



EUROPEAN CENTRAL BANK  
EUROSYSTEM

## Working Paper Series

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### Gender bias and credit access

No 1822 / July 2015



**Note:** This Working Paper should not be reported as representing the views of the European Central Bank (ECB). The views expressed are those of the authors and do not necessarily reflect those of the ECB

## **Abstract**

This paper studies the causal effect of gender bias on access to bank credit. We extract an exogenous measure of gender bias from survey responses by descendants of US immigrants on questions about the role of women in society. We then use data on 6,000 small business firms from 17 countries and find that in countries with higher gender bias, female-owned firms are more frequently discouraged from applying for bank credit and more likely to rely on informal finance. At the same time, loan rejection rates and terms on granted loans do not vary between male and female firm owners. These results are not driven by credit risk differences between female- and male-owned firms or by any idiosyncrasies in the set of countries in our sample. Overall, the evidence suggests that in high-gender bias countries, female entrepreneurs are more likely to opt out of the loan application process, even though banks do not appear to discriminate against females that apply for credit.

**JEL classification:** G21, J16, N32, Z13.

**Keywords:** Cultural bias; Gender-based discrimination; Bank credit; Female-owned firms.

## Non-technical summary

In this paper, we aim to establish a causal link going from a well-defined cultural belief – i.e., the belief that women are inferior to men, or the *gender bias* – to a well-defined economic outcome – i.e., credit access. Specifically, we study whether, in high-gender bias countries and relative to male-owned counterparts, females-owned firms: (1) Are more often denied bank credit; (2) are more often discouraged from applying for bank credit; (3) rely less on bank credit and more on alternative sources of finance, such as trade credit, in the financing of the operations of their firm; and (4) are offered inferior terms on granted loans.

To extract the predetermined component of the gender bias across our sample of countries, we employ information on cultural attitudes of US-born descendants of European immigrants embedded in the General Social Survey. In particular, we focus on whether the person agrees or disagrees with the claim: *“It is much better for everyone involved if the man is the achiever outside the home and the woman takes care of the home and family.”* Since social capital is transmitted from parents to children, the degree of the gender bias of a person born in the U.S. whose parents were born in Germany is a good proxy for the degree of gender bias of his parents, and by extension a good proxy for the predetermined component of gender bias in contemporaneous Germany. This measurement strategy allows us to isolate the inherited component of the gender bias for 17 European countries. We then match our country-specific proxy for gender bias to information on the credit market experience by 5,905 firm-owners – 4,193 males and 1,712 females – in these countries, and test whether variations in inherited cultural biases are mapped into variations in credit access and in the terms on loans and credit lines granted by banks.

We find that cross-country differences in gender bias explain a substantial proportion of the variation in credit access by female firm-owners, but not in loan rejection rates or in the loan terms of the ultimately successful loan applications. In particular, in countries with a higher inherited gender bias and comparing female owners to male owners, the former group

of owners: 1) More often do not apply for a loan, and 2) finance a lower portion of their firm's operating expenses with bank credit and a higher portion with trade credit. However, once the firm applies for a loan or a line of credit, we find – in most specifications - no statistical differences between male- and female-owned firms in the probability of application denial. We also find no differences in the terms on granted loans, such as interest rates, collateral requirements, and the negotiation time involved. The evidence thus implies that the negative effect of gender bias on credit access is primarily manifested through a reluctance of female entrepreneurs to apply for formal credit which is driven by their belief that their credit application will be denied. Once the credit application is made, similar approval rates and loan terms suggest female-owned firms are assessed to be identical to male-owned firms, and this assessment is correct because their credit worthiness also turns out to be statistically similar. The evidence thus suggests that there is no taste-based discrimination at the level of the bank, i.e., it is not the case that loan officers select only the best female-owned firms while lending also to mediocre male-owned firms.

The contribution of our paper consists in linking the severity of the inherited cultural gender bias as it exists across countries to one specific economic outcome (credit access). Our results are consistent with a mechanism whereby female entrepreneurs tend to shy away from the formal credit granting process in countries where cultural attitudes favour males, even though credit markets are not actively discriminating against them. Policies in high-gender bias countries that enable and facilitate lending to female-owned firms are therefore called for and in particular and beyond doubt will enhance overall firm performance. One possibility could be to stimulate banks to recruit and train female loan officers that may be less subject to a gender bias, and thus encourage female entrepreneurs to apply. An alternative policy could be subsidies to banks to actively solicit loan applications from creditworthy female-owned firms that are now for no good reason discouraged from seeking formal access to credit.

