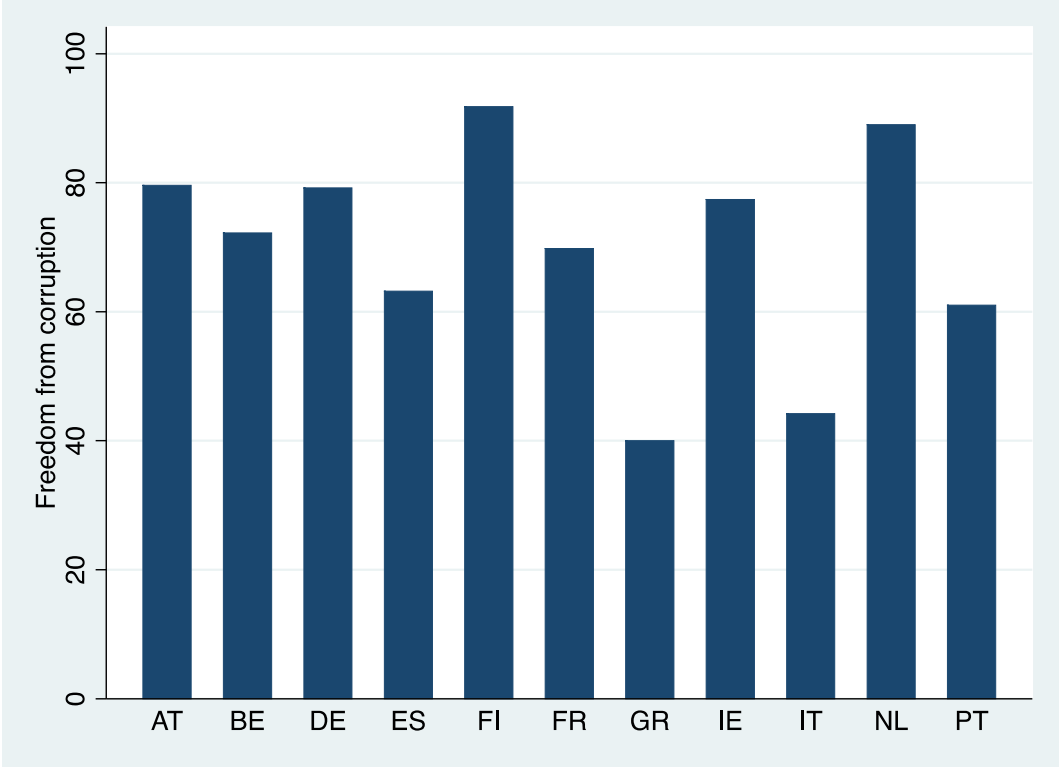
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Figure 1: Percentage of female firms by country



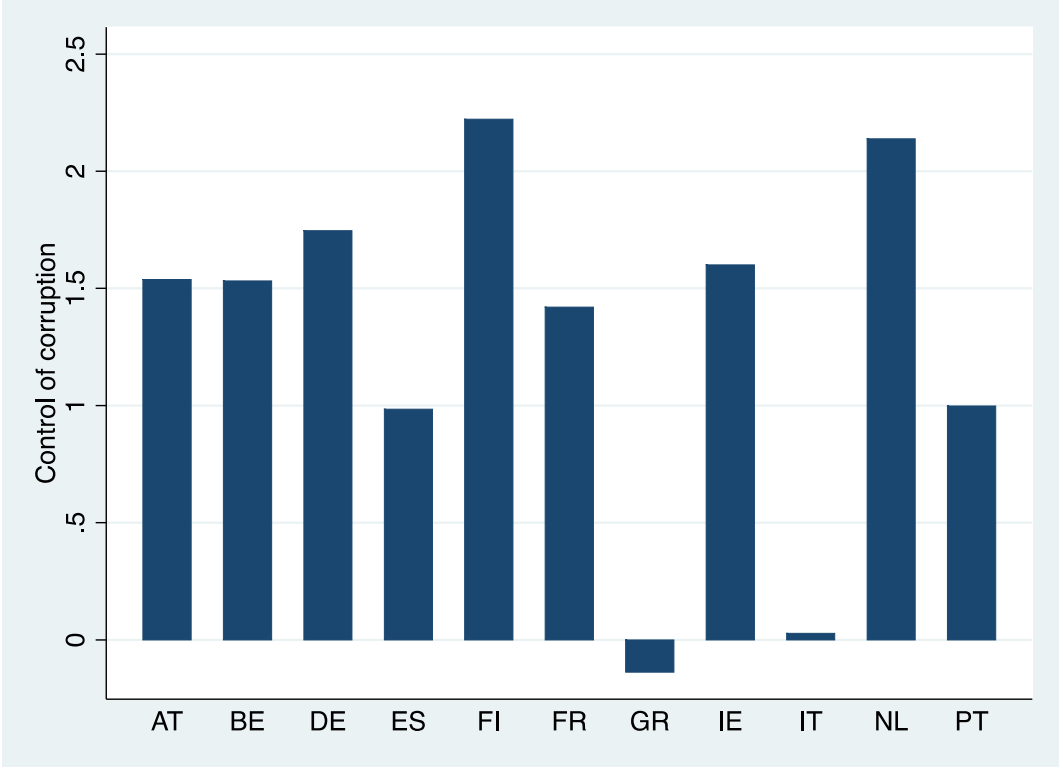
AT = Austria, BE = Belgium, DE = Germany, ES = Spain, FI = Finland, FR = France, GR = Greece, IE = Ireland, IT = Italy, NL = The Netherlands, PT = Portugal.

