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Is There a Gender Effect on the Cost of Bank Financing?[1]

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Abstract

In this paper, we address the question of whether the gender of a firm's leader affects the cost of bank funding faced by small and medium enterprises in Europe. Using a large sample of observations of non-financial firms, during the years 2009-2013, we empirically test for the presence of discrimination, comparing female-led and male-led firms. After controlling for a rich set of variables and addressing potential endogeneity, our results show that *i*) female-led enterprises are more likely to face worse price conditions for bank financing compared to their male-led counterparts and, *ii*) firms whose leadership changes from female to male are more likely to benefit from an improvement in interest rate levels. This evidence is robust to different model specifications and various methodological approaches. The existence of such bias in the credit markets highlights the need of policy measures addressing female-led businesses, thus reducing their bank financing burdens and enhancing their entrepreneurial opportunities.

JEL classification: D22, G21, G32, J16

Keywords: Cost of funding, Gender discrimination, Bank lending, SMEs

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1. Introduction and literature review

The access conditions to a broad range of financial services, and the level of the related costs, are pivotal to the survival and the development of firms. Indeed, small- and medium-sized enterprises (SMEs) heavily rely on bank credit as their main source of financing as they are generally unable to access equity markets (Caglayan and Xu, 2016; Inklaar et al., 2015; Kremp and Sevestre, 2013; Moro and Fink, 2013; Vermoesen et al., 2013). Therefore, the issue of credit access is considered crucial by policy makers and researchers (Berger and Udell, 2006; Cole and Sokolyk, 2016; Kirschenmann, 2016), given that SMEs dominate the business landscape in Europe and are the main drivers of employment, growth, and innovation in the European economy (Degryse and Van Cayseele, 2000; De Kok et al., 2011; Ferreira Filipe et al., 2016; Popov and Udell, 2012). In addition, it is worth noting that SMEs have a harder time than larger firms in obtaining credit (Beck et al., 2010). This is mainly due to their intrinsic lack of ability to produce high quality collateral and a lack of transparency related to their creditworthiness (Cowan et al., 2015; Fredriksson and Moro, 2014; Öztürk and Mrkaic, 2014; Pigini et al., 2016; Vos et al., 2007). In particular, the availability of information is important to banks, as it eases the selection of the borrowers by reducing moral hazard and adverse selection risks (Berger and Udell, 1995; Berger and Udell, 2002; Diamond, 1984). Moreover, credit obstacles tend to be more severe during times of financial distress, thus leading to the phenomena of credit rationing and suboptimal lending to SMEs (Agénor and Pereira da Silva, 2017; Carbo-Valverde et al., 2015; Popov and Udell, 2012; Popov and Van Horen, 2015; Tayler and Zilberman, 2016).

A significant body of the literature underscores that difficulties in access to bank credit can be even greater for female-led firms,[3] and this, in turn, affects their investment opportunities (World Bank, 2011). This branch of the literature examines such problems from both the demand and the supply side. In particular, from the demand side the literature recognizes that female borrowers may self-restrain – thus not applying for credit – because women *i*) tend to be more risk-averse and less confident than men (Croson and Gneezy, 2009), *ii*) exhibit a lower propensity towards indebtedness (Marlow and Carter, 2006), and *iii*) are more cautious in regards to financial choices (Barber and Odean, 2001). From the supply perspective, the literature highlights the existence of possible frictions by the lenders against women-led enterprises. As a consequence, female firms may face *i*) higher rates of rejection (Cavalluzzo et al., 2002), *ii*) lower credit availability (Bellucci et al., 2010), *iii*) worse price terms and conditions (Coleman, 2000; Alesina et al., 2013).

Although the literature that scrutinizes the demand side is quite unanimous in recognizing that women generally tend to self-restrain, more than men, from applying for credit (among others, see Cole and Mehran, 2011; Coleman, 2000; Coleman and Robb, 2009; Moro et. al, 2017; Treichel-Zimmerman and Scott, 2006), the evidence from the supply side is mixed. For instance, Aristei and Gallo (2016) using 28 transitional European countries find signs of gender-based discrimination against female-led firms in terms of credit access. Bellucci et al. (2010), using Italian data, observe that female-owned businesses are disadvantaged vis-à-vis their male counterparts in terms of collateral requirements and credit availability. Cavalluzzo et al. (2002) find evidence in support of greater rates of loan denials for female-led firms. In contrast, Asiedu et al. (2012), Blanchflower et al. (2003), as well as Moro et al. (2017) indicate that female firms are

[3] Apart from the gender issues in access to credit, there is ample literature in the fields of sociology, psychology, and economics that draws attention to the existence of possible gender differences in terms of attitudes towards risk (see, for instance, Croson and Gneezy, 2009; Francis et al., 2014; Francis et al., 2015).

not discriminated against in access to bank credit. Similarly, Cavalluzzo and Cavalluzzo (1998) observe that female-led SMEs are treated equally compared to their male counterparts in terms of loans approval rates.

It is worth mentioning here that the issue of gender discrimination is not a novelty in the literature, as it has received considerable attention for decades. Indeed, two main types of discrimination have been depicted: *taste-based or prejudicial discrimination* and *statistical discrimination*. The former is not motivated by any economic reason – meaning that female- and male-led firms are perfect substitute in terms of credit risk – but, rather, based on lender preferences and beliefs about the gender itself (Becker, 1957). The latter occurs in situations characterized by imperfect information, where the collection of information on the firm's productivity or creditworthiness is difficult and costly to uncover. Therefore, in these circumstances, it is easier to infer the necessary information by observable demographic characteristics of individuals – and gender can be one of those (Aristei and Gallo, 2016; Bellucci et al., 2010; Blanchard et al., 2008; Moro, 2009).

Departing from this literature stream, our contribution is to shed additional light on the possible existence of gender discrimination in the bank credit market in the Euro-area by focusing on the change in the cost of bank financing (i.e., the change in the interest rates and other costs) for female- versus male-led firms when the loans files have been approved by the lenders. We address this issue by relying on 19,969 observations related to a sample of SMEs chartered in 11 Euro-area countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain) for the period 2009-2013. To this end, we utilize the European Central Bank (ECB) Survey on the Access to Finance of Enterprises (SAFE) dataset. This survey provides – on a bi-annual basis since 2009 – comparable, timely, and

frequent financial information, as well as a series of firm characteristics about SMEs in the European Union.

Specifically, our research relates to the literature that studies the effects of gender on the cost of financing borne by enterprises. A lack of consensus in terms of empirical findings has also emerged from this niche of the literature. For example, Coleman (2000) observes that lenders apply higher price conditions to women than men. Muravyev et al. (2009), using the BEEPS Survey on a sample of Western and Eastern transitional European economies, find that female-led firms are charged higher interest rates than male-led firms. Alesina et al. (2013), focusing on data about Italian firms, investigated the issue as well. After controlling for the structure of the banking industry, the degree of competition and the presence of small banks, for which fiduciary and personal relationships with the clients matter – thus, possibly favoring female firms – they find that women pay higher interest rates within any structure of the banking industry. In contrast, Francis et al. (2013) – based on US data – observe that companies controlled by female CFOs benefit from lower prices in their bank funding than their male-CFO controlled counterparts – based on their reliability in providing accounting data and their lower default risk. Similarly, Asiedu et al. (2012) document that women in the US pay lower interest rates than men. Finally, there is also a series of studies that report that female-led enterprises are not discriminated against in terms of their credit price conditions (e.g., Bellucci et al., 2010; Cavalluzzo and Cavalluzzo, 1998; Cavalluzzo et al., 2002).

While those studies investigated the issue of cost disparities in credit access by focusing on either a single country or on a cross-country environment employing different datasets, this paper is the first attempt to test for the existence of gender discrimination by looking at the change in the cost of bank financing utilizing the SAFE. More precisely, our contribution to the literature is

threefold. First, we examine the impact of the gender of the SME's leadership on the change in the cost of bank financing by employing the comprehensive survey from the European Central Bank. Second, and more importantly, we investigate this issue in depth by looking at the effects determined by variations in leadership gender. Third, causality and endogeneity problems are properly addressed.

Hence, the hypotheses we test in this study are two. First, we test whether female-led firms perceive a form of discrimination in price-terms and conditions of bank financing compared to male-led counterparts.

H_1: Female-led firms are more likely to experience worse price terms and conditions for bank financing than their male-led counterparts.

Second, we investigate whether a change in the leadership gender of a firm affects the shift in the cost of bank financing faced by the enterprises in our sample.

H_2: A change in leadership – from male to female (from female to male) – engenders a deterioration (an improvement) in price terms and conditions of bank financing.

To the best of our knowledge, the idea to test for such a hypothesis represents an important novelty in the literature. In other words, we are able to provide a conclusive test on the existence of possible gender discrimination in bank financing by employing a model that takes into account the variations of the firm leader's gender over time.

Although we acknowledge that the SAFE only provides data based on interviews and, as such, lacks balance sheet data, we are able – by exploiting the information from the survey – to control for an ample series of firm financial indicators and firm characteristics. Therefore, given the information available in our dataset, we try our best to discern from some types of statistical discrimination by controlling for a series of SMEs characteristics, such as sector of activity, age,

size, change in leverage, profit, and credit history, and in collateral or personal guarantees. However, we are aware that other possible statistical discrimination stemming from the lender side may be out of our control as it may result from specific information characterizing the bank-firm relationship (e.g., any sort of risk factors only observable by the bankers).

Ascertaining a causal relationship between the leader's gender and the change in the cost of bank financing, however, is a demanding task. Indeed, the gender of the firm leader might not be entirely exogenous (inter alia, Adams and Ferreira, 2009; Campbell and Vera, 2010; Pathan and Faff, 2013; Liu et al., 2014). Potentially, two sources of endogeneity may bias our estimates, namely, omitted variables and reverse causality. As regards the former, we acknowledge that omitted unobservable firm characteristics may have an impact on our estimates. In other words, there could be unobservable factors, such as corporate culture, which could simultaneously influence the decision regarding the firm leader to be hired, the performance of the firm, and, as a result, the cost of bank financing. With regards to the latter, instead, this source of endogeneity may especially affect our estimates related to the second hypothesis. Here, the concern arises because the change in leadership gender might not be a completely exogenous event. Indeed, because of their peculiarities – that is, higher attendance at boards, better monitoring abilities, greater aptitude in solving conflicts (see, for instance, Adams and Ferreira, 2009) – women may be more likely to be appointed when firms are in a critical condition (see Adams and Ferreira, 2009; Campbell and Vera, 2010). To formally address these potential endogeneity issues we employ a variety of econometric techniques such as instrumental variable (IV) methods and two-step system generalized methods of moments (GMM) approach.

Overall, our results support the existence of gender differences associated with a change in the price conditions of bank financing faced by female-led enterprises compared to male-led

ones. This evidence holds for both changes in interest rates and other costs (e.g., fees and commissions). Moreover, results are robust to different model specifications and remain statistically significant after correcting for the endogeneity issue. Additionally, our analysis shows that firms whose leadership changes from female to male are more likely to benefit from an improvement in interest rates. This result still holds when we address the potential reverse causality problem. Interestingly, such evidence is not inconsequential as it further proves the existence of gender discrimination against female-run businesses in the credit markets.

The rest of this paper is organized as follows. In Section 2, we present the data and the methodology. In Section 3, we discuss the empirical results and provide some additional analyses. Finally, Section 4 concludes.