*A woman cannot be herself in the society of the present day, which is an exclusively masculine society, with laws framed by men and with a judicial system that judges feminine conduct from a masculine point of view.*

Henrik Ibsen, *Ibsen's Workshop*, 1912

## **1. Introduction**

Economic research has focused intensely in recent years on the link between culture – which Guiso, Sapienza, and Zingales (2006) define as *the customary beliefs and values that are transmitted fairly unchanged from generation to generation* – and economic outcomes. Scholars have provided strong evidence that various beliefs and preferences, rooted in the cultural experience of economic agents, are related to a wide array of economic phenomena, ranging from growth (Knack and Keefer, 1997) and financial development (Guiso, Sapienza, and Zingales, 2004), to trade (Guiso, Sapienza, and Zingales, 2009) and regulation (Aghion, Algan, Cahuc, and Shleifer, 2010).

Having established a robust correlation, the research effort has turned to identifying the causal impact of culture on economic outcomes. Doing so requires taking two crucial steps. First, one needs to show that a narrow subset of the entire range of cultural beliefs and preferences has a directly measurable impact on a specific economic phenomenon. Second, one needs to show that not only the contemporaneous component of these beliefs and preferences, but also their predetermined component, has an impact on the economic outcome in case.

This paper aims to take both steps concurrently by investigating the impact of a well-defined cultural belief – i.e., the belief that women are inferior to men, or the *gender bias* – on a well-defined economic outcome – i.e., credit access. Specifically, we study whether, in high-gender bias countries and relative to male-owned counterparts, females-owned firms: (1) Are

more often denied bank credit; (2) are more often discouraged from applying for bank credit; (3) rely less on bank credit and more on alternative sources of finance, such as trade credit, in the financing of the operations of their firm; and (4) are offered inferior terms on granted loans.

Establishing a causal link from gender bias to credit market outcomes is at the heart of our paper. To extract the predetermined component of the gender bias across our sample countries, we borrow the empirical strategy from Algan and Cahuc (2010) who employ information on cultural attitudes of US-born descendants of European immigrants to extract measures of inherited trust and investigate its effect on economic growth. We focus on answers provided by U.S. descendants of European immigrants to survey questions about the proper place of women in society. For instance, we compare Americans of German, Polish, or Russian origin whose ancestors immigrated to the US in 1960. Since it is well established that social capital is transmitted from parents to children (Putnam, 2000; Guiso, Sapienza, and Zingales, 2006), the degree of the gender bias of a person born in the U.S. that has parents that were born in Russia is a good proxy for the degree of gender bias of his parents, and by extension a good proxy for the predetermined component of gender bias in contemporaneous Russia.

This measurement strategy allows us to isolate the inherited component of the gender bias for 17 European countries. Our measure of inherited gender bias is clearly superior – in a causal sense – to similar measures that are commonly extracted from contemporaneous surveys of cultural attitudes in these countries, such as the World Values Survey, that may be directly influenced by the current experiences of the surveyees including those in credit markets.

Next, we match our country-specific proxy for gender bias to information on the credit market experience by 5,905 firm-owners – 4,193 males and 1,712 females – in these countries, and test whether variation in inherited cultural biases is mapped into variations in credit access and in the terms on loans and credit lines granted by banks. We focus on small individually- or

family-owned firms to make sure that if one of the owners of the firm is female, she is materially influential in the firm's decisions.

We find that cross-country differences in gender bias explain a substantial proportion of the variation in credit access by female firm-owners, but not in loan rejection rates or in the loan terms of the ultimately successful loan applications. In particular, in countries with a higher inherited gender bias and comparing female owners to male owners, the former group of owners: 1) More often do not apply for a loan because they believe they will not get one, and 2) finance a lower portion of their firm's operating expenses with bank credit and a higher portion with trade credit. However, once the firm applies for a loan or a line of credit, we find – in most specifications - no statistical differences between male- and female-owned firms in the probability of application denial. We also find no differences in the terms on granted loans, such as interest rates, collateral requirements, and the negotiation time involved.

The evidence thus implies that the negative effect of gender bias on credit access is manifested through a self-selection of female entrepreneurs out of the loan application process rather than through higher loan denial rates or a higher price of credit. Importantly, this self-selection is largely driven by the female firm-owners' belief that their credit application will be denied. Our results are observed even when country and industry fixed effects (which capture important time-invariant variation within the high versus low gender-bias group), a wide range of firm-specific characteristics, and a nearly exhaustive set of characteristics capturing the national business environment are included.

Overall, our evidence is consistent with Cavalluzzo, Cavalluzzo, and Wolken (2002) and Muravyev, Schäfer, and Talavera (2009) who find that female-owned firms are less likely to apply for and/or to obtain bank credit than male-owned firms, both in the US and in an international context. However, to our knowledge, our paper is the first to make the empirical link between gender, a specific economic outcome (credit access), and the *gender bias*.