Figure 2: Freedom from corruption by country



AT = Austria, BE = Belgium, DE = Germany, ES = Spain, FI = Finland, FR = France, GR = Greece, IE = Ireland, IT = Italy, NL = The Netherlands, PT = Portugal.

Figure 3: Control of corruption by country



AT = Austria, BE = Belgium, DE = Germany, ES = Spain, FI = Finland, FR = France, GR = Greece, IE = Ireland, IT = Italy, NL = The Netherlands, PT = Portugal.

**Table 1:** Observations by country

Country Name	Freq.	Percent
Austria	3,800	6.33
Belgium	3,642	6.06
Finland	3,643	6.07
France	8,921	14.85
Germany	8,670	14.44
Greece	3,849	6.41
Ireland	3,382	5.63
Italy	8,043	13.39
Netherlands	3,670	6.11
Portugal	3,734	6.22
Spain	8,704	14.49
Total	60,058	100.00

**Table 2:** Summary statistics

	Observations	Mean	Median	St. Dev.	p1	p99
<b><i>Dependent variable</i></b>						
Applying for bank loans	60,058	2.625	3.000	1.085	1.000	4.000
<b><i>Key variable</i></b>						
Female	60,058	0.125	0.000	0.331	0.000	1.000
<b><i>Corruption</i></b>						
Freedom from corruption	60,058	67.556	69.000	15.783	34.000	94.000
Control of corruption	60,058	1.197	1.420	0.713	-0.250	2.220
<b><i>Country-level controls</i></b>						
GDP growth rate	60,058	-0.188	0.300	2.675	-8.200	5.050
Trade freedom	60,058	86.037	87.100	2.160	80.800	87.600
Rule of law	60,058	1.282	1.430	0.506	0.360	1.970
Domestic credit by banks	60,058	133.621	116.834	38.873	89.313	207.619
GGGI	60,058	0.733	0.733	0.042	0.672	0.845
Concentration	60,058	0.091	0.060	0.079	0.021	0.370
<b><i>Firm-level (SAFE) controls</i></b>						
Demand up	60,058	0.190	0.000	0.392	0.000	1.000
Demand down	60,058	0.135	0.000	0.341	0.000	1.000
Profit up	60,058	0.246	0.000	0.431	0.000	1.000
Profit down	60,058	0.466	0.000	0.499	0.000	1.000
Creditworthiness up	60,058	0.213	0.000	0.409	0.000	1.000
Creditworthiness down	60,058	0.141	0.000	0.348	0.000	1.000
Micro	60,058	0.336	0.000	0.472	0.000	1.000
Small	60,058	0.337	0.000	0.473	0.000	1.000
Medium	60,058	0.254	0.000	0.436	0.000	1.000
Very recent	60,058	0.017	0.000	0.127	0.000	1.000
Recent	60,058	0.066	0.000	0.248	0.000	1.000
Old	60,058	0.126	0.000	0.332	0.000	1.000