2. Data and methodology

2.1 Data

To test our research questions, we use the SAFE,[4] which is administrated by the European Central Bank and the European Commission and is systematically run every six months involving a limited number of Euro-area countries (i.e., Austria, Belgium, France, Finland, Germany, Greece, Italy, Ireland, the Netherlands, Portugal, and Spain).[5] Starting in 2009, and on a bi-annual basis, this survey gathers information about access to financing for SMEs as well as a series of firm characteristics (e.g., size, age, sector, profit, credit history, and manager's gender). The firms interviewed are non-financial firms; however, enterprises in agriculture, public administration, and financial services are intentionally excluded from the survey. The enterprises in the survey are

[4] The survey is available at: https://www.ecb.europa.eu/stats/money/surveys/sme/html/index.en.html
[5] The smallest countries (i.e., those that represent less than 3% of the total number of employees in the Euro-area) are excluded from the survey, as they would only marginally affect the results.

randomly chosen from the Dun & Bradstreet Business Register. The related sample is stratified by country, firm size, and activity. More specifically, our main analysis relies on 19,969 observations obtained by pooling together 9 waves of the SAFE (i.e., from the 2nd to the 10th wave), related to SMEs chartered in 11 Euro-area countries for the period 2009-2013.

Table 1 shows our sample observations by country, as well as the observations of female-led firms by country, with France, Spain, and Italy displaying the highest numbers.

TABLE 1 HERE

Interestingly, the Netherlands has the lowest share of female-led firms (6% of the total Dutch firms interviewed). In contrast, female-led respondents represent 12.6% of the total firms interviewed in Portugal. Overall, female-led enterprises cover about 11% of the sample. This very low share of female-led businesses throughout the sample may be explained by the difficulties encountered by women in reaching top managerial positions (Bush, 2011; Grosvold, 2011).

2.2 Dependent variables

We rely on the information about price terms and conditions of bank financing provided by the respondents to test our hypotheses. In particular, the SAFE collects information on *i*) the level of interest rates, and on *ii*) the level of the cost of financing other than interest rates (e.g., fees and commissions).[6]

Our dependent variables are qualitative and ordinal and are based on the following question: "For each of the above mentioned terms and conditions, could you please indicate whether they

[6] The SAFE also provides information on non-price terms and conditions of bank financing – namely, *i*) the available size of the loan or credit line, *ii*) the available maturity of the loan, *iii*) the collateral requirements, and *iv*) other (e.g., loan covenants, required guarantees), which, however, are not the object of our investigation.

increased, remained unchanged, or decreased over the past 6 months?" The answers in the SAFE dataset were originally coded 1/2/3 for increased/unchanged/decreased, respectively.[7] However, we recoded them as 1/2/3, for decreased/unchanged/increased, in order to make our dependent variables easier to intuitively interpret. In fact, since the labeling is ordinal, any monotonic transformation of the labels gives an equally valid labeling (Öztürk and Mrkaic, 2014).

Table 2 shows the observations by manager gender of the outcomes of our dependent variables. In Panel A, we observe that only 14% of female-led firms experienced a decrease in the level of interest rates, whereas male-led firms benefiting from lower costs of financing amounted to more than 17%. Nonetheless, we find that around 48% of both male- and female-led firms faced higher interest rates during the observed period. In contrast, in Panel B we note that a larger share of female-led firms (about 56%) faced higher other costs of financing (in terms, for example, of bank fees and commissions) compared to male-led counterparts (about only 52%).

TABLE 2 HERE

2.3 Gender dummies

The survey provides information about the gender of the owner, director, or CEO of the firm in the 2nd to the 10th waves (i.e., from July 1, 2009, to March 31, 2014).[8] This allows us to generate a dummy that is the key part of our empirical analysis. In particular, we create *Female* that is a dichotomous variable equal to one if the owner/director/CEO of the firm is female, and zero otherwise.

[7] Answers coded with 9 (N.A.) were disregarded.

[8] We exclude from our analysis the first wave of the survey, as the gender information is limited to firms with a unique owner. Additionally, although available, we had to exclude the waves from 11 onwards as the information on the manager's gender was no longer collected.

Additionally, by exploiting the panel structure of our dataset, we are able to keep track of possible changes in management – in terms of gender – at the firm level. Namely, we capture changes in leadership by using the first difference of our female dummy, that is ($Female_{it} - Female_{it-1}$). The possible outcomes of this first differentiation are three, namely, "–1" if a firm changed from female to male leadership, "0" if a company did not change its leadership gender, and "+1" if an enterprise changed from male to female leadership. On the basis of these outcomes, we generate two dichotomous variables, namely, *Female-to-Male* when the first difference is equal to –1, and *Male-to-Female* when the first difference is instead equal to +1. It is worth noting that the panel structure provided by the SAFE is relatively complex: while the number of observations is fairly large, the number of firms that were repeatedly interviewed in more than one wave of the survey is very limited due to the random selection process characterizing the survey. Therefore, given the unbalanced nature of our dataset, when first-differencing the female dummy, numerous missing values are generated; for this reason, we only obtain 5,915 observations of *Male-to-Female* and *Female-to-Male* dummies.

2.4 Econometric strategy and control variables

As described in Section 1, the aim of our investigation is to provide evidence of possible discrimination between female- and male-led firms in the Euro-area credit markets by testing two hypotheses.

To test the first hypothesis (H_1), we estimate an ordered logit model, as our dependent variables are qualitative and ordinal, and study the impact on the level of the cost of bank financing attributable to the manager's gender. More specifically, we study the probability that a female-led firm will report at time *t* that its bank financing price conditions are in one of the

three classes (decreased/unchanged/increased) depicted by our dependent variables. As in Öztürk and Mrkaic (2014), this technique allows the use of both continuous and categorical variables as covariates. As mentioned earlier, we utilize a sample of 19,969 observations. Calibrated weights are employed to adjust the sample to be representative of the population from which it is extracted (as in Ferrando et al., 2017). Standard errors are corrected for heteroskedasticity as well as clustered at the country-level to remove possible bias in the estimations. More formally, the general specification of our model is the following:

$$\Pr(CBF_{it}) = F(\alpha\, Female_{it} + \beta X_{it} + \gamma Q_{it} + \psi K_{it} + \delta Z_{jt} + \theta B_{jt} + \vartheta C_j + \mu T_t) \quad (1)$$

where *i* depicts the firm, *j* the country, and *t* the time. The cost of bank financing (*CBF*) indicates the change in either interest rates or other costs in the past six months. *Female* is our dummy that captures the impact of the manager's gender on the change in the bank financing costs. X_{it} is a vector of standard firm controls, namely, size, age, and sector; this vector also includes controls for public support to SMEs that we employ as supplementary covariates in a test discussed in the robustness section of the paper. Q_{it} is a vector of additional firm controls accounting for the respondents' answers about perceived changes in risk, profitability, and credit history. K_{it} controls for some non-price conditions of bank financing (i.e., available maturity of the loan and collateral requirements). Z_{jt} is a vector of macroeconomic controls, namely, GDP growth, rate of inflation, and rate of unemployment. B_{jt} is a vector accounting for some banking market indicators invariant at the firm level (i.e., non-performing loans over gross loans (NPL ratio), change in the cost of credit, market share of cooperatives, banks' lending activities (BLS), and

the level of banking concentration). C_j is a vector of 11 country dummies. T_t controls for the time effects (i.e., the survey waves) across the observed period. All variable descriptions and sources are provided in detail in Table A1 in the Appendix.

The coefficient of interest in our analyses is alpha, which refers to the *Female* dummy. Our hypothesis on the existence of gender differences would imply a positive alpha. All the controls at the firm and country level, together with the dummies accounting for country and time effects, should reduce any endogeneity problems which may arise from the data. Specifically, the standard firm-specific controls (X_{it}) should reduce the potential source of endogeneity by capturing the independent impact of firm-level heterogeneity related to size, age, and sector. The inclusion of those variables is aimed at alleviating possible concerns that the variations in the cost of credit may be driven by firm specific characteristics rather than the existence of gender differences.

Table 3 reports the summary statistics of the variables employed in our analysis. In particular, we observe that micro, small, and medium firms[9] account for around 26%, 34%, and 30% of our sample observations, respectively.

TABLE 3 HERE

The additional controls (the vector Q_{it}) for the change in risk, profitability, and creditworthiness at the firm level, which all come from the SAFE, are also meant to reduce the effect of potential sources of bias that could affect our hypotheses. In particular, the variables *leverage up* and *leverage down* capture how a borrower's balance sheet affects the cost of funding. These variables indicate whether the debt-to-asset ratios have increased or decreased over the past six months. Using the SAFE information, we create these two dummies: *leverage up* equals

[9] We utilize the standard definition of firm size provided by the SAFE and widely employed in the literature (see, for instance, Lawless et al., 2015).

one if the firm declares that over the past six months leverage has increased; *leverage down* equals one if the firm declares that over the past six months leverage has decreased. We expect enterprises that have increased their debt-to-assets ratios to be more penalized than those who have reduced their leverage positions because of the implied increase in the level of risk. The change in profit captures variations in firm profitability (i.e., net income after taxes) in the previous six months. We would expect that better performing firms could negotiate better terms and conditions for bank credit. Following the same procedure as above, we create the two dummies for the change in profit: *profit up* equals one if the firm declares that over the past six months its profit has increased; and *profit down* equals one if the firm declares that over the past six months its profit has decreased. Finally, we also control for the declared credit history of the firm.[10] We would expect that firms that showed a better creditworthiness over time might gain more bargaining power with the banks, thus benefiting from more favorable financing costs. Again, we create two dummies for the change in firm credit history: *creditworthiness up* equals one if the firm declares that over the past six months its creditworthiness has increased; and *creditworthiness down* equals one if the firm asserts that over the past six months its creditworthiness has decreased. However, these dummies do not capture the level of leverage, profitability, and creditworthiness. Instead, they provide information about the perceived change from the perspective of the surveyed firm in the aforementioned measures. Indeed, the use of such dummies works well as the dependent variable captures the perceived change in the cost of bank financing (rather than the amount itself). An ideal additional control would have been the level of education of the firm's leader. Indeed, the ability to run a business, as well as the self-

[10] We acknowledge here that the variable that we use to proxy for the creditworthiness is not an objective measure of the firm's ability to repay loans (i.e., it does not come from the lender side), rather it is the firm's perception about the changes in its credit history.

confidence in managing financial decisions, are likely related to a manager's skills and education. However, the SAFE does not keep track of such information.

The vector K_{it} includes some controls for the non-price conditions of bank financing that we think play a key role in determining the cost of funding for enterprises. Hence, we control for the time to maturity of the bank loans (similarly to Hasan et al., 2016) because we think this may have an impact on the price conditions of bank financing. Specifically, we employ the dummies *maturity up* and *maturity down* if the enterprises experienced, respectively, an increase or a decrease in the available maturity of the loan in the past six months. Additionally, we keep track an increase (decrease) in the collateral requirements faced by the surveyed firms – in the six months preceding the interview – via the dummy *collateral up* (*collateral down*).

The macro vector Z_{jt} accounts for the general macroeconomic environment that we believe may affect the credit market and the cost of borrowing. We employ here GDP growth (as in Casey and O'Toole, 2014), inflation, and unemployment rates. During a slowdown in the economic cycle, *ceteris paribus,* firms tend to be penalized in terms of credit conditions when accessing formal credit. On the other hand, we expect a positive correlation between the cost of financing and both inflation and unemployment. As the SAFE is conducted on a bi-annual basis, we use, for the macro variables, averages of quarterly data for each survey round (as in Ferrando et al., 2017). In the vector B_{jt} we include five additional country-level controls, namely, the cost of borrowing, the non-performing loans (NPL) ratio, the market share of cooperative banks, the bank credit standards, and the index of bank concentration in each country. In particular, we employ the cost of borrowing for loans to non-financial firms, as well as the ratio of non-performing loans to total gross loans, as these might affect the price-terms and conditions adopted by the banks in a given country for their customers. As the level of non-performing

loans-to-total gross loans represents a measure of credit risk, we think that firms in countries with increasing NPL ratios may be more penalized than those located in safer markets. Our choice to control for the market share of cooperative banks follows a discrete branch of the literature (Albertazzi and Marchetti, 2010; Catturani et al., 2014), highlighting the role of cooperatives in increasing credit quantity and quality in areas characterized by higher social capital. In our case, where the share of cooperative banks is higher, we expect a greater likelihood that a firm turns to a cooperative bank, thus benefiting from better credit conditions.[11] Additionally, we retrieve data regarding the bank credit standards from the Bank Lending Survey (BLS), which is run on a quarterly basis on behalf of the ECB by the national central banks (see, for instance, Moro et al., 2015; Moro et al., 2016; Moro et al., 2017). Specifically, we employ information about bank lending activities to enterprises in the previous three months as a control for bank propensities to lend.[12] We presume that a lower inclination to lend – which may lead to excess demand for loans – might then determine a deterioration in the bank funding costs borne by the firms. Finally, we use the Herfindahl Index (HI) of bank concentration in each country, as we would expect that the structure of the banking industry and the level of competition might have an impact on the firm cost for bank financing.