This paper's results are robust to one potentially confounding influence. In particular, a higher gender bias can over time trigger changes in the skill composition of the labor force through the selection of workers into education or employment, or through migration, for instance (Mulligan and Rubinstein, 2008). One potential implication is that in countries with high gender bias, female firm-owners' set of skills required to run a firm could be inferior. If banks know this, they would be rationally rationing female-owned firms in the credit markets, and consequently the line between statistical and taste-based discrimination would become blurred. However, we verify that there is no statistical difference in firm growth between female-owned and male-owned firms. Even stronger than that, we show that in high gender-bias countries, there is no statistical difference in growth rates between *constrained female-owned* firms and *unconstrained male-owned* firms. We therefore argue that our estimates indeed pick up the effect of taste-based discrimination rather than the rationing of potentially inferior projects by banks in countries with a pronounced gender bias.

We are clearly not the first to analyze the impact of cultural beliefs and preferences on economic outcomes. Putnam, Leonardi, and Nanneti (1993) show that social capital is a good predictor of government performance across Italian regions. Guiso, Sapienza, and Zingales show that trust in society affects phenomena such as entrepreneurship (2006) and trade (2009). Algan and Cahuc (2009) and Aghion, Algan, and Cahuc (2011) analyze the relationship between trust and institutions and find that, in general, countries whose citizens trust each other less tend to put in place more restrictive institutions. Aghion, Algan, Cahuc, and Shleifer (2010) explain this result by arguing that distrust increases the public demand for government intervention whereas regulation in itself discourages the formation of trust. Tabellini (2008) analyzes the role of culture on the per-capita-income of European regions by using institutional history and literacy rates as an instrument for contemporaneous trust. Finally, Barr and Serra (2010) find that social norms in the home country are related to immigrants' tolerance for corruption.



Our contribution to this extant literature is that we uncover a specific mechanism through which culture affects economic growth, namely through the gender bias and the differential access to credit. To make this contribution we borrow the recently introduced identification strategy from Algan and Cahuc (2010). They use the cultural attitudes of U.S.-born descendants of non-U.S. born ancestors to extract another predetermined component of culture, i.e., trust, in the ancestral countries and in this way made an important contribution to this literature.

The second related strand of the literature analyzes the relation between well-defined characteristics of the credit market and various social outcomes. Garmaise and Moskowitz (2006) for example show that bank mergers result in substantially higher property crime rates, because lower access to finance depresses local economic growth and raises the relative benefit of illegal activity. Beck, Levine, and Levkov (2010) show that bank deregulation is associated with a tighter distribution of income, an outcome that is not due to better access to credit for poorer households, but to an increase in the relative demand for low-skilled workers by business firms. While we do not explore the link between the structure of the credit market and economic outcomes, our work is naturally related to these studies in that we study how gender bias is transmitted into entrepreneurship through the channel of access to bank credit.

Our paper also relates to the literature on taste-based discrimination pioneered by Becker (1957). This literature has focused mainly on the labor market consequences of various physical attributes. For example, Hammermesh and Biddle (1994) and Mobius and Rosenblat (2006) find that physical beauty has a positive effect on earnings, while Cawley (2004) finds that obesity lowers the wages of white females. Persico, Postlewaite, and Silverman (2004) and Case and Paxson (2008) establish a robust effect of height on earnings, the latter through the channel of higher cognitive abilities. Johnston (2010) finds a substantial female wage premium from being blonde.

Various authors have also looked into the effect of discrimination – as well as of its interaction with various market developments – on the white-black wage gap (Neal and Johnson, 1996; Rodgers and Sprigs, 1996; Bertrand and Mullainathan, 2004; Carneiro, Heckman, and Masterov, 2005; Charles and Guryan, 2008; Levine and Rubinstein, 2011). And, in a recent contribution, Castilo, Petrie, Torero, and Vesterlund (2013) find that difference between males and females in prices and rejection rates in a highly competitive taxi market with experienced traders is due to statistical, not to taste-based discrimination.

Conceptually most similar to our study is the research on the effect of discrimination on the male-female wage gap (Bayard, Hellerstein, Neumark, and Troske, 2003), and on female market participation (Goldin and Rouse, 2000). This research in general confirms the existence of a sizeable earnings gender gap. For example, controlling for education, experience, personal characteristics, city and region, occupation, industry, government employment, and part-time status, Altonji and Blank (1999) find that only about 27 percent of the gender wage gap is explained by differences in observable characteristics. We argue that the difference in income between females and males can be related to cultural beliefs, with access to credit being one channel through which the gender bias depresses the earnings of women in society. To our knowledge, ours is the first paper to test for a direct link between the *predetermined cultural component* of gender discrimination and a well-defined economic outcome.