**Table 3:** The impact of gender on the non-application reasons

This table displays regression results for the multinomial logistic model presented in Section 3.4.1, concerning the impact of gender on the reasons for not applying to bank credit. The estimation period is 1st July 2009 – 31st March 2014 (from the second to the tenth of the SAFE waves). The dependent variable – which is also described in Section 3.2 – is a variable that equals one/two/three/four if a firm applied/did not apply because of possible rejection/did not apply because of sufficient internal funds/did not apply for other reasons during the past six months, respectively. **Female** is a dummy that equals one if the firm’s owner/director/CEO is female, and zero otherwise. Panel A (Panel B) controls for a country’s level of corruption by including, as regressor, “Freedom from corruption” (“Control of corruption”). Although not reported, controls for the firm’s size and age are always included. See Table A1 in the Appendix for all variable definitions and sources. All regressions use sampling weights that adjust the sample to be representative of the population. Additionally, regressions in Columns 1–8 include country and time dummies; whereas regressions in Columns 9–12 include country\*time dummies. Heteroskedasticity-robust standard errors appear in parentheses. Marginal effects are reported in brackets. Intercepts are included but not reported. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level.

<i>Panel A</i>												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Applied	Did_not_apply_b ecause_of_possib l	Did_not_apply_b ecause_of_suffici	Did_not_apply_f or_other_reasons	Applied	Did_not_apply_b ecause_of_possib l	Did_not_apply_b ecause_of_suffici	Did_not_apply_f or_other_reasons	Applied	Did_not_apply_b ecause_of_possib l	Did_not_apply_b ecause_of_suffici	Did_not_apply_f or_other_reasons
<b>Female</b>	(base)	<b>0.301***</b> (0.07) [0.063]	<b>0.119**</b> (0.05) [0.471]	<b>0.124**</b> (0.05) [0.199]	(base)	<b>0.295***</b> (0.07) [0.063]	<b>0.118**</b> (0.05) [0.471]	<b>0.127**</b> (0.05) [0.199]	(base)	<b>0.299***</b> (0.07) [0.063]	<b>0.116**</b> (0.05) [0.471]	<b>0.125**</b> (0.05) [0.199]
<b>Freedom from corruption</b>		<b>-0.091***</b> (0.01)	<b>-0.024***</b> (0.01)	<b>-0.013</b> (0.01)		<b>-0.092***</b> (0.02)	<b>-0.025**</b> (0.01)	<b>0.012</b> (0.01)		<b>-0.059*</b> (0.03)	<b>0.009</b> (0.02)	<b>-0.045**</b> (0.02)
GDP growth						0.109*** (0.03)	0.036* (0.02)	-0.058*** (0.02)				
Trade freedom						-0.112* (0.07)	0.112** (0.04)	-0.036 (0.04)				
Rule of law						-4.899*** (0.95)	-0.934 (0.68)	-1.231* (0.72)				
Domestic credit by banks						0.016*** (0.00)	-0.007** (0.00)	0.009*** (0.00)				
GGGI						-4.021 (3.59)	-0.133 (2.29)	-6.222** (2.47)				
Concentration						-8.683*** (3.05)	0.124 (2.27)	5.291** (2.35)				
Demand up		-1.085*** (0.06)	-2.910*** (0.05)	-2.172*** (0.05)		-1.097*** (0.06)	-2.912*** (0.05)	-2.173*** (0.05)		-1.100*** (0.06)	-2.922*** (0.05)	-2.174*** (0.05)
Demand down		-0.171* (0.09)	-0.330*** (0.05)	-0.387*** (0.06)		-0.169* (0.09)	-0.330*** (0.05)	-0.386*** (0.06)		-0.173* (0.09)	-0.328*** (0.05)	-0.382*** (0.06)
Profit up		-0.116 (0.09)	0.003 (0.05)	-0.156*** (0.06)		-0.125 (0.09)	-0.001 (0.05)	-0.159*** (0.06)		-0.135 (0.09)	0.001 (0.05)	-0.161*** (0.06)
Profit down		0.183*** (0.07)	-0.098** (0.04)	0.138*** (0.05)		0.187*** (0.07)	-0.090** (0.04)	0.136*** (0.05)		0.186*** (0.08)	-0.092** (0.05)	0.134*** (0.05)
Creditworthiness up		-0.342*** (0.08)	-0.263*** (0.05)	-0.397*** (0.05)		-0.334*** (0.08)	-0.264*** (0.05)	-0.395*** (0.05)		-0.315*** (0.08)	-0.266*** (0.05)	-0.400*** (0.05)
Creditworthiness down		0.400*** (0.06)	-0.840*** (0.05)	-0.356*** (0.05)		0.413*** (0.06)	-0.836*** (0.05)	-0.356*** (0.05)		0.418*** (0.06)	-0.833*** (0.05)	-0.349*** (0.05)
Observations	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058
Pseudo R-squared	0.140	0.140	0.140	0.140	0.142	0.142	0.142	0.142	0.148	0.148	0.148	0.148
Firm’s size and age controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES				
Country*Time dummies									YES	YES	YES	YES