To check our second hypothesis (H_2), we need to exploit the panel structure of our dataset. The panel dimension is crucial for us to investigate whether changes in leadership gender at the firm level have an impact on the cost of bank financing faced by the SMEs in our sample. Specifically, we test H_2 through the following model:

[11] Better credit conditions offered by cooperative banks should not surprise us given the mutual nature of such organizations.

[12] Since the information on bank credit standards is not available for Finland, for this country we employ the average Euro-area index.

$$\Pr(CBF_{it}) = F(\varphi_1(\text{male to female}) + \varphi_2(\text{female to male}) + \beta X_{it} + \gamma Q_{it} + \psi K_{it} + \delta \Delta Z_j + \theta \Delta B_j + \vartheta C_j + \mu T_t) \quad (2)$$

The variables in this specification – whose vectors are the same as the ones defined for equation (1) – are all first-differenced. Moreover, the key variables capture the changes in leadership both from male to female and from female to male, as defined in Section 2.3. To test our hypothesis of possible discrimination against female-led firms, we expect a positive phi_1, thus implying an increase in the cost of funding when firms undergo a change in leadership from male to female. In contrast, we anticipate a negative phi_2 in a female-to-male change in leadership. Notably, with regards to the methodology, when employing this first-differenced model, all firm-fixed effects are effectively washed away in the first differencing, which makes our estimates very robust.[13] Moreover, consistent with our previous model, we use cluster (at the country-level) robust standard errors to control for possible heteroskedasticity and serial dependence across groups in the error structure.

2.5 Causality and endogeneity

Some contributions in the literature have raised concerns about the potential endogeneity problem between the gender of a firm's leader and the firm's performance (e.g., Adams and Ferreira, 2009; Campbell and Vera, 2010; Pathan and Faff, 2013; Liu et al., 2014). Although we do not directly investigate this relationship, we are aware that the change in the cost of bank financing is likely influenced by firm performance. The presence of this problem may thus affect the interpretation of our inferences. With no attempt to address this endogeneity issue, one

[13] Indeed, the model is conceptually similar to a fixed-effect panel model.

cannot provide evidence of a causal relation. To formally address concerns about causality and endogeneity, we use a variety of econometric strategies.

Starting with H_1, we first include in model (1) an interaction term of the *Female* dummy with a variable accounting for firm performance. The idea is to alleviate concerns that the observed variations in the cost of financing are driven by a deterioration in profit (experienced by a female-led firm), rather than by the possible discrimination itself.

The second strategy is based on the use of an instrumental variable (IV) method. Such technique requires the identification of instruments that satisfy the following two criteria, namely, the instruments *i*) must be correlated with the key explanatory variable, and *ii*) cannot be correlated with the error term. We therefore identify the share of female employment by sector of activity (i.e., construction, manufacturing, mining, wholesale/retail) as a good instrument for our female variable. Such ratios, drawn from Eurostat, are available for each country in our sample and for each survey round (i.e., we compute them as averages of quarterly data). Hence, because *Female* is dichotomous, we employ a dummy endogenous variable model and apply a three-step approach as proposed in Wooldridge (2002) and implemented by Berger et al. (2016). This approach implies the use of a probit model for the first step, where we regress our *Female* dummy on the rate of female employment and all the controls from model (1). The fitted value from the first step is then used as an instrument in the second stage. Thus, the second step is a regression of the endogenous variable *Female* on the predicted probability from the first stage and all the controls. Finally, the third stage is a regression of the change in the cost of bank financing on the predicted value from the second stage and all the controls as in model (1).

In model (2), we deal with the endogeneity problem by employing a two-step system GMM approach (Roodman, 2009), as in Liu at al. (2014) and Pathan and Faff (2013). Indeed, this is a

suitable method *i*) to overcome endogeneity issues arising from reverse causality and possible unobserved factors, and *ii*) to cope with the challenge of identifying proper exogenous instruments for our dummies that capture the change in leadership gender. Similarly to Pathan and Faff (2013), the model now includes one lag of the dependent variable as an additional regressor. Technically, this approach allows us to treat the key dummies and all the explanatory variables as endogenous while using their past values as instruments. More specifically, all the explanatory variables are treated as endogenous with the exception of the country-level regressors and time dummies, as in Wintoki et al. (2012) and Pathan and Faff (2013). Finally, we check the validity of the system GMM inferences by accompanying them with two tests that may detect potential misspecification. The first is a second order autocorrelation test. Because reliable estimates from system GMM are based on the assumption that the model is complete (i.e., a sufficient number of lags has been included), no serial correlation should persist in the error term. The second is the Hansen test of over identifying restrictions. Since the system GMM allows us to use more than one lag of past values as instrumental variables, we need to test the null hypothesis that all instruments are jointly valid.

3. Empirical Results

3.1. Does female leadership affect the change in the cost of bank financing?

3.1.1 Ordered logistic regressions and instrumental variable estimations

To investigate our hypothesis H_1, we employ two main econometric strategies. First, we use an ordered logit model. Second, we employ an instrumental variable approach. The empirical results are presented in Table 4 where we report the coefficients of a variety of specifications related to

equation (1) for the change in the interest rates (Columns 1–3) and the cost of financing other than interest rates (Columns 4–6).

The coefficient of interest here is the one related to the *Female* dummy, which captures the likelihood that a female-led firm – compared to its male-led counterpart – reports, at time *t*, that its price conditions of bank funding are in one of the three classes depicted by the dependent variable. A positive coefficient of this dummy signals that, all else being equal, the female-led firms are more likely to experience a deterioration in the cost of funding than male counterparts.

Looking at the change in the interest rates, Column (1) reports an ordered logit estimate of the basic model (1). The positive and significant coefficient (at the 5% level) of the *Female* dummy seems to highlight the presence of gender disparities in the cost of bank financing across the observed period; that is, female-led firms faced a greater probability than male-led counterparts of reporting an increase in the cost of funding. Because we cannot interpret the magnitude of the ordered logit coefficients,[14] we decide to compute the marginal effects. For the sake of brevity, we only focus on our key variable. Specifically, the marginal effects indicate that female-led firms are 1.2% less likely to experience a decrease in interest rates from the bank, and are 2.6% more likely to face an increase in their costs of bank financing compared to their male-led counterparts.

To alleviate concerns that the observed difference of the change in interest rates between female-led and male-led enterprises is driven by a deterioration of firm performance – rather than a signal of gender discrimination itself – we include an interaction term between our *Female* dummy and a variable accounting for the change in firm profitability. More specifically, because the SAFE is not linked to the firms' balance sheet data, we capture the change in a firm's

[14] The coefficients from an ordered logit regression cannot be read as normal elasticities like the OLS ones.

performance via the declared increase in profitability that we proxy via our *profit up* dummy. The estimates are displayed in Column (2). Although the interaction term is not significant – even though the sum of the three coefficients (i.e., *Female*, *profit up*, and *Female*profit up*) is higher than zero – our *Female* dummy remains positive and significant. This evidence seems to signal that even when female-led firms experience an increase in profit, they are likely to face an increase in interest rates from their lenders, thus highlighting a sign of discrimination.

TABLE 4 HERE

Interesting insights come from the signs of some of the covariates that are used in the estimations as control variables. Starting with the financial firm covariates, the dummy *leverage up* has a positive sign indicating that firms that have increased their leverage over the past six months are more likely to face an increase in interest rates from the bank compared to firms that reported no change or a decline in their leverage ratios. It is also worth noting that the signs of *creditworthiness up* and *down*, as well as *profit down*, are consistent with our expectations and highly significant. The dummies *collateral up* and *down*, and *maturity down* play a significant role as well in determining the change in interest rates borne by enterprises.

Moreover, the coefficients of the covariates related to the banking system indicators are coherent in their signs with the predictions of the model under investigation. More specifically, we detect a negative and highly significant coefficient for the market share of cooperative banks, which suggests that the likelihood that firms may detect an increase in the cost of funding is lower when the market share of cooperative banks is higher. In other words, where cooperative banks cover an important share of the market, there is a higher likelihood that a firm turns to a cooperative bank, thus benefiting from better credit conditions. Consistent with the prediction of the theory, the coefficient of the cost of borrowing is positive and highly significant as well,

indicating that firms are more likely to experience increased financing costs in countries that face positive changes in the costs of borrowing. Additionally, we find that the coefficient of bank concentration has a negative sign, suggesting that firms chartered in more concentrated banking markets are more likely to experience a decrease in bank financing costs. This result, however, is not a novelty in the literature since other contributions have documented similar results explained by the *information hypothesis* (see, for instance, Dell'Ariccia and Marquetz, 2006; Fungáčová et al., 2016; Petersen and Rajan, 1995). In particular, when the bank credit market is competitive, financial institutions are less apt to get information about their customers; therefore they simply charge higher spreads. In contrast, when the banking industry is more concentrated, banks have a higher incentive to accurately scrutinize their borrowers and create durable businesses, which leads them to decrease interest rates – thus favoring the bank's customers (see, in this regard, Alesina et al., 2013).

Although the female coefficient in our estimates turns out to be consistently significant, we are aware that correlation does not imply a causal relationship. We address this issue by implementing a three-step procedure (as in Berger et al., 2016) that includes the use of an IV technique. When implementing the IV method, our sample size decreases to 18,080 observations, as we need to exclude 1,889 observations for which the SAFE does not provide information about the enterprise's main activity.

Following the procedure described in Section 2.5, we report the result of the final stage of our three-step approach in Column (3). As we observe, the instrumented female variable turns out to be positive and highly significant at the 1% level, thus supporting our main finding.[15]

[15] Unreported tests show that results from Columns (1) and (2) are confirmed when we run the same ordered logit regressions on the sample of 18,080 observations (i.e., the same used for the IV estimates) that we obtained by excluding the firms for which we do not have information about their economic activity.

As for the change in the cost of financing other than interest rates (e.g., fees and commissions), we perform analogous tests to the ones about the change in interest rates and report the related results in Columns 4–6 of Table 4. Starting with the ordered logit analysis, results in Columns 4–5 highlight the existence of a positive relation between the *Female* dummy and the change in the cost of financing other than interest rates. Indeed, the *Female* dummy is highly significant (at the 1% level) in both specifications. Moreover, unreported marginal effects show that female-led firms are 4.2% (0.4%) more (less) likely to experience an increase in the cost of bank financing other than interest rates compared to male-led businesses. Finally, results from Column 6 corroborate the existence of a causal effect between gender and the cost of funding when we perform our three-step IV approach.

We now offer insights about unreported additional analyses. Since all the specifications based on model (1) contain a vector of country dummies (C_i), one might worry that such an inclusion may generate collinearity issues with the vector of country invariant controls (e.g., macroeconomic and banking market variables). Hence, we re-estimated all our regressions without the inclusions of the country dummies. The resulting inferences (not reported here for the sake of brevity) corroborate our previous findings.

Furthermore, to overcome the concern that sample-selection might bias our inferences, similarly to Moro et al. (2016), we re-estimate our ordered logit models following the Heckman (1976) approach.[16] Unreported tests indicate that our results are not affected by sample selection bias. Finally, as for the IV estimates, our hypothesis that female-led firms are more likely than male-led ones to experience an increase in the cost of bank financing is also confirmed when we perform panel IV regressions with random effects.