Most related to our paper is the empirical research on gender and credit market outcomes. Using US data on small businesses, Asiedu, Freeman, and Nti-Addae (2012) find that while race is a significant predictor of both access to credit and the cost of credit, gender is not. Belluci, Borisov, and Zazzaro (2010) find that female firm-owners in Italy face tighter credit constraints when dealing with one individual bank, even though they do not pay higher interest rates. Using the Italian Credit Registry, however, Alesina, Lotti, and Mistrulli (2013) find that after controlling for entrepreneurial risk, female borrowers do pay higher rates, especially when their guarantor is a female, too. Using a large cross-country sample, Muravyev, Schäfer, and Talavera (2012) find that female firm-owners are more likely to be denied bank credit and that

they tend to pay higher rates on bank loans, while for a number of Sub-Saharan countries Aterido, Beck, and Iacovone (2013) in contrast find no evidence of such gender discrimination. The first three papers use data from one country only and so unlike ours are unable to relate access to credit to the variation in cultural biases across countries. Relative to the latter two papers, we are not only able to link gender to credit outcomes in an international context, but also to investigate the effect of gender bias on that link.

The rest of the paper is organized as follows. Section 2 presents the data. Section 3 discusses our identification strategy. Our estimates of the effect of inherited cultural biases on credit market outcomes are presented in Section 4. Section 5 concludes.

## **2. Data**

In this section, we discuss the various data sources used in this paper.

### **A. General Social Survey**

Our measure of the inherited gender bias is constructed using data on U.S. born descendants of non-U.S. born forebears. The information itself is provided by the General Social Survey database (GSS). The database covers the period 1972-2010. The data contains a range of demographic characteristics, such as age, gender, religion, marital status, education, and employment status of the respondents. Importantly for our purposes, it provides information on the birthplace and the country of origin of the respondents' forebears since 1977. The respective GSS variable "ETHNIC" is defined as the answer to the question: "From what countries or part of the world did your ancestors come?" The countries of origin cover almost all European countries, alongside Canada, Mexico, India, and Africa (an aggregate category). We use information on U.S. citizens whose ancestors came from abroad, regardless of when they arrived in the U.S.

Our proxy for gender bias is derived from the variable "FEFAM" which is defined by the answer to following question: "*It is much better for everyone involved if the man is the achiever*

*outside the home and the woman takes care of the home and family.*” The answers are given on a scale from 1 to 4. From these answers, we construct a variable for inherited gender bias which we denote as “Traditional gender roles”. The variable is equal to 1 if the respondent answered “Strongly agree” or “Agree”, and equal to 0 if the respondent answered “Disagree” or “Strongly disagree”. There are a total of 20,992 responses in the GSS, of which 8,715 (41.5 percent) responded “Strongly agree” or “Agree”, and 12,277 (58.5 percent) responded “Disagree” or “Strongly disagree”.<sup>1</sup> 6,472 of those respondents come from 17 countries that overlap with the countries in our firm-level dataset which we describe next.

### **B. Firm-level data**

Our firm-level data come from the 2004/2005 wave of the Business Environment and Enterprise Performance Survey (BEEPS), administered jointly by the World Bank and the European Bank for Reconstruction and Development (EBRD).<sup>2</sup> We exclude data from other waves of this survey as they do not provide comparable information on credit access. The 2004 and 2005 BEEPS surveyed 9,655 firms from 27 countries in Eastern Europe and central Asia, and 4,453 firms from 5 Western European countries, respectively. We narrow this sample down to 17 countries for which we also have GSS data.<sup>3</sup> In addition to that, we exclude all firms that are not sole proprietorships. This allows us to focus on small individually- or family-owned firms. In this way, we make sure that if one of the owners of the firm is female, she has actual influence

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<sup>1</sup> Algan and Cahuc (2010) use an identical strategy to extract the predetermined component of trust from GSS answers on the question whether people in general can be trusted.

<sup>2</sup> For a detailed discussion of the data, see, e.g., Brown, Ongena, Popov, and Yeşin (2011), Popov and Udell (2012), and Ongena, Popov, and Udell (2013).