<i>Panel B</i>												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Applied	Did_not_apply_b	Did_not_apply_b	Did_not_apply_f	Applied	Did_not_apply_b	Did_not_apply_b	Did_not_apply_f	Applied	Did_not_apply_b	Did_not_apply_b	Did_not_apply_f

		ecause_of_possib l	ecause_of_suffici l	or_other_reasons		ecause_of_possib l	ecause_of_suffici l	or_other_reasons		ecause_of_possib l	ecause_of_suffici l	or_other_reasons
<b>Female</b>	(base)	<b>0.301***</b> (0.07) [0.063]	<b>0.120**</b> (0.05) [0.471]	<b>0.125**</b> (0.05) [0.199]	(base)	<b>0.296***</b> (0.08) [0.063]	<b>0.119**</b> (0.05) [0.471]	<b>0.127**</b> (0.05) [0.199]	(base)	<b>0.299***</b> (0.07) [0.063]	<b>0.116**</b> (0.05) [0.471]	<b>0.125**</b> (0.05) [0.199]
<b>Control of corruption</b>		<b>-1.679***</b> (0.42)	<b>-0.425</b> (0.29)	<b>-0.710**</b> (0.34)		<b>-1.223**</b> (0.49)	<b>0.142</b> (0.31)	<b>-0.566</b> (0.37)		<b>-1.394*</b> (0.78)	<b>0.223</b> (0.36)	<b>-1.059**</b> (0.42)
GDP growth						0.075*** (0.03)	0.025 (0.02)	-0.049*** (0.02)				
Trade freedom						-0.062 (0.07)	0.143*** (0.04)	-0.068* (0.04)				
Rule of law						-4.004*** (1.05)	-1.036 (0.69)	-0.656 (0.72)				
Domestic credit by banks						0.027*** (0.00)	-0.005 (0.00)	0.009** (0.00)				
GGGI						-9.207** (3.75)	-0.937 (2.28)	-6.565*** (2.46)				
Concentration						-0.262 (2.69)	2.703 (1.97)	4.602** (2.07)				
Demand up		-1.079*** (0.06)	-2.909*** (0.05)	-2.171*** (0.05)		-1.093*** (0.06)	-2.911*** (0.05)	-2.173*** (0.05)		-1.100*** (0.06)	-2.922*** (0.05)	-2.174*** (0.05)
Demand down		-0.171* (0.09)	-0.329*** (0.05)	-0.386*** (0.06)		-0.167* (0.09)	-0.329*** (0.05)	-0.386*** (0.06)		-0.173* (0.09)	-0.328*** (0.05)	-0.382*** (0.06)
Profit up		-0.107 (0.09)	0.004 (0.05)	-0.157*** (0.06)		-0.115 (0.09)	0.002 (0.05)	-0.161*** (0.06)		-0.135 (0.09)	0.001 (0.05)	-0.161*** (0.06)
Profit down		0.193*** (0.07)	-0.095** (0.04)	0.140*** (0.05)		0.192*** (0.07)	-0.088** (0.04)	0.135*** (0.05)		0.186*** (0.07)	-0.092** (0.04)	0.134*** (0.05)
Creditworthiness up		-0.348*** (0.08)	-0.264*** (0.05)	-0.397*** (0.05)		-0.338*** (0.08)	-0.265*** (0.05)	-0.395*** (0.05)		-0.315*** (0.08)	-0.266*** (0.05)	-0.400*** (0.05)
Creditworthiness down		0.411*** (0.06)	-0.835*** (0.05)	-0.353*** (0.05)		0.420*** (0.06)	-0.834*** (0.05)	-0.356*** (0.05)		0.418*** (0.06)	-0.833*** (0.05)	-0.349*** (0.05)
Observations	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058
Pseudo R-squared	0.139	0.139	0.139	0.139	0.141	0.141	0.141	0.141	0.148	0.148	0.148	0.148
Firm's size and age controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country*Time dummies									YES	YES	YES	YES