[16] As a matter of fact, because our original dataset includes 61,657 observations and we conduct our estimates on a sub-sample of only 19,969 observations (i.e., those that are not missing the price conditions of bank financing information), one might raise concerns that our results could be affected by sample selection bias.

Overall, our results suggest that female-led firms seem to experience a greater probability of facing worse bank financing costs compared to their male-led counterparts. This evidence is confirmed even after addressing the causality and endogeneity issue. Hence, our findings provide support to the theory of gender discrimination in credit markets and largely corroborate other authors' outcomes (e.g., Alesina et al., 2013; Coleman, 2000; Muravyev et al., 2009).

3.1.2 Robustness checks: controlling for public support and for financial autonomy

In order to verify the robustness of our results, we provide here also an alternative specification of equation (1) that includes as further controls two dummy variables that capture increased or decreased levels of public support.[17] In particular, *public support up* (*public support down*) is a dummy that equals one if a firm experienced an increase (decrease) in the level of public financial support, and zero otherwise. The inclusion of these dichotomous variables is aimed at alleviating concerns that the observed variations in the cost of financing are driven by possible government subsidies that could be designed by policy makers to correct any failure or bias occurring in credit markets,[18] rather than capturing the effects of the leader's gender.

TABLE 5 HERE

Table 5 reports the regressions based on model (1) with the inclusion of the dummies accounting for public support, using the various econometric techniques already described. Results here seem to corroborate the presence of gender differences in the change of the cost of borrowing. Indeed, the coefficient of the *Female* dummy – which is again the key variable to test our research hypothesis – preserves its significance and sign across the various specifications.

[17] The enterprises were also asked whether they had access to public financial support (including guarantees).
[18] Such as through subsidies aimed at sustaining the start-up or the growth of female-led firms (Gennari and Lotti, 2013).

We now repeat the tests performed for Table 5 on a sub-sample of businesses that have declared to be autonomous profit-oriented enterprises, namely, firms that are able to make independent financial decisions. This means that we are, for instance, excluding subsidiaries and branches from our sample because they are not fully financial autonomous. The aim of this analysis is to address concerns that our results are driven by the presence in our sample of leaders that are not actually involved in the financial decision process of the enterprise. This criterion, which involves a minor drop in observations, leads us to a sample of 16,700 observations. Results of this additional robustness check are reported in Table 6, where we observe that the coefficient of the female variable is always significant and positive across the various specifications. This supports the previous findings and the presence of gender bias in the change of the cost of bank financing.

TABLE 6 HERE

Overall, given the stability of the sign and the significance of the coefficient of the *Female* dummy throughout the several specifications – run by employing different econometric techniques and samples – we conclude that the results seem to confirm the existence of gender differences in the cost of bank financing that may be motivated by the theory of discrimination.

3.1.3 Additional analyses: cross-county heterogeneity and macroeconomic shocks

We now exploit the cross-country and the "time" heterogeneity characterizing our dataset. The former enables us to verify whether the observed gender discrimination might have different intensities according to the predominant culture in each country. The latter, instead, is necessary for us to examine whether variations in the macroeconomic conditions over time exert a different impact on the change in the cost of funding experienced by female-led firms. Because we think

that – among our dependent variables – the change in interest rates is the one more likely to rapidly reflect the consequences of a macroeconomic shock, in this section we decide to focus only on this variable.

To perform our first test, we split our sample into three clusters according to different levels of gender discrimination characterizing the countries under investigation. More precisely, we proxy gender discrimination via the Global Gender Gap Index (GGGI) provided by the World Economic Forum. This index seeks to measure aspects of gender equality across four key areas: health, education, economy, and politics. As we believe that discrimination may reflect some cultural features of a country, we employ the GGGI to proxy for the cultural differences emerging across our sample. The first cluster includes some "Southern" countries (i.e., Greece, Italy, and Portugal), where the GGGI is very low (thus indicating a high level of gender disparities). The second cluster includes four European countries (i.e., Austria, Belgium, Germany, and the Netherlands, hereafter the "Germanic" group) that share affinities in language, belonging to the Saxon group, as well as in gender equality. Finally, Finland and Ireland ("Northern" countries) are the ones within our sample with the highest GGGI and thus characterized by the lowest level of gender disparity.[19]

TABLE 7 HERE

We run our ordered logit regressions on the different sub-samples described above and compare the resulting marginal effects. Results reported in Columns 1–3 of Table 7 highlight that the *Female* dummy is positive and significant for the first two clusters (i.e., the "Southern" and the "Germanic" countries), while no signs of discrimination seem to emerge from the "Northern"

[19] We choose not to include Spain in any of these clusters because although it is culturally more similar to the Southern group, its GGGI is higher in magnitude and nearer to the Germanic countries. Similarly, we exclude France because although its GGGI is closer to the one characterizing the Southern group, it does not fully share cultural affinities with such a cluster of countries.

group (i.e., Finland and Ireland). More specifically, we observe that the marginal effects of the *Female* dummy display different intensities according to the cluster under investigation. For instance, for the three Southern countries, the marginal effects suggest that female-led firms are 1% less likely to experience a decrease in interest rates from banks, and 4.9% more likely to face an increase in their costs of financing compared to their male-led counterparts. Not surprisingly, the likelihood of experiencing an increase in the costs of bank financing, instead, is lower for female-led enterprises belonging to the group of the four Germanic countries (where gender inequalities are lower than in the previous cluster): here, female-led firms are 3.3% more likely to face an increase and 3.6% less likely to benefit from a decrease in interest rates. Finally, the non-result emerging from the Northern group seems to indicate that female-led firms chartered in these countries are not likely to face different price conditions for bank financing compared to male-led ones. In other words, it appears very plausible that in countries characterized by lower gender inequalities, female-led businesses are much more likely not to experience this form of discrimination in bank lending.

Now, we assess whether a couple of macroeconomics shocks that occurred during the observed period affected with different intensity the probability of female-led firms experiencing variations in the cost of financing compared to male-led firms. To do so, we define – in a similar fashion to Ferrando et al. (2017) – two sub-samples that are representative of the most important events characterizing our sample period. We first identify the phase of the sovereign debt crisis (waves 3, 4, and 5; i.e., from April 1, 2010 – which is the period during which the sovereign debt crisis spread – until September 30, 2011). Second, we capture a period of expansionary monetary policy in the Euro-area that followed the announcement of the Outright Monetary Transaction (OMT) Program (waves 8, 9, and 10; i.e., from October 1, 2012 until March 31, 2014). Inferences run on these two sub-groups are reported in Columns (4) and (5) of Table 7. The results suggest

that during the period of the sovereign debt crisis, female-led firms appear to be more discriminated against than male-led firms compared to the period that followed the OMT announcement. Indeed, the reported marginal effects highlight that during the sovereign crisis, female-led enterprises were 4.7% more likely to face an increase in interest rates, compared to male-led ones. Not unexpectedly, during the period of expansionary monetary policy such marginal effect was about 1% lower. This evidence supports the view that credit obstacles tend to be more severe during times of crises, especially penalizing female-led SMEs.

3.2 The effect of a change in the leadership's gender on the cost of bank financing

3.2.1 Panel ordered logit estimates

To test our second hypothesis (H_2) we need to exploit the panel structure of our dataset. Specifically, this section presents the results of the estimates based on equation (2) where we study, via a panel ordered logit model, whether changes in the leadership gender at the firm level have an impact on the change in the price terms and conditions of the bank financing faced by the enterprises in our sample. The rationale behind our approach is to capture the effect that a change in leadership – from female to male or from male to female – may induce on the probability that firms face a decrease or an increase in the cost of bank financing.

As already underlined in Section 2.3, due to the random selection process of the firms interviewed, our dataset is unbalanced; indeed, firms were not always repeatedly interviewed in consecutive waves. For this reason, when first-differencing our *Female* dummy, we register a drop in the available observations (from 19,969 to 5,915). Nevertheless, during the observed period,

we are able to detect a considerable number of variations in leadership gender, namely, 196 (202) changes from a male to a female (from a female to a male) manager.[20]

It is worth noting that because we employ a first-differenced model, all firm-fixed effects are effectively washed away, thus making our estimates very robust. The outcome of our investigation is reported in Table 8.

TABLE 8 HERE

Interestingly, while the variation in leadership from a male to a female manager does not seem to affect the change in the cost of the bank financing, we observe that the change from a female to a male manager negatively and significantly affects the variation in interest rates. This result clearly emerges from Column (1) where our *Female-to-Male* dummy is significant at the 5% level, meaning that firms are more likely to experience a decrease in the level of interest rates when the leadership shifts from a female to a male manager. To put it in different words, our evidence suggests the presence of a sort of *qualitative premium* on the cost of funding that the i^{th} firm may gain when its leadership changes from female to male. This finding supports, once again, the hypothesis of gender-based discrimination that we have investigated in our study. Indeed, a change in firm leadership, from a woman to a man, may thus alleviate the loan officers' concerns and help the enterprise benefit from better conditions for bank funding.

To corroborate our analyses, we then perform two checks. First, we control for the existence of possible changes in government subsidies by including specific dummies in Column (2) of Table 8. By doing so, we are able to rule out the possibility that the results are capturing the

[20] Note that because of the unbalanced nature of the dataset, some firms may indeed present gaps in the series. Therefore, we are able to capture changes in the leadership gender (at the firm level) only among consecutive waves of the survey.

effects of higher or lower government support to firms rather than the effect of a change in leadership gender. Here, results confirm the evidence provided in Column (1).

Second, as a further robustness check, we re-estimate equation (2) by separately including the dummies accounting for changes in leadership; namely, we insert our *Male-to-Female* and *Female-to-Male* dummies one by one in our regressions. In this way, we are able to exclude the possibility that our findings are driven by the contemporaneous presence of both dummies. Results are reported in Columns (3) and (4) of Table 8 and turn out to be consistent with the evidence provided earlier.

Unfortunately, no results seem to emerge when we repeat our analysis for the change in the cost of financing other than interest rates (e.g., fees and commissions). Indeed, the dummies *Female-to-Male* and *Male-to-Female* displayed in Columns 5–8 of Table 8 do not turn out to be statistically significant in any of the specifications reported.

3.2.2 Dynamic System GMM estimates

As discussed above in Section 2.5, when dealing with the change in leadership our estimates may be affected by a problem of reverse causality. Specifically, the concern arises here because the change in the leadership gender might not be fully exogenous. Indeed, because of their features, that is, higher attendance at boards, better monitoring abilities, and greater aptitude in solving conflicts (see, for instance, Adams and Ferreira, 2009), women may be more likely to be appointed when firms are in critical conditions (see Adams and Ferreira, 2009; Campbell and Vera, 2010).

To address such concern, we employ a two-step dynamic system GMM approach (Roodman, 2009), as in Liu et al. (2014) and Pathan and Faff (2013). Since we utilize the lagged dependent

variable as a regressor, given the unbalanced nature of our dataset, the observations drop to 3,554. Table 9 reports the results of our GMM estimates about the effects of a change in leadership gender on the declared variations in the level of interest rates.[21] The diagnostic tests provided in Table 9 highlight that the model is properly fitted, with statistically insignificant statistics for both the second-order autocorrelation (i.e., *AR*(2)) test and the test of over-identifying restrictions (i.e., Hansen).[22]

TABLE 9 HERE

Interestingly, the evidence provided here supports the findings obtained with the panel ordered logit models displayed in Table 8. The sign of the dummy *Female-to-Male* is always negative and significant. Additionally, the coefficient of the *Male-to-Female* dummy turns out to be positive and mildly significant (at the 10% level) in Column (3) suggesting that, when the leadership changes from male to female, firms are likely to face an increase in interest rates.

Overall, even when correcting our inferences to overcome the potential reverse causality issue, results seem to corroborate the existence of a sort of *qualitative premium* that firms may gain when changing from female to male leadership.