<sup>3</sup> Unfortunately, due to the geographic scope of the survey, we are missing information from many European countries, such as the Scandinavian ones, that were pioneers in women’s rights. We address this issue in a robustness test described in Section 4.B.

in the firm's decisions. The number of firms that report all the information we require for this study ranges from 141 in Bosnia, Croatia, and Lithuania, to 763 in Poland.<sup>4</sup>

### **B.1. Credit access**

To measure credit access by the firm we employ four different measures. We employ the self-reported *Share working capital financed with bank credit* and the *Share working capital financed with trade credit* as two direct measures of "past" access to credit. The survey questionnaire also includes three questions about firm financing which allow us to further describe firms' current access to credit. Firms are first asked if they have a loan or not. Those firms without a loan are then asked in Q47a whether they (a) did not apply for a loan or (b) applied for a loan, but the application was turned down or (c) have a loan application pending.<sup>5</sup>

Those firms that did not apply for a loan are then asked in Q47b to list the main reasons why they did not do so. To this question there are multiple possible answers: (a) The firm does not need a loan, (b) application procedures are too burdensome, (c) collateral requirements are too strict, (d) interest rates are too high, (e) informal payments are necessary, or (f) the firm did not think their application would be approved. From the above questions we establish our two indicators of current credit access. The variable *Firm discouraged from applying for a loan* is a dummy variable which equals 1 for those firms which did not apply for a loan, listing (b), (c), (d), (e), or (f) as a potential reason. For all firms which did apply for a loan, or did not apply because of reason (a), the variable equals 0. The variable *Loan application rejected* is a dummy variable

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<sup>4</sup> The survey aimed to achieve representativeness in terms of the size of firms it surveyed: Roughly two thirds of the firms surveyed are "small", i.e., they have less than 20 workers. By design the survey only covers established firms, i.e., firms which have been in business for at least three years. This implies that our sample does not allow us to examine credit access for very young or start-up firms. Moreover, our results are subject to sample selection, in the sense that we only observe firms which had sufficient internal or external funds to survive for at least three years.

<sup>5</sup> Despite the care by the surveyors to solicit the correct answers, it is not entirely impossible that males underreport past loan rejection or application discouragement more than females. Yet it seems rather unlikely to us that the (mis-)reporting of the shares of working capital would be gender-specific.

which equals 1 for those firms which applied for a loan but their application was turned down, and equals 0 for those firms which applied for a loan and have a loan. Firms with pending applications (i.e., less than 1 percent) are treated as missing.

< Table 1 >

Table 1 presents summary statistics for our indicators of past and current credit access by country. The table shows that there are substantial cross-country differences in credit access across the countries in our sample. For instance, while only 4 percent of the average Russian firm's working capital is financed with bank credit, in Ireland bank credit accounts for almost a quarter (24 percent). The fraction of firms that are discouraged from applying for a loan varies between 2 percent in Ireland and 53 percent in Macedonia. The cross-country variation in loan rejection rates is similarly substantial, with 1 percent of loan applications rejected in Bosnia versus 16 percent in the Czech Republic. In general, loan rejection rates appear low, suggesting that in our sample, restriction in access to finance happen mostly in the dimension of discouragement, and that firms apply for a loan only when they are reasonably certain that their application will not be rejected.

The availability of data on discouraged firms is one of the main strengths of the BEEPS, allowing us to separate firms that did not apply for a loan because they do not need one from those that did not apply although they need one. The reasons for not applying for a loan vary widely across countries in Eastern Europe. The share of firms which do not apply because they do not need a loan varies from 47 percent in Yugoslavia to 81 percent in Slovenia. The share of firms that are discouraged by burdensome procedures varies from 2 percent in Slovakia to 16 percent in Macedonia. Whereas only 1 percent of firms in Estonia feel discouraged because they anticipate rejection, this share is 10 percent in Lithuania. In addition to that, discouragement may signal an actual rejection if firms decide not to file an application after an informal conversation with the loan officer (see Duca and Rosenthal, 1993).

## **B.2. Loan terms**

Alongside variables describing various aspects of credit availability, we make use of a number of variables that describe the terms of granted bank loans. Firms with outstanding bank credit provide many details on their most recent loan. In particular, firms in BEEPS are asked about the loan rate, the maturity, the currency denomination, the collateral requirements, and the time it took to negotiate the last bank loan.

< Table 2 >

Table 2 provides the sample summary statistics by country for the most relevant loan characteristics. In the full sample it takes an average of almost 20 days to negotiate a loan, but only 8 days in Spain and more than a month in the Czech Republic and in Slovakia. The overwhelming majority of loans in all countries are collateralized, but there is great deal of variation, with the share of collateralized loans ranging from 56 percent in Greece and Slovenia to 95 percent in Bosnia and Macedonia. Collateral itself averages 149 percent of the loan. In euro area countries, at most 2 percent of the loans are in foreign currency compared to 45 percent in Macedonia. Finally, the nominal average annualized rate of loans is 985 basis points, ranging from 474 basis points in Ireland to 1,794 basis points in Romania.