**Table 4:** The impact of gender on the non-application reasons – Two-step multinomial logistic analysis

This table displays regression results of the final stage of the two-step multinomial logistic model discussed in Section 3.4.2, concerning the impact of gender on the reasons for not applying to bank credit. The estimation period is 1st July 2009 – 31st March 2014 (from the second to the tenth of the SAFE waves). The dependent variable – which is also described in Section 3.2 – is a variable that equals one/two/three/four if a firm applied/did not apply because of possible rejection/did not apply because of sufficient internal funds/did not apply for other reasons during the past six months, respectively. Here, the variable **Female** contains predicted values of the Female dummy obtained from an unreported first step logistic estimation. Panel A (Panel B) controls for a country’s level of corruption by including, as regressor, “Freedom from corruption” (“Control of corruption”). Although not reported, all regressions include controls for the firm’s demand for credit, profitability, creditworthiness, size, and age. Additionally, regressions in Columns 5–8 include a vector of country-level controls (i.e., GDP growth, Trade freedom, Rule of law, Domestic credit by banks, GGGI, Concentration). See Table A1 in the Appendix for all variable definitions and sources. All regressions use sampling weights that adjust the sample to be representative of the population. Additionally, regressions in Columns 1–8 include country and time dummies; whereas regressions in Columns 9–12 include country\*time dummies. Heteroskedasticity-robust standard errors appear in parentheses. Intercepts are included but not reported. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level.

<i>Panel A</i>												
VARIABLES	(1) Applied	(2) Did_not_apply_b ecause_of_possib l	(3) Did_not_apply_b ecause_of_suffici	(4) Did_not_apply_f or_other_reasons	(5) Applied	(6) Did_not_apply_b ecause_of_possib l	(7) Did_not_apply_b ecause_of_suffici	(8) Did_not_apply_f or_other_reasons	(9) Applied	(10) Did_not_apply_b ecause_of_possib l	(11) Did_not_apply_b ecause_of_suffici	(12) Did_not_apply_f or_other_reasons
<b>Female</b>	(base)	<b>0.865***</b> (0.33)	<b>4.004***</b> (0.91)	<b>3.516***</b> (0.57)	(base)	<b>0.681*</b> (0.38)	<b>3.977***</b> (0.93)	<b>3.528***</b> (0.58)	(base)	<b>0.675*</b> (0.40)	<b>3.955***</b> (0.95)	<b>3.466***</b> (0.61)
<b>Freedom from corruption</b>		<b>-0.083**</b> (0.03)	<b>-0.025**</b> (0.01)	<b>-0.017</b> (0.01)		<b>-0.079**</b> (0.03)	<b>-0.031***</b> (0.01)	<b>-0.002</b> (0.01)		<b>-0.067***</b> (0.00)	<b>0.016***</b> (0.00)	<b>-0.046***</b> (0.00)
Country-level controls					YES	YES	YES	YES		YES	YES	YES
SAFE controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	57,885	57,885	57,885	57,885	57,885	57,885	57,885	57,885	57,885	57,885	57,885	57,885
Pseudo R-squared	0.129	0.129	0.129	0.129	0.131	0.131	0.131	0.131	0.136	0.136	0.136	0.136
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES				
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES				
Country*Time dummies									YES	YES	YES	YES
<i>Panel B</i>												
VARIABLES	(1) Applied	(2) Did_not_apply_b ecause_of_possib l	(3) Did_not_apply_b ecause_of_suffici	(4) Did_not_apply_f or_other_reasons	(5) Applied	(6) Did_not_apply_b ecause_of_possib l	(7) Did_not_apply_b ecause_of_suffici	(8) Did_not_apply_f or_other_reasons	(9) Applied	(10) Did_not_apply_b ecause_of_possib l	(11) Did_not_apply_b ecause_of_suffici	(12) Did_not_apply_f or_other_reasons
<b>Female</b>	(base)	<b>0.812**</b> (0.38)	<b>3.993***</b> (0.93)	<b>3.493***</b> (0.60)	(base)	<b>0.654*</b> (0.41)	<b>3.980***</b> (0.94)	<b>3.517***</b> (0.59)	(base)	<b>0.675*</b> (0.40)	<b>3.955***</b> (0.95)	<b>3.466***</b> (0.61)
<b>Control of corruption</b>		<b>-1.729</b> (1.23)	<b>-0.464</b> (0.41)	<b>-1.060***</b> (0.34)		<b>-1.600*</b> (0.91)	<b>0.066</b> (0.46)	<b>-1.055***</b> (0.29)		<b>-1.573***</b> (0.07)	<b>0.384***</b> (0.05)	<b>-1.094***</b> (0.06)
Country-level controls					YES	YES	YES	YES		YES	YES	YES
SAFE controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	57,885	57,885	57,885	57,885	57,885	57,885	57,885	57,885	57,885	57,885	57,885	57,885
Pseudo R-squared	0.129	0.129	0.129	0.129	0.130	0.130	0.130	0.130	0.136	0.136	0.136	0.136
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES				
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES				
Country*Time dummies									YES	YES	YES	YES