4. Conclusions

Access to formal credit for SMEs is crucial to their survival, as they have to rely more on bank credit than large firms. Once financed, enterprises may experience different price-terms and conditions for their funding that vary according to a firm's creditworthiness, leverage, and

[21] We disregard the effects of a change in the leadership gender on the other costs of financing because the related results in Table 8 were not statistically significant.
[22] The *AR*(1) test is statistically significant because the residuals in the first difference are serially correlated by way of construction.

profitability, among others. Nonetheless, a branch of the literature highlights the existence of possible differences in the price conditions from banks because of the gender of a firm's leader.

Following the theory of gender discrimination in credit markets, in this study, we test two hypotheses of gender bias by looking at the change in the cost of bank financing experienced by female-led firms versus their male-led counterparts. Our empirical analysis is based on data coming from the ECB SAFE conducted on a large sample of SMEs across 11 European countries during the period 2009-2013.

Our first hypothesis aims at testing whether female-led firms are more likely to face worse price terms and conditions of bank financing (i.e., in terms of interest rates and other costs) than male-led counterparts. In order to investigate this research question, we estimate an ordered logit model – as our dependent variables are qualitative and ordinal – and study the impact on the cost of bank financing attributable to the manager's gender. Furthermore, to formally address the causality issue we employ instrumental variable regressions. Finally, we run a series of robustness checks to corroborate our findings and also provide additional analyses carried out by exploiting the cross-country and "time" heterogeneity of our dataset.

The second hypothesis, instead, aims at verifying whether changes in leadership gender at the firm level have an impact on the change in the cost of bank financing faced by the enterprises in our sample. In other words, to the best of our knowledge this is the first study that explores the existence of gender discrimination by looking at changes in leadership gender at SMEs that we detected via the panel dimension of the dataset. In particular, after having used the ordered logit panel model, we employ a two-step system GMM approach to address the potential reverse causality issue that may affect the estimates.

Our findings show that female-led enterprises face a higher probability of being confronted with worse bank financing costs, as they are more likely to experience an increase in interest rates and in other costs than their male-led counterparts. Results turn out to be stable to different model specifications and different econometric strategies. Additionally, we also find that firms that experience a change in leadership from female to male are more likely to benefit from a decrease in interest rates. Such evidence highlights the existence of a sort of *qualitative premium* that firms may gain when changing from a female to a male leader. Put another way, banks appear more inclined to favor firms when they are under the control of a man. This is not inconsequential as it further proves the existence of gender discrimination in bank lending.

With all the caveats of the empirical investigation, our approach seems to exclude the presence of statistical discrimination. Put differently, although we lack objective data from firm balance sheets, we try our best to control for a variety of risk factors, including the changes in the borrower's credit history, leverage, and profit, variations in the maturity and collaterals required on the loans, as well as for the age, size, and sector in which the SMEs operate. We are also aware that any other possible statistical discrimination stemming from the lender side may be out of our control as it may result from the specific information characterizing the bank-firm relationship, for example, any sort of risk factors only observable by the bankers. Nevertheless, to some extent, we are able to exclude that female-led firms pay more because they experience worse performance or changes in risk levels. Rather, our findings seem to lean more toward a *prejudicial discrimination* by the lender. We acknowledge, anyway, that *prejudicial discrimination* is something difficult to detect that we may attribute, for instance, to the lender that lacks objective standards when judging female-led enterprise applicants.

At least two explanations can be provided to support our findings. First, we could argue that the loan officers may see women as less able to run businesses than men (Alesina et al., 2013).

This aversion by the lenders, hence, results in worse pricing conditions for the bank loans. Second, women may be more likely to experience higher costs of bank financing because of poorer bargaining abilities when dealing with bankers (e.g., Babcock and Laschever, 2003; Croson and Gneezy, 2009). A deeper scrutiny of these two explanations would require additional information and investigation that are beyond the scope of this study. However, the identification of such biases has important implications for both researchers and policymakers. Indeed, the existence of such failures – attributable to both lenders and women – suggests that the adoption of policy measures addressing female-led businesses, such as in the form of interest relief, may be crucial in reducing the likelihood that such businesses experience worse conditions for bank financing compared to male-led enterprises, as well as in enhancing female entrepreneurial opportunities.

Finally, although our findings are robust, we are aware of the limitations that arise from the use of a survey-based dataset without any link to the firm's financial statements. Furthermore, we are conscious that the availability of information on the level of education of the firms' leaders would be an ideal additional asset to enrich our analyses. Addressing such limitations, therefore, may lay the groundwork for future research.

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Table 1: Total observations and Female observations by country

	Total observations		Female observations	
Country Name	Frequency	% (on the full sample)	Frequency	% (at the country level)
Austria	1,162	5.82	140	12.05
Belgium	1,078	5.40	119	11.04
Finland	692	3.47	73	10.55
France	3,620	18.13	415	11.46
Germany	2,580	12.92	301	11.67
Greece	1,059	5.30	92	8.69
Ireland	920	4.61	97	10.54
Italy	3,573	17.89	388	10.86
Netherlands	647	3.24	39	6.03
Portugal	997	4.99	126	12.64
Spain	3,641	18.23	400	10.99
Sample mean				11.00
Total	19,969	100.00	2,190	

Table 2: Dependent variables – Observations by manager's gender

Panel A: Level of interest rates

	Observations			
Manager's Gender	Decreased	Unchanged	Increased	*Total*
Female	316	815	1,059	2,190
Male	3,114	5,970	8,695	17,779
Total				19,969

Panel B: Level of the cost of financing (other than interest rates)

	Observations			
Manager's Gender	Decreased	Unchanged	Increased	*Total*
Female	81	873	1,213	2,167
Male	785	7,570	9,252	17,607
Total				19,774

Table 3: Summary statistics

Variables	Observations	Mean	Median	St. Dev.	p1	p99
Dependent variables						
Change in the level of interest rates	19,969	2.317	2.000	0.748	1.000	3.000
Change in the level of the cost of financing	19,774	2.485	3.000	0.581	1.000	3.000
Gender dummies						
Female	19,969	0.110	0.000	0.312	0.000	1.000
Male-to-Female	5,915	0.033	0.000	0.179	0.000	1.000
Female-to-Male	5,915	0.034	0.000	0.182	0.000	1.000
Controls for firm quality						
Leverage up	19,969	0.328	0.000	0.469	0.000	1.000
Leverage down	19,969	0.282	0.000	0.450	0.000	1.000
Profit up	19,969	0.240	0.000	0.427	0.000	1.000
Profit down	19,969	0.501	1.000	0.500	0.000	1.000
Creditworthiness up	19,969	0.237	0.000	0.426	0.000	1.000
Creditworthiness down	19,969	0.214	0.000	0.410	0.000	1.000
Controls for the non-price conditions of the bank financing						
Maturity up	19,969	0.080	0.000	0.271	0.000	1.000
Maturity down	19,969	0.095	0.000	0.293	0.000	1.000
Collateral up	19,969	0.366	0.000	0.482	0.000	1.000
Collateral down	19,969	0.030	0.000	0.170	0.000	1.000
Additional firm controls						
Micro	19,969	0.259	0.000	0.438	0.000	1.000
Small	19,969	0.344	0.000	0.475	0.000	1.000
Medium	19,969	0.302	0.000	0.459	0.000	1.000
Very recent	19,969	0.015	0.000	0.120	0.000	1.000
Recent	19,969	0.060	0.000	0.238	0.000	1.000
Old	19,969	0.119	0.000	0.324	0.000	1.000
Construction	19,969	0.098	0.000	0.297	0.000	1.000
Manufacturing	19,969	0.243	0.000	0.429	0.000	1.000
Wholesale/Retail	19,969	0.296	0.000	0.457	0.000	1.000
Public support up	19,969	0.049	0.000	0.215	0.000	1.000
Public support down	19,969	0.275	0.000	0.447	0.000	1.000
Country level controls						
GDP Growth	19,969	-0.212	0.300	2.553	-8.200	5.050
Inflation	19,969	1.830	1.950	1.133	-0.900	4.900
Unemployment	19,969	12.170	9.800	6.494	4.700	27.400
Concentration	19,969	0.076	0.057	0.064	0.021	0.355
BLS	19,969	9.053	5.000	15.288	-6.000	85.000
Cost of borrowing	19,969	-0.100	-0.043	0.877	-2.947	1.323
Cooperatives	19,969	23.930	20.600	18.501	0.000	60.300
NPL ratio	19,969	7.426	4.495	5.940	0.500	31.899

Table 4: The impact of gender on changes in price terms and conditions of bank financing

This table reports ordered logit (Columns 1-2; 4-5) and IV two-stage least squares (Columns 3 and 6) regressions concerning the impact of gender on changes in interest rates and other costs than interest rates. The estimation period is July 1, 2009 – March 31, 2014 (from the 2nd to the 10th of the SAFE waves). The dependent variables – which are also described in Section 2.2 – are ordinal variables that equal 1/2/3 if the price terms and conditions (experienced by each firm) decreased/remained unchanged/increased 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. 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, all regressions include time and country dummies. Heteroskedasticity-robust standard errors, clustered at the country level, appear in parentheses. Intercepts are included but not reported. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Change in the level of interest rates			**Change in the level of other costs than interest rates**		
	O. Logit	O. Logit	IV	O. Logit	O. Logit	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Female	**0.105****	**0.128***	**3.070*****	**0.167*****	**0.182*****	**0.915****
	(0.05)	**(0.07)**	**(0.89)**	**(0.05)**	**(0.03)**	**(0.43)**
Profit up	0.018	0.027	0.010	-0.113**	-0.108*	0.006
	(0.08)	(0.09)	(0.03)	(0.06)	(0.06)	(0.02)
Female * Profit up		-0.098			-0.064	
		(0.21)			(0.16)	
Profit down	0.168***	0.168***	0.059**	0.075	0.075	0.052***
	(0.04)	(0.04)	(0.03)	(0.05)	(0.05)	(0.01)
Leverage up	0.132*	0.132*	0.048*	0.135***	0.135***	0.028**
	(0.07)	(0.07)	(0.03)	(0.05)	(0.05)	(0.01)
Leverage down	-0.042	-0.042	0.004	-0.100**	-0.100**	-0.022
	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.01)
Creditworthiness up	-0.143***	-0.143***	-0.051*	-0.076***	-0.076***	-0.019
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)
Creditworthiness down	0.330***	0.330***	0.087***	0.238***	0.238***	0.069***
	(0.03)	(0.03)	(0.03)	(0.07)	(0.07)	(0.01)
Maturity up	-0.081	-0.081	0.006	0.154	0.154	0.039*
	(0.12)	(0.12)	(0.04)	(0.15)	(0.15)	(0.02)
Maturity down	0.360***	0.361***	0.031	0.464**	0.464**	0.052***
	(0.11)	(0.11)	(0.04)	(0.19)	(0.19)	(0.02)
Collateral up	0.673***	0.673***	0.248***	0.989***	0.989***	0.242***
	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.01)
Collateral down	-0.672***	-0.673***	-0.101	-0.869***	-0.869***	-0.124***
	(0.12)	(0.12)	(0.07)	(0.12)	(0.12)	(0.04)
Micro	-0.013	-0.013	-0.247***	0.316	0.316	-0.026
	(0.11)	(0.11)	(0.08)	(0.19)	(0.19)	(0.04)
Small	0.016	0.017	-0.075**	0.210*	0.211*	0.000
	(0.07)	(0.07)	(0.04)	(0.13)	(0.13)	(0.02)
Medium	-0.036	-0.035		0.098*	0.098*	
	(0.06)	(0.06)		(0.05)	(0.05)	
Very recent	0.234	0.235	-0.027	-0.379***	-0.377***	-0.096**
	(0.20)	(0.20)	(0.10)	(0.11)	(0.11)	(0.05)
Recent	-0.111**	-0.110**	-0.148**	-0.171	-0.171	-0.068**
	(0.06)	(0.06)	(0.07)	(0.15)	(0.15)	(0.03)
Old	-0.009	-0.009	-0.041	-0.111	-0.110	-0.038**
	(0.09)	(0.09)	(0.04)	(0.07)	(0.07)	(0.02)
Construction	0.021	0.021	0.031	0.068	0.068	0.020
	(0.05)	(0.05)	(0.04)	(0.11)	(0.11)	(0.02)
Manufacturing	-0.077**	-0.077**	-0.178***	0.053	0.053	-0.034
	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.03)
Wholesale/Retail	-0.025	-0.025	-0.183***	0.065	0.065	-0.035
	(0.02)	(0.02)	(0.05)	(0.07)	(0.07)	(0.03)
GDP Growth	0.016	0.016	0.007	-0.048**	-0.048**	-0.009*
	(0.05)	(0.05)	(0.01)	(0.02)	(0.02)	(0.01)
Inflation	0.156*	0.155*	0.084***	0.100	0.100	0.036***
	(0.09)	(0.09)	(0.02)	(0.07)	(0.07)	(0.01)
Unemployment	0.095**	0.095**	0.024**	0.043***	0.043***	0.009*
	(0.04)	(0.04)	(0.01)	(0.01)	(0.01)	(0.01)
Concentration	-17.146**	-17.125**	-4.142**	-5.581	-5.570	-2.035***
	(8.39)	(8.40)	(1.68)	(3.89)	(3.90)	(0.78)
BLS	0.001	0.001	0.001	0.005	0.005	0.001**
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Cost of borrowing	0.742***	0.743***	0.077***	0.413**	0.414**	0.031**
	(0.24)	(0.24)	(0.03)	(0.17)	(0.17)	(0.01)
Cooperatives	-0.020***	-0.020***	-0.025***	0.001	0.001	-0.003*
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
NPL ratio	0.043	0.043	0.004	0.043***	0.043***	0.007*
	(0.03)	(0.03)	(0.01)	(0.02)	(0.02)	(0.00)
Observations	19,969	19,969	18,080	19,774	19,774	17,888
Pseudo-R squared	0.154	0.154		0.156	0.156	
Time dummies	YES	YES	YES	YES	YES	YES
Country dummies	YES	YES	YES	YES	YES	YES