## **B.3. Firm characteristics**

Recent empirical research by Brown, Jappelli, and Pagano (2009), Brown, Ongena, and Yeşin (2009), Brown, Ongena, Yeşin, and Popov (2011), Popov and Udell (2012), and Ongena, Popov, and Udell (2012) using the BEEPS data, and by Chakravarty and Xiang (2013) using the similar Investment Climate Survey data, has shown that firm size, ownership, activity, product market competition, accounting standards, bank use and internal financing, and obstacles to doing business affect credit access and credit terms.

Following the above literature we relate our indicators of credit access to firm-level indicators of firm size (*Small firm*, *Medium firm*, and *Large firm*), privatization history (*Originally*

*private*), export activities (*Exporter*), the number of local product market competitors of the firm (*Competition*), access to government subsidies (*Subsidized*), and accounting standards (*Audited*). We further feature an indicator of the sector in which the firm operates (by SIC 1-digit). Crucially, we incorporate information on the firm owner's gender (*Female*). While we do not have data on tangible assets to proxy for the ability of the firm to pledge collateral, the variables capturing firm size and industry of operation alleviate this problem to a large degree.

< Table 3 >

The definitions of these firm-level variables are provided in the Appendix. Summary statistics for our firm-level variables are presented in Table 3. The table shows substantial cross-country variation within our sample in terms of ownership by gender. For example, fewer than 1 in 5 firms in Macedonia, Slovakia, and Spain have a female owner, while 1 in 2 in Portugal does. Apart from that, the average firm in our sample is small, originally private, has no access to foreign product markets, receives no subsidies from local or central governments, and does not have its financial statements certified by an external auditor.

### **C. Country-level data**

As in Pistor, Raiser, and Gelfer (2000), de Haas and Lelyveld (2006), Giannetti and Ongena (2008), and Brown, Jappelli, and Pagano (2009), we pay attention to how access to credit may be determined by market and institutional characteristics. In particular, we relate access to credit and loan terms to foreign ownership in the banking sector, to credit information sharing, and creditors' rights, as well as to various macroeconomic and financial developments.

< Table 4 >

Table 4 presents summary statistics for our country-level variables. Unsurprisingly, foreign bank ownership is very low in countries with large domestic banks (like Germany and Spain) and very high in Eastern European countries which underwent bank privatizations in the



1990s. Western European countries which have large and developed financial sectors and are euro area members also have the highest private credit/GDP ratios, the highest degree of information sharing, the highest GDP per capita, and the lowest inflation. Conversely, Eastern European countries have on average higher GDP growth rates, although the highest growth rates in the sample are in Greece and Ireland.

The central variable in our study is the country-specific gender bias. The variable is calculated using the answers by descendants of European immigrants in the US to the GSS question on the role of women in society (see Section 2.A). We describe the estimating procedure we employ to calculate this variable in the next section, but the general idea is that after controlling for a variety of demographic characteristics, we interpret the coefficient on the country-of-origin fixed effect as the inherited gender bias. In an OLS context, this gender bias is calculated *relative* to the rest of the countries in the GSS. As Table 4 makes clear, being a descendant of parents coming from the countries in former Yugoslavia results in a higher gender bias, and being a descendant of, for instance, Irish parents results in a lower gender bias, than being a descendant of parents coming from the reference group.

### **3. Identification strategy**

In this section, we discuss the construction of our measure of country-specific inherited gender bias, as well as the identification strategy.

#### **A. *Inherited gender bias***

The construction of the country-specific measure of gender bias is based on the GSS. To simplify things, we do not focus on one particular generation, but take the answers of all respondents in the survey, regardless of what generation immigrants they are. Thus, inherited

trust in 2005 corresponds to the trust inherited by U.S.-born children of European immigrants, born at any point after 1910.<sup>6</sup>

< Table 5 >

Table 5 reports the OLS estimates of the gender bias for the full sample.<sup>7</sup> The gender bias of all other countries of origin is used as the reference group.<sup>8</sup> The regression includes country-of-ancestry dummies, whose estimated coefficients are then used as the country-specific proxies for the gender bias. In addition to those, the regression controls for a host of individual-specific characteristics: Age, age squared, education, gender, religion, employment status, and income. The total number of observations for which data is available on all relevant variables is 20,992.

The results imply that the gender bias increases with age and decreases with education. Males have a higher gender bias than females. All religious groups have a higher gender bias than atheists (the reference groups), with the exception of Jewish respondents. Employed, unemployed, and retired persons have a lower gender bias relative to the control group (which is comprised of inactive persons). Finally, respondents with a higher income have a significantly lower gender bias.

Turning to the countries in our sample, the lowest gender bias in our sample – all else equal - is exhibited by the descendant of immigrants from Ireland, who are 4.1 percentage points less likely to agree that *“it is better if the man pursues a professional career and the*

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<sup>6</sup> Paulson and Osili (2008) show that the ancestral beliefs of U.S. immigrants decline over time, suggesting that gender bias may be more pronounced for U.S. citizens who immigrated to the U.S. more recently. We perform tests using the latest wave of immigrants only, and our results are robust to this alternative measurement of the inherited gender bias.