**Table 5:** The impact of corruption on the female-led firm's non-application reasons

This table displays regression results for the multinomial logistic model presented in Section 3.4.1, where we assess whether corruption influences female-led firms' decision not to apply for bank credit. The estimation period is 1st July 2009 – 31st March 2014 (from the second to the tenth of the SAFE waves). The dependent variable – which is also described in Section 3.2 – is a variable that equals one/two/three/four if a firm applied/did not apply because of possible rejection/did not apply because of sufficient internal funds/did not apply for other reasons during the past six months, respectively. **Female** is a dummy that equals one if the firm's owner/director/CEO is female, and zero otherwise. Panel A (Panel B) controls for a country's level of corruption by including, as regressor, mean-centred values – to avoid multicollinearity with its interactions – of “Freedom from corruption” (“Control of corruption”). Although not reported, all regressions include controls for the firm's demand for credit, profitability, creditworthiness, size, and age. Additionally, regressions in Columns 5–8 include a vector of country-level controls (i.e., GDP growth, Trade freedom, Rule of law, Domestic credit by banks, GGGI, Concentration). See Table A1 in the Appendix for all variable definitions and sources. All regressions use sampling weights that adjust the sample to be representative of the population. Additionally, regressions in Columns 1–8 include country and time dummies; whereas regressions in Columns 9–12 include country\*time dummies. Heteroskedasticity-robust standard errors appear in parentheses. Intercepts are included but not reported. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level.

<i>Panel A</i>												
	(1) Applied	(2) Did_not_apply_b ecause_of_possib l	(3) Did_not_apply_b ecause_of_suffici	(4) Did_not_apply_f or_other_reasons	(5) Applied	(6) Did_not_apply_b ecause_of_possib l	(7) Did_not_apply_b ecause_of_suffici	(8) Did_not_apply_f or_other_reasons	(9) Applied	(10) Did_not_apply_b ecause_of_possib l	(11) Did_not_apply_b ecause_of_suffici	(12) Did_not_apply_f or_other_reasons
<b>Female</b>	(base)	<b>0.315***</b> (0.08)	<b>0.118**</b> (0.05)	<b>0.120**</b> (0.06)	(base)	<b>0.309***</b> (0.08)	<b>0.117**</b> (0.05)	<b>0.122**</b> (0.06)	(base)	<b>0.313***</b> (0.08)	<b>0.115**</b> (0.05)	<b>0.119**</b> (0.06)
<b>Freedom from corruption</b>		<b>-0.092***</b> (0.01)	<b>-0.023***</b> (0.01)	<b>-0.012</b> (0.01)		<b>-0.093***</b> (0.02)	<b>-0.025**</b> (0.01)	<b>0.012</b> (0.01)		<b>-0.060*</b> (0.03)	<b>0.010</b> (0.02)	<b>-0.045**</b> (0.02)
Female * Freedom from corr.		0.004 (0.01)	-0.002 (0.00)	-0.002 (0.00)		0.004 (0.01)	-0.002 (0.00)	-0.002 (0.00)		0.004 (0.01)	-0.002 (0.00)	-0.002 (0.00)
Country-level controls					YES	YES	YES	YES				
SAFE controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058
Pseudo R-squared	0.140	0.140	0.140	0.140	0.142	0.142	0.142	0.142	0.148	0.148	0.148	0.148
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES				
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES				
Country*Time dummies									YES	YES	YES	YES
<i>Panel B</i>												
	(1) Applied	(2) Did_not_apply_b ecause_of_possib l	(3) Did_not_apply_b ecause_of_suffici	(4) Did_not_apply_f or_other_reasons	(5) Applied	(6) Did_not_apply_b ecause_of_possib l	(7) Did_not_apply_b ecause_of_suffici	(8) Did_not_apply_f or_other_reasons	(9) Applied	(10) Did_not_apply_b ecause_of_possib l	(11) Did_not_apply_b ecause_of_suffici	(12) Did_not_apply_f or_other_reasons
<b>Female</b>	(base)	<b>0.310***</b> (0.08)	<b>0.120**</b> (0.05)	<b>0.124**</b> (0.06)	(base)	<b>0.306***</b> (0.08)	<b>0.119**</b> (0.05)	<b>0.126**</b> (0.06)	(base)	<b>0.308***</b> (0.08)	<b>0.116**</b> (0.05)	<b>0.124**</b> (0.06)
<b>Control of corruption</b>		<b>-1.689***</b> (0.42)	<b>-0.420</b> (0.29)	<b>-0.709**</b> (0.34)		<b>-1.235**</b> (0.49)	<b>0.146</b> (0.31)	<b>-0.564</b> (0.37)		<b>-1.404*</b> (0.78)	<b>0.226</b> (0.36)	<b>-1.058**</b> (0.42)
Female * Control of corr.		0.074 (0.11)	-0.047 (0.07)	-0.013 (0.08)		0.083 (0.11)	-0.044 (0.07)	-0.018 (0.08)		0.075 (0.11)	-0.033 (0.07)	-0.016 (0.08)
Country-level controls					YES	YES	YES	YES				
SAFE controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058	60,058
Pseudo R-squared	0.139	0.139	0.139	0.139	0.141	0.141	0.141	0.141	0.148	0.148	0.148	0.148
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES				
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES				
Country*Time dummies									YES	YES	YES	YES