Table 5: The impact of gender on changes in price terms and conditions of bank financing – controlling for public support
This table reports ordered logit (Columns 1-2; 4-5) and IV two-stage least squares (Columns 3 and 6) regressions concerning the impact of gender on changes in interest rates and other costs than interest rates. The estimation period is July 1, 2009 – March 31, 2014 (from the 2nd to the 10th of the SAFE waves). The dependent variables – which are also described in Section 2.2 – are ordinal variables that equal 1/2/3 if the price terms and conditions (experienced by each firm) decreased/remained unchanged/increased 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. 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, all regressions include time and country dummies. Heteroskedasticity-robust standard errors, clustered at the country level, appear in parentheses. Intercepts are included but not reported. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Change in the level of interest rates			**Change in the level of other costs than interest rates**		
	O. Logit	O. Logit	IV	O. Logit	O. Logit	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Female	**0.135****	**0.156****	**3.091*****	**0.121****	**0.142*****	**0.939****
	(0.06)	**(0.08)**	**(0.89)**	**(0.06)**	**(0.05)**	**(0.43)**
Profit up	-0.007	0.005	0.012	0.025	0.038	0.009
	(0.05)	(0.07)	(0.03)	(0.07)	(0.07)	(0.02)
Female * Profit up		-0.093			-0.101	
		(0.13)			(0.17)	
Profit down	0.178***	0.178***	0.058**	0.200**	0.200**	0.049***
	(0.02)	(0.02)	(0.03)	(0.08)	(0.08)	(0.01)
Leverage up	0.156***	0.156***	0.047*	0.124	0.124	0.027**
	(0.05)	(0.05)	(0.03)	(0.09)	(0.09)	(0.01)
Leverage down	-0.049*	-0.049*	0.003	-0.114**	-0.114***	-0.025*
	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.01)
Creditworthiness up	-0.150***	-0.151***	-0.049	-0.021	-0.021	-0.014
	(0.05)	(0.06)	(0.03)	(0.05)	(0.05)	(0.01)
Creditworthiness down	0.256***	0.256***	0.083***	0.295***	0.295***	0.062***
	(0.05)	(0.05)	(0.03)	(0.04)	(0.04)	(0.01)
Maturity up	-0.065	-0.065	0.008	0.208	0.208	0.043*
	(0.13)	(0.13)	(0.04)	(0.14)	(0.14)	(0.02)
Maturity down	0.211**	0.212***	0.029	0.309***	0.310***	0.048**
	(0.08)	(0.08)	(0.04)	(0.10)	(0.10)	(0.02)
Collateral up	0.677***	0.677***	0.241***	0.958***	0.959***	0.230***
	(0.06)	(0.06)	(0.03)	(0.04)	(0.04)	(0.01)
Collateral down	-0.593***	-0.594***	-0.102	-0.533***	-0.534***	-0.125***
	(0.11)	(0.11)	(0.07)	(0.13)	(0.14)	(0.04)
Micro	-0.005	-0.005	-0.250***	0.201	0.201	-0.031
	(0.11)	(0.11)	(0.08)	(0.16)	(0.16)	(0.04)
Small	0.042	0.042	-0.076**	0.106	0.106	-0.002
	(0.04)	(0.04)	(0.04)	(0.09)	(0.09)	(0.02)
Very recent	0.224	0.226	-0.027	-0.290**	-0.287**	-0.097**
	(0.15)	(0.15)	(0.10)	(0.13)	(0.13)	(0.05)
Recent	-0.020	-0.020	-0.149**	-0.113	-0.113	-0.070**
	(0.06)	(0.06)	(0.07)	(0.13)	(0.13)	(0.03)
Old	0.039	0.039	-0.042	-0.108*	-0.108*	-0.040**
	(0.08)	(0.08)	(0.04)	(0.06)	(0.06)	(0.02)
Construction	0.024	0.024	0.030	0.057	0.058	0.018
	(0.05)	(0.05)	(0.04)	(0.11)	(0.11)	(0.02)
Manufacturing	-0.076**	-0.076**	-0.180***	0.048	0.048	-0.037
	(0.04)	(0.04)	(0.05)	(0.06)	(0.06)	(0.03)
Wholesale/Retail	-0.031	-0.030	-0.185***	0.052	0.053	-0.038
	(0.02)	(0.02)	(0.05)	(0.07)	(0.07)	(0.03)
Public support up	-0.208**	-0.208**	-0.037	-0.266**	-0.266**	-0.064**
	(0.10)	(0.10)	(0.05)	(0.11)	(0.11)	(0.03)
Public support down	0.314***	0.314***	0.041	0.387***	0.388***	0.071***
	(0.03)	(0.03)	(0.03)	(0.08)	(0.08)	(0.02)
GDP Growth	0.038	0.038	0.006	-0.028	-0.028	-0.009*
	(0.06)	(0.06)	(0.01)	(0.03)	(0.03)	(0.01)
Inflation	0.151	0.151	0.082***	0.103***	0.103***	0.033***
	(0.12)	(0.12)	(0.02)	(0.04)	(0.04)	(0.01)
Unemployment	0.067	0.067	0.024**	0.014	0.013	0.008
	(0.04)	(0.04)	(0.01)	(0.02)	(0.02)	(0.01)
Concentration	-13.967*	-13.919*	-4.135**	-6.541	-6.493	-2.005**
	(7.78)	(7.79)	(1.69)	(4.90)	(4.91)	(0.78)
BLS	-0.002	-0.002	0.001	0.004	0.004	0.001**
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Cost of borrowing	0.855***	0.856***	0.078***	0.453***	0.455***	0.032**
	(0.27)	(0.28)	(0.03)	(0.09)	(0.09)	(0.01)
Cooperatives	-0.020***	-0.020***	-0.025***	-0.001	-0.001	-0.004**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
NPL ratio	0.067*	0.067*	0.004	0.061**	0.060**	0.008*
	(0.04)	(0.04)	(0.01)	(0.02)	(0.02)	(0.00)
Observations	18,080	18,080	18,080	17,888	17,888	17,888
Pseudo-R squared	0.160	0.160		0.155	0.155	
Time dummies	YES	YES	YES	YES	YES	YES
Country dummies	YES	YES	YES	YES	YES	YES

Table 6: The impact of gender on changes in price terms and conditions of bank financing – financially autonomous firms only
This table reports ordered logit (Columns 1-2; 4-5) and IV two-stage least squares (Columns 3 and 6) regressions concerning the impact of gender on changes in interest rates and other costs than interest rates. The estimation period is July 1, 2009 – March 31, 2014 (from the 2nd to the 10th of the SAFE waves). The dependent variables – which are also described in Section 2.2 – are ordinal variables that equal 1/2/3 if the price terms and conditions (experienced by each firm) decreased/remained unchanged/increased 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. 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, all regressions include time and country dummies. Heteroskedasticity-robust standard errors, clustered at the country level, appear in parentheses. Intercepts are included but not reported. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Change in the level of interest rates			**Change in the level of other costs than interest rates**		
	O. Logit	O. Logit	IV	O. Logit	O. Logit	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Female	**0.138****	**0.161****	**3.377*****	**0.111****	**0.134****	**0.869****
	(0.06)	**(0.08)**	**(1.01)**	**(0.06)**	**(0.06)**	**(0.44)**
Profit up	0.006	0.020	0.012	0.042	0.056	0.010
	(0.05)	(0.06)	(0.04)	(0.08)	(0.08)	(0.02)
Female * Profit up		-0.107			-0.110	
		(0.13)			(0.18)	
Profit down	0.187***	0.187***	0.062*	0.205**	0.205**	0.049***
	(0.02)	(0.02)	(0.03)	(0.09)	(0.09)	(0.01)
Leverage up	0.141**	0.141**	0.031	0.121	0.121	0.023*
	(0.06)	(0.06)	(0.03)	(0.08)	(0.08)	(0.01)
Leverage down	-0.072***	-0.072***	-0.011	-0.122***	-0.122***	-0.029**
	(0.02)	(0.02)	(0.03)	(0.04)	(0.04)	(0.01)
Creditworthiness up	-0.134**	-0.134**	-0.039	-0.020	-0.020	-0.014
	(0.05)	(0.05)	(0.03)	(0.05)	(0.05)	(0.02)
Creditworthiness down	0.251***	0.251***	0.094***	0.306***	0.306***	0.066***
	(0.05)	(0.05)	(0.03)	(0.04)	(0.04)	(0.01)
Maturity up	-0.067	-0.067	0.019	0.181	0.181	0.036
	(0.12)	(0.12)	(0.05)	(0.14)	(0.14)	(0.02)
Maturity down	0.186**	0.188**	0.017	0.310***	0.311***	0.045**
	(0.09)	(0.09)	(0.05)	(0.10)	(0.10)	(0.02)
Collateral up	0.691***	0.691***	0.246***	0.956***	0.957***	0.227***
	(0.06)	(0.06)	(0.03)	(0.04)	(0.04)	(0.01)
Collateral down	-0.623***	-0.623***	-0.105	-0.556***	-0.557***	-0.136***
	(0.13)	(0.13)	(0.07)	(0.14)	(0.14)	(0.04)
Micro	-0.012	-0.012	-0.260***	0.201	0.200	-0.022
	(0.13)	(0.13)	(0.08)	(0.17)	(0.17)	(0.04)
Small	0.029	0.030	-0.078**	0.094	0.095	-0.000
	(0.05)	(0.05)	(0.04)	(0.09)	(0.09)	(0.02)
Very recent	0.237*	0.239*	-0.036	-0.284**	-0.282**	-0.093*
	(0.13)	(0.13)	(0.12)	(0.12)	(0.12)	(0.05)
Recent	-0.046	-0.046	-0.185**	-0.095	-0.095	-0.064**
	(0.06)	(0.06)	(0.08)	(0.14)	(0.14)	(0.03)
Old	0.046	0.046	-0.063	-0.098	-0.098	-0.040**
	(0.08)	(0.08)	(0.05)	(0.06)	(0.06)	(0.02)
Construction	0.020	0.021	0.035	0.044	0.045	0.015
	(0.06)	(0.06)	(0.04)	(0.12)	(0.12)	(0.02)
Manufacturing	-0.085	-0.085	-0.208***	0.034	0.034	-0.040
	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.03)
Wholesale/Retail	-0.034	-0.033	-0.207***	0.035	0.036	-0.040
	(0.03)	(0.03)	(0.06)	(0.06)	(0.06)	(0.03)
Public support up	-0.219*	-0.219*	0.006	-0.325**	-0.325**	-0.069**
	(0.12)	(0.12)	(0.06)	(0.14)	(0.14)	(0.03)
Public support down	0.322***	0.323***	0.048	0.377***	0.377***	0.072***
	(0.03)	(0.03)	(0.03)	(0.08)	(0.08)	(0.01)
GDP Growth	0.048	0.048	0.008	-0.026	-0.027	-0.007
	(0.06)	(0.06)	(0.01)	(0.03)	(0.03)	(0.01)
Inflation	0.153	0.152	0.087***	0.125***	0.124***	0.034***
	(0.12)	(0.12)	(0.02)	(0.04)	(0.04)	(0.01)
Unemployment	0.062	0.062	0.030**	0.013	0.013	0.009
	(0.05)	(0.05)	(0.01)	(0.02)	(0.02)	(0.01)
Concentration	-15.537*	-15.476*	-5.009***	-7.119	-7.064	-2.278***
	(7.96)	(7.96)	(1.92)	(5.27)	(5.28)	(0.82)
BLS	-0.002	-0.002	0.001	0.004	0.004	0.001**
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Cost of borrowing	0.892***	0.894***	0.072**	0.415***	0.417***	0.028**
	(0.28)	(0.28)	(0.03)	(0.10)	(0.11)	(0.01)
Cooperatives	-0.021***	-0.021***	-0.027***	0.000	0.000	-0.003*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
NPL ratio	0.074*	0.074*	0.002	0.062**	0.062**	0.008*
	(0.04)	(0.04)	(0.01)	(0.03)	(0.03)	(0.00)
Observations	16,700	16,700	16,700	16,528	16,528	16,528
Pseudo-R squared	0.164	0.164		0.154	0.154	
Time dummies	YES	YES	YES	YES	YES	YES
Country dummies	YES	YES	YES	YES	YES	YES