<sup>7</sup> The probit regression yields similar results.

<sup>8</sup> An identical ranking of countries in terms of gender bias is obtained when we run the test on the 17 countries in the BEEPS data only, using Polish-Americans as a reference group.

*woman takes care of the house and family*” than the descendants of the immigrants from the reference group. At the other extreme, descendants of the immigrants from Yugoslavia are 20.2 percentage points more likely to agree with this claim than the reference country descendants. We match the coefficient on the Yugoslavia dummy to all five countries in the sample that by 2005 former Yugoslavia had broken into (i.e., Bosnia, Croatia, Macedonia, Slovenia, and Yugoslavia, comprised of Serbia and Montenegro; we later report on the strengthening effect on our estimates of removing Yugoslavia from the sample). We also assign the estimate on the Czechoslovakia dummy to both the Czech Republic and to Slovakia.

In general, we classify the bottom 50% of the countries as in terms of gender bias relative to the reference group as low-gender bias countries. These countries are the Czech Republic, Germany, Greece, Ireland, Lithuania, Portugal, Russia, and Slovakia. Because the country-specific gender bias includes a measurement error, being an OLS regression estimate itself, in future tests, we pool these countries into the group of “Low gender bias” countries. The rest of the countries we classify as the “High gender bias” countries.

One caveat related to our approach is that even if we have a good proxy for inherited gender bias, the correlation between inherited values and contemporaneous economic outcomes can be interpreted as a causal relation only if the two variables are not coterminous by common factors. It is possible that changes in inherited trust and in credit access are driven by changes in institutions that disadvantage women. For example, if the legal system excludes women from the inheritance of property, female entrepreneurs will be less likely to have tangible collateral to pledge against bank credit, and this phenomenon may affect both gender bias and credit access. To address this issue, in robustness tests we calculate the gender bias from the earliest possible sub-sample of immigrants to the US. This does not change the ranking of countries in terms of gender bias, and hence the main results of the paper.

## **B. Empirical strategy**

In order to tease out the causal effect of culture on credit market outcomes, we evaluate the effect of gender on credit market outcomes accounting for gender bias. For simplicity of illustration, yet without loss of generality, assume that countries can be divided into those with a high gender bias and those where society does not derive disutility from treating females as equal to males. We create a dummy variable equal to 1 if the US descendants of emigrants from the respective country have a higher gender bias than the US descendants of emigrants from the reference group, and to 0 if they have a lower gender bias. Then, we estimate the following equations:

$$Credit\_access_{isc} = \beta_1 Female_{isc} \cdot Bias_c + \beta_2 Female_{isc} + \beta_3 X_{isc} + \beta_4 \Delta_{sc} + \varepsilon_{isc} \quad (1)$$

and

$$Loan\_term_{isct} = \beta_1 Female_{isc} \cdot Bias_c + \beta_2 Female_{isct} + \beta_3 X_{isc} + \beta_4 Y_{sc} + \beta_5 \Delta_{sct} + \varepsilon_{isct} \quad (2)$$

In model (1), we evaluate the effect of the gender of the owner of firm  $i$  in sector  $s$  in country  $c$  on the probability of being rejected or discouraged in credit markets, as well as on the share of capital financed from bank versus non-bank sources, in high relative to low gender bias countries.<sup>9</sup> The equation controls for firm ( $X$ ) characteristics, and it includes interactions of sector and country fixed effects ( $\Delta_{sc}$ ). Including firm characteristics is crucial since female-owned firms may also be smaller, and so the effect of gender on credit we measure may be contaminated by the effect of size. The fixed effects are also enormously important as they control for any market-sector unobservables that are common across all firms. For example, it is possible that there is disproportionate concentration of female entrepreneurs in industries

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<sup>9</sup> In the case of our dummy variables for credit access, we employ a probit regression, but the results are robust to using a logit model.

which use more trade credit and less bank credit for technological reasons. While this “female-run agriculture vs. male-run manufacturing” story may be more applicable to developing economies than to the countries in our sample, we wish to fully account for such possibilities, and the comprehensive matrix of country and sector fixed effects does exactly that.

In model (2), we evaluate the effect of gender on the terms of granted loans (days to negotiate the loan, collateral, currency denomination, loan rate), in high relative to low gender bias countries. Although there is only one loan per firm, this regression has a panel component because loans were received at different points in time (between 1998 and 2005), which allows us to control for the time-varying component of the various country-level developments ( $Y$ ). The regressions also include different combinations of country, industry, and time fixed effects.