## Appendix

**Table A1:** Variable descriptions and sources

Variables	Description	Source
<i>Dependent variable</i>		
Applying for bank loans	Variable that equals one/two/three/four if (considering the bank loans) a firm applied/did not apply because of possible rejection/did not apply because of sufficient internal funds/did not apply for other reasons during the past six months, respectively.	ECB: SAFE
<i>Key variable</i>		
Female	Dummy variable that equals one if the firm's owner/director/CEO is female, and zero otherwise.	ECB: SAFE
<i>Corruption</i>		
Freedom from corruption	The higher the level of corruption, the lower the level of overall economic freedom and the lower a country's score.	Heritage Foundation
Control of corruption	The higher the level of corruption, the lower a country's score.	Worldwide Governance Indicators
<i>Country-level controls</i>		
GDP growth	The annual growth rate of real GDP based on averages of quarterly data for each survey round.	OECD
Trade freedom	A measure of a country's trade freedom.	Heritage Foundation
Rule of law	An indicator that reflects the perceptions about the quality of contract enforcement and property rights.	Worldwide Governance Indicators
Domestic credit by banks	The share of domestic credit provided to the private sector by banks, as percentage of GDP.	World Bank
GGGI	An index designed to measure a country's gender equality.	World Economic Forum
Concentration	The Herfindahl index (HI) of total assets concentration (for the banking sector).	ECB: Data Warehouse
<i>Firm-level (SAFE) controls</i>		
Demand up	Dummy variable that equals one if a firm's needs of bank loan increased in the past six months.	ECB: SAFE
Demand down	Dummy variable that equals one if a firm's needs of bank loan decreased in the past six months.	ECB: SAFE
Profit up	Dummy variable that equals one if a firm experienced an increase of the net income after taxes in the past six months.	ECB: SAFE
Profit down	Dummy variable that equals one if a firm experienced a decrease of the net income after taxes in the past six months.	ECB: SAFE
Creditworthiness up	Dummy variable that equals one if the firm's credit history improved in the past six months.	ECB: SAFE
Creditworthiness down	Dummy variable that equals one if the firm's credit history worsened in the past six months.	ECB: SAFE
Micro	Dummy variable that equals one if the firm has between 1 and 9 employees.	ECB: SAFE
Small	Dummy variable that equals one if the firm has between 10 and 49 employees.	ECB: SAFE
Medium	Dummy variable that equals one if the firm has between 50 and 249 employees.	ECB: SAFE
Very recent	Dummy variable that equals one if the firm is less than 2 years old.	ECB: SAFE
Recent	Dummy variable that equals one if the firm is between 2 and 5 years old.	ECB: SAFE
Old	Dummy variable that equals one if the firm is between 5 and 10 years old.	ECB: SAFE