Table 7: The impact of gender on changes in interest rates – exploring country and "time" heterogeneity
This table reports ordered logit regressions concerning the impact of gender on changes in interest rates. The dependent variable – which is also described in Section 2.2 – is an ordinal variable that equals 1/2/3 if the level of interest rates (experienced by each firm) decreased/remained unchanged/increased 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. 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, all regressions include time and country dummies. Heteroskedasticity-robust standard errors, clustered at the country level, appear in parentheses. Intercepts are included but not reported. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Change in the level of interest rates				
	Country heterogeneity			**Time heterogeneity**	
	GR, IT, PT	AT, BE, DE, NL	FI, IE	Sovereign Crisis	Post-OMT announcement
	(1)	(2)	(3)	(4)	(5)
Female	**0.224****	**0.196*****	**-0.057**	**0.193****	**0.153*****
	(0.10)	**(0.06)**	**(0.44)**	**(0.09)**	**(0.04)**
dy/dx (when Y = increased)	4.9%	3.3%		4.7%	3.6%
dy/dx (when Y = decreased)	–1.0%	–3.6%		–1.3%	–1.9%
Profit up	0.067	-0.089***	-0.164	0.005	-0.046
	(0.06)	(0.03)	(0.21)	(0.06)	(0.05)
Profit down	0.244***	0.178***	-0.003	0.174***	0.196***
	(0.00)	(0.02)	(0.18)	(0.03)	(0.06)
Leverage up	0.300***	0.023	0.276**	0.205***	0.111
	(0.02)	(0.05)	(0.13)	(0.07)	(0.09)
Leverage down	-0.010	-0.058	-0.099	0.009	-0.113
	(0.07)	(0.04)	(0.22)	(0.03)	(0.10)
Creditworthiness up	-0.207***	-0.182***	0.173	-0.118**	-0.121
	(0.05)	(0.03)	(0.33)	(0.06)	(0.10)
Creditworthiness down	0.273***	0.234***	0.116***	0.155***	0.364***
	(0.09)	(0.07)	(0.04)	(0.05)	(0.11)
Maturity up	-0.048	-0.381***	0.327	0.176*	-0.334
	(0.12)	(0.12)	(0.33)	(0.09)	(0.29)
Maturity down	0.289**	0.334**	-0.284	0.155	0.344**
	(0.12)	(0.16)	(0.39)	(0.13)	(0.16)
Collateral up	0.731***	0.526***	0.832***	0.756***	0.599***
	(0.07)	(0.01)	(0.26)	(0.07)	(0.11)
Collateral down	-0.278*	-0.611***	-0.432	-0.608***	-0.447***
	(0.16)	(0.10)	(0.46)	(0.21)	(0.11)
Micro	-0.187***	0.182***	-0.166	-0.269***	0.205
	(0.02)	(0.06)	(0.40)	(0.09)	(0.13)
Small	-0.028	0.092***	-0.419***	-0.123**	0.172**
	(0.04)	(0.02)	(0.10)	(0.06)	(0.07)
Very recent	0.645*	0.232**	-0.382	-0.091	0.328
	(0.33)	(0.11)	(0.62)	(0.22)	(0.30)
Recent	-0.162*	0.255***	-0.042	-0.067	-0.116*
	(0.09)	(0.05)	(0.10)	(0.13)	(0.06)
Old	0.148***	0.208**	-0.201***	-0.070	0.005
	(0.02)	(0.10)	(0.06)	(0.09)	(0.11)
Construction	0.139***	0.031	0.027***	-0.067	0.137
	(0.04)	(0.04)	(0.00)	(0.05)	(0.14)
Manufacturing	-0.063***	-0.168***	-0.010	0.001	-0.113**
	(0.01)	(0.02)	(0.07)	(0.07)	(0.05)
Wholesale/Retail	-0.050	-0.037	-0.082	0.078**	-0.105**
	(0.04)	(0.07)	(0.06)	(0.04)	(0.04)
Public support up	-0.018	-0.303***	-0.248***	-0.292	-0.076
	(0.40)	(0.05)	(0.03)	(0.19)	(0.23)
Public support down	0.272***	0.277***	0.439**	0.363***	0.206**
	(0.07)	(0.09)	(0.21)	(0.07)	(0.09)
GDP Growth	0.034	0.022	-0.007	0.253**	-0.317***
	(0.04)	(0.07)	(0.02)	(0.11)	(0.06)
Inflation	-0.042	0.648***	-0.326**	0.053	0.447***
	(0.12)	(0.19)	(0.17)	(0.05)	(0.07)
Unemployment	-0.017	0.154**	0.313***	0.093	-0.251***
	(0.13)	(0.07)	(0.03)	(0.12)	(0.09)
Concentration	15.051*	15.371	-33.993***	0.514	7.590
	(9.10)	(14.71)	(3.63)	(15.12)	(11.67)
BLS	-0.007	-0.014***	0.065***	-0.011	-0.015***
	(0.01)	(0.00)	(0.02)	(0.01)	(0.00)
Cost of borrowing	0.819	-0.421	-0.393	1.365***	0.772***
	(0.73)	(0.79)	(0.26)	(0.46)	(0.25)
Cooperatives	-0.215**	0.536***	-0.102***	-0.158	-0.039
	(0.09)	(0.19)	(0.01)	(0.17)	(0.10)
NPL ratio	-0.118	1.324***	0.126***	-0.073	0.094
	(0.12)	(0.38)	(0.02)	(0.10)	(0.12)
Observations	5,110	4,937	1,552	5,918	6,607
Pseudo-R squared	0.101	0.078	0.079	0.130	0.164
Time dummies	YES	YES	YES	YES	YES
Country dummies	YES	YES	YES	YES	YES

Table 8: The impact of a change in the leadership on changes in price terms and conditions of the bank financing
This table reports panel ordered logit regressions concerning the impact of a change in the leadership on price terms and conditions of the bank financing. The estimation period is July 1, 2009 – March 31, 2014 (from the 2nd to the 10th of the SAFE waves). The dependent variables – which are also described in Section 2.2 – are ordinal variables that equal 1/2/3 if the price terms and conditions (experienced by each firm) decreased/remained unchanged/increased during the past six months, respectively. **Male-to-Female** (**Female-to-Male**) is a dummy that equals one if a firm experienced a change in leadership, i.e. from a male to a female (from a female to a male) owner/director/CEO. See Table A1 in the Appendix for all variable definitions and sources. All regressions include time and country dummies. Heteroskedasticity-robust standard errors, clustered at the country level, appear in parentheses. Intercepts are included but not reported. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

	Change in the level of interest rates				**Change in the level of other costs than interest rates**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Male-to-Female	**-0.047**	**-0.041**	**-0.020**		**-0.057**	**-0.043**	**-0.040**	
	(0.14)	**(0.14)**	**(0.13)**		**(0.17)**	**(0.18)**	**(0.17)**	
Female-to-Male	**-0.303****	**-0.304****		**-0.301****	**-0.050**	**-0.052**		**-0.049**
	(0.15)	**(0.15)**		**(0.15)**	**(0.25)**	**(0.24)**		**(0.24)**
Profit up	-0.009	0.008	0.007	0.008	-0.136	-0.128	-0.128	-0.127
	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
Profit down	0.316***	0.299***	0.297***	0.300***	0.232*	0.216*	0.216*	0.216*
	(0.08)	(0.09)	(0.09)	(0.09)	(0.12)	(0.12)	(0.12)	(0.12)
Leverage up	0.193***	0.196***	0.195***	0.196***	0.110	0.107	0.107	0.107
	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.08)
Leverage down	-0.016	-0.023	-0.021	-0.023	-0.046	-0.056	-0.055	-0.056
	(0.05)	(0.05)	(0.05)	(0.05)	(0.07)	(0.07)	(0.07)	(0.07)
Creditworthiness up	-0.218**	-0.193**	-0.193**	-0.193**	-0.077	-0.062	-0.062	-0.062
	(0.09)	(0.10)	(0.10)	(0.10)	(0.06)	(0.05)	(0.05)	(0.05)
Creditworthiness down	0.176***	0.135***	0.136***	0.135***	0.179	0.139	0.139	0.139
	(0.04)	(0.04)	(0.04)	(0.04)	(0.12)	(0.12)	(0.12)	(0.12)
Maturity up	-0.010	-0.002	0.001	-0.003	0.474***	0.469***	0.469***	0.468***
	(0.11)	(0.11)	(0.11)	(0.11)	(0.18)	(0.18)	(0.18)	(0.18)
Maturity down	0.329**	0.325**	0.327**	0.324**	0.446**	0.435**	0.435**	0.435**
	(0.13)	(0.13)	(0.13)	(0.13)	(0.17)	(0.18)	(0.18)	(0.18)
Collateral up	0.801***	0.750***	0.748***	0.750***	1.201***	1.143***	1.143***	1.143***
	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Collateral down	-0.688***	-0.703***	-0.697***	-0.703***	-0.684***	-0.723***	-0.722***	-0.722***
	(0.20)	(0.20)	(0.21)	(0.20)	(0.23)	(0.24)	(0.24)	(0.24)
Micro	0.082	0.065	0.059	0.064	0.329*	0.312*	0.312*	0.311*
	(0.19)	(0.19)	(0.19)	(0.19)	(0.18)	(0.18)	(0.18)	(0.18)
Small	0.146	0.144	0.139	0.143	0.140	0.134	0.134	0.133
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
Medium	0.038	0.038	0.035	0.037	0.041	0.035	0.034	0.034
	(0.13)	(0.13)	(0.14)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Very recent	-0.408	-0.418	-0.417	-0.420	-0.540**	-0.551**	-0.550**	-0.553**
	(0.29)	(0.28)	(0.29)	(0.29)	(0.23)	(0.22)	(0.22)	(0.22)
Recent	0.097	0.098	0.103	0.098	0.010	0.005	0.006	0.005
	(0.16)	(0.16)	(0.16)	(0.16)	(0.20)	(0.20)	(0.20)	(0.20)
Old	-0.113	-0.116	-0.113	-0.115	-0.179	-0.181	-0.181	-0.180
	(0.15)	(0.15)	(0.15)	(0.15)	(0.12)	(0.12)	(0.12)	(0.12)
Construction	0.037	0.034	0.036	0.035	0.176	0.170	0.169	0.170
	(0.12)	(0.12)	(0.12)	(0.12)	(0.14)	(0.14)	(0.14)	(0.14)
Manufacturing	-0.119	-0.131	-0.134	-0.131	0.161*	0.154	0.154	0.154
	(0.08)	(0.09)	(0.09)	(0.08)	(0.09)	(0.10)	(0.10)	(0.10)
Wholesale/Retail	-0.086	-0.096	-0.097	-0.096	0.058	0.051	0.051	0.051
	(0.10)	(0.09)	(0.09)	(0.09)	(0.10)	(0.11)	(0.11)	(0.10)
Public support up		-0.285	-0.284	-0.284		0.016	0.016	0.016
		(0.18)	(0.18)	(0.18)		(0.30)	(0.30)	(0.30)
Public support down		0.338***	0.337***	0.338***		0.389***	0.389***	0.389***
		(0.08)	(0.08)	(0.08)		(0.09)	(0.09)	(0.09)
Δ GDP Growth	0.015	0.011	0.012	0.011	0.035	0.031	0.031	0.031
	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)
Δ Inflation	0.193	0.176	0.179	0.177	-0.052	-0.066	-0.065	-0.065
	(0.13)	(0.13)	(0.13)	(0.13)	(0.10)	(0.11)	(0.11)	(0.11)
Δ Unemployment	0.315***	0.300***	0.300***	0.300***	0.353***	0.337***	0.337***	0.337***
	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)
Δ Concentration	-5.883	-6.117	-6.325	-6.182	3.612	3.181	3.145	3.128
	(5.71)	(5.92)	(5.80)	(5.89)	(5.85)	(6.09)	(6.13)	(6.13)
Δ BLS	0.005	0.005	0.005	0.005	0.004	0.004	0.004	0.004
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Δ Cost of borrowing	-0.523*	-0.503*	-0.505*	-0.503*	-0.134	-0.113	-0.114	-0.113
	(0.30)	(0.30)	(0.30)	(0.30)	(0.13)	(0.12)	(0.12)	(0.12)
Δ Cooperatives	-0.029**	-0.031**	-0.031**	-0.031**	-0.019	-0.020	-0.020	-0.020
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Δ NPL ratio	0.014	0.011	0.013	0.011	-0.045	-0.048	-0.048	-0.048
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.06)	(0.06)	(0.06)
Observations	5,915	5,915	5,915	5,915	5,878	5,878	5,878	5,878
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES

Table 9: The impact of a change in the leadership on changes in interest rates – System-GMM regressions

This table reports two-step system GMM regressions (after augmenting the main regression with a lagged dependent variable) concerning the impact of a change in the leadership on changes in interest rates. The estimation period is July 1, 2009 – March 31, 2014 (from the 2nd to the 10th of the SAFE waves). The dependent variable – which is also described in Section 2.2 – is an ordinal variable that equals 1/2/3 if the level of interest rates (experienced by each firm) decreased/remained unchanged/increased during the past six months, respectively. **Male-to-Female** (**Female-to-Male**) is a dummy that equals one if a firm experienced a change in leadership, i.e. from a male to a female (from a female to a male) owner/director/CEO. See Table A1 in the Appendix for all variable definitions and sources. All regressions include time and country 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.

	Change in the level of interest rates			
	(1)	(2)	(3)	(4)
Male-to-Female	**0.027**	**0.040**	**0.047***	
	(0.03)	**(0.03)**	**(0.03)**	
Female-to-Male	**-0.066****	**-0.067****		**-0.074****
	(0.03)	**(0.03)**		**(0.04)**
Profit up	-0.044**	-0.049***	-0.052**	-0.054***
	(0.02)	(0.02)	(0.02)	(0.02)
Profit down	0.034*	0.036*	0.040*	0.041*
	(0.02)	(0.02)	(0.02)	(0.02)
Leverage up	0.026*	0.021	0.030*	0.013
	(0.02)	(0.02)	(0.02)	(0.02)
Leverage down	-0.042**	-0.039**	-0.034*	-0.037*
	(0.02)	(0.02)	(0.02)	(0.02)
Creditworthiness up	-0.016	-0.019	-0.025	-0.018
	(0.02)	(0.02)	(0.02)	(0.02)
Creditworthiness down	0.031*	0.021	0.014	0.022
	(0.02)	(0.02)	(0.02)	(0.02)
Maturity up	0.089***	0.096***	0.096***	0.095***
	(0.02)	(0.02)	(0.02)	(0.02)
Maturity down	0.013	0.016	0.018	0.024
	(0.02)	(0.02)	(0.02)	(0.02)
Collateral up	0.115***	0.107***	0.105***	0.106***
	(0.02)	(0.02)	(0.02)	(0.02)
Collateral down	-0.188***	-0.198***	-0.201***	-0.219***
	(0.05)	(0.05)	(0.05)	(0.05)
Micro	2.930***	2.842***	2.199***	0.003
	(0.17)	(0.17)	(0.10)	(0.06)
Small	2.924***	2.835***	2.187***	0.004
	(0.17)	(0.16)	(0.09)	(0.06)
Medium	2.929***	2.860***	2.204***	0.033
	(0.17)	(0.17)	(0.09)	(0.05)
Large	2.871***	2.812***	2.177***	0.000
	(0.17)	(0.17)	(0.10)	(0.00)
Very recent	-0.164	-0.155	-0.167*	-0.149
	(0.11)	(0.11)	(0.10)	(0.11)
Recent	0.124***	0.139***	0.136***	0.132***
	(0.04)	(0.04)	(0.04)	(0.04)
Old	-0.041	-0.036	-0.037	-0.034
	(0.03)	(0.03)	(0.03)	(0.03)
Construction	0.184***	0.174***	0.155***	0.186***
	(0.03)	(0.03)	(0.03)	(0.03)
Manufacturing	0.046	0.037	0.035	0.042
	(0.04)	(0.04)	(0.04)	(0.04)
Wholesale/Retail	0.101***	0.097***	0.095***	0.097***
	(0.03)	(0.03)	(0.03)	(0.03)
Public support up		0.135***	0.135***	0.164***
		(0.04)	(0.04)	(0.04)
Public support down		0.083***	0.081***	0.082***
		(0.02)	(0.02)	(0.02)
Δ GDP Growth	-0.006	-0.010	-0.008	-0.010
	(0.01)	(0.01)	(0.01)	(0.01)
Δ Inflation	0.064***	0.064***	0.065***	0.065***
	(0.01)	(0.01)	(0.01)	(0.01)
Δ Unemployment	0.112***	0.102***	0.099***	0.104***
	(0.02)	(0.02)	(0.02)	(0.02)
Δ Concentration	-2.617***	-2.189**	-2.450**	-2.462**
	(0.98)	(0.98)	(1.01)	(1.00)
Δ BLS	0.001	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)
Δ Cost of borrowing	-0.242***	-0.251***	-0.247***	-0.243***
	(0.04)	(0.04)	(0.04)	(0.04)
Δ Cooperatives	-0.014***	-0.015***	-0.015***	-0.015***
	(0.00)	(0.00)	(0.00)	(0.00)
Δ NPL ratio	0.003	-0.001	-0.000	0.002
	(0.01)	(0.01)	(0.01)	(0.01)
Observations	3,554	3,554	3,554	3,554
Time dummies	YES	YES	YES	YES
Country dummies	YES	YES	YES	YES
AR(1) test – *p-value*	0.001	0.001	0.001	0.001
AR(2) test – *p-value*	0.990	0.995	0.997	0.952
Hansen test – *p-value*	0.834	0.819	0.768	0.740

Appendix

Table A1: Variable descriptions and sources

Variables	Description	Source
Dependent variables		
Change in the level of interest rates	Ordinal variable that equals one/two/three if the level of interest rates – experienced by each firm – decreased/remained unchanged/increased during the past six months, respectively.	ECB: SAFE
Change in the level of the cost of financing	Ordinal variable that equals one/two/three if the level of the cost of financing (other than interest rates) – experienced by each firm – decreased/remained unchanged/increased during the past six months, respectively.	ECB: SAFE
Gender dummies		
Female	Dummy variable that equals one if the firm's owner/director/CEO is female, and zero otherwise.	ECB: SAFE
Male-to-Female	Dummy variable that equals one if a firm experienced a change in the leadership (from a male to a female owner/director/CEO).	ECB: SAFE
Female-to-Male	Dummy variable that equals one if a firm experienced a change in the leadership (from a female to a male owner/director/CEO).	ECB: SAFE
Controls for firm quality		
Leverage up	Dummy variable that equals one if a firm experienced an increase in the debt-to-assets ratio in the past six months.	ECB: SAFE
Leverage down	Dummy variable that equals one if a firm experienced a decrease in the debt-to-assets ratio in the past six months.	ECB: SAFE
Profit up	Dummy variable that equals one if a firm experienced an increase in net income after taxes in the past six months.	ECB: SAFE
Profit down	Dummy variable that equals one if a firm experienced a decrease in 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 deteriorated in the past six months.	ECB: SAFE
Controls for the non-price conditions of the bank financing		
Maturity up	Dummy variable that equals one if a firm experienced an increase in the available maturity of the loan in the past six months.	ECB: SAFE
Maturity down	Dummy variable that equals one if a firm experienced a decrease in the available maturity of the loan in the past six months.	ECB: SAFE
Collateral up	Dummy variable that equals one if a firm experienced an increase in the collateral requirements in the past six months.	ECB: SAFE
Collateral down	Dummy variable that equals one if a firm experienced a decrease in the collateral requirements in the past six months.	ECB: SAFE
Additional firm controls		
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
Construction	Dummy variable that equals one if the firm's main activity is construction.	ECB: SAFE
Manufacturing	Dummy variable that equals one if the firm's main activity is manufacturing.	ECB: SAFE
Wholesale/Retail	Dummy variable that equals one if the firm's main activity is wholesale or retail trade.	ECB: SAFE
Not fully autonomous	Dummy variable that equals one if the firm is part of a profit-oriented enterprise, not taking fully autonomous financial decisions.	ECB: SAFE
Autonomous	Dummy variable that equals one if the firm is an autonomous profit-oriented enterprise, making independent financial decisions.	ECB: SAFE
Public support up	Dummy variable that equals one if a firm experienced an improvement in access to public financial support in the past six months.	ECB: SAFE
Public support down	Dummy variable that equals one if a firm experienced a deterioration in access to public financial support in the past six months.	ECB: SAFE
Country level controls		
GDP Growth	The annual growth rate of real GDP based on averages of quarterly data for each survey round.	OECD
Inflation	The annual inflation rate based on averages of quarterly data for each survey round.	OECD
Unemployment	The annual unemployment rate based on averages of quarterly data for each survey round.	Eurostat
Concentration	The Herfindahl Index (HI) of total assets concentration (for the banking sector).	ECB: Data Warehouse
BLS	The bank credit standards (in the previous three months) based on averages of quarterly data for each survey round.	ECB: BLS
Cost of borrowing	The annual change in the cost of borrowing for loans to non-financial firms.	ECB: Data Warehouse
Cooperatives	The market share of cooperative banks.	European Association of Co-operative Banks
NPL ratio	The ratio of bank non-performing loans over total gross loans.	World Bank
Instrumental variable		
Share of female employment	The share of female employment based on averages of quarterly data for each survey round.	Eurostat
Variable for the cross-country test		
GGGI	An index designed to measure a country's gender equality.	World Economic Forum