In the two equations,  $\varepsilon_{isc}$  and  $\varepsilon_{isct}$ , respectively, are i.i.d. error terms composed of a person-specific idiosyncratic shock and any unobservable sector-country (sector-country-year) fixed effects. We cluster the standard errors by country to allow for arbitrary within-country correlations in the errors.

In these specifications,  $\beta_2$  measures the causal impact of being female on access to credit or on the terms of granted loans, respectively, and  $\beta_1 + \beta_2$  measures the effect of being female on credit market outcomes or on the terms of granted loans in countries with high gender bias. The direct effect of gender bias, which is common to everyone in the respective group of countries, is subsumed in the country fixed effects. The matrix of country and industry fixed effect interactions accounts for the possibility that a “female-run agriculture vs. male-run manufacturing”-type separation is more likely to take place in countries with a high gender bias.

## 4. Results

### A. *Inherited cultural bias, gender, and credit market outcomes*

We now turn to the correlation between gender and credit market outcomes, in high vs. low gender bias countries. The idea of this section is to test the following hypotheses: a) Firm-owners' decision whether to apply for credit are affected by their gender and by the cultural environment, and b) bankers' decisions to ration female-owned firms that are similar to male-owned firms in terms of creditworthiness are driven by a gender bias. While Hertz (2011) and Muravyev, Schäfer, and Talavera (2012) provide evidence that banks discriminate against female corporate loan applicants, we want to test whether such an effect can be linked to gender bias in society. We also aim to test whether there is an informal mechanism whereby female firm-owners are more often discouraged from applying for formal credit in high gender bias countries.

#### *A.1. Inherited cultural bias, gender, and credit access*

We first investigate the determinants of credit access. Table 6 reports the empirical estimates from Model (1). We start by zooming in on the sources of financing of working capital. We focus on bank credit and on trade credit. Prior work on the pecking order in corporate finance suggests that trade credit is the most expensive source of finance for the firm, and it is only used when no other source of external finance (such as bank credit) is accessible (e.g., Petersen and Rajan, 1994; Petersen and Rajan, 1997; Harhoff and Koerting, 1998). We make two salient assumptions, i.e., that female firm-owners have the same preferences over the pecking order and that they face the same probability of success when applying for trade credit. Then, female owners having relatively lower access to cheaper bank credit and having to rely relatively more on more expensive trade credit, especially in high gender bias countries, would be one manifestation of taste-based discrimination.

< Table 6 >

Column (1) investigates the determinants of bank credit finance and column (2) the determinants of trade credit finance. Consistent with the prior literature we find that, all else equal, small firms and sole proprietorships are more credit constrained, potentially indicating a lower ability to tap alternative capital markets; firms that export part of their production are less constrained in terms of both types of finance, potentially signalling the willingness of banks and customers/suppliers to lend to firms with higher growth prospects; and audited firms are less credit constrained, implying gains from the reduction of informational opacity in terms of credit market access.

Turning to our primary variable of interest - the interaction term of “Traditional gender roles” with “Female owner” – we find that a stronger gender bias in the country moderately decreases the share of working capital that is financed with bank credit in firms with female owners (column (1)). This effect is not statistically significant. At the same time, female firm-owners appear to finance a smaller portion of their capital expenditures using bank loans, with this effect being significant across the board.

The estimate in column (2) implies that a strong gender bias sharply (and statistically significantly) increases the share financed with trade credit. Numerically, the estimated coefficient implies that if a firm with a female owner would move from Ireland to Spain, for example, trade credit financing would increase by 1.6 percentage points more than if the owner of the firms was a male. Given that the mean share of working capital financed with trade credit in the sample is only 6.4 percent, moving to a low-gender bias country would decrease reliance on informal credit by 25%.

In the next two columns, we investigate the determinants of being completely shut out from the credit markets, either because the firm was discouraged from applying (column (3)) or because it applied but its application was rejected (column (4)). We confirm the sign of the firm covariates; namely, small firms are both rejected and discouraged more often, while exporters and audited firms are less often credit constrained. Importantly, we find further evidence for a

link between gender bias and credit access. Column (3) shows that female owners are more likely to be discouraged from applying for a loan in countries with high gender bias. Numerically, moving from Ireland to Spain increases discouragement by female owners by 6 percentage points more than male owners. Once again, this result is economically significant: given that the mean probability of discouragement across all firms is 23 percent, a female entrepreneur in a low-gender bias country would be 26% less likely to be discouraged from applying for bank credit than in a high-gender bias country, *ceteris paribus*.<sup>10</sup>

To get an idea of the aggregate effect, consider the following back-of-the-envelope calculation. In 2012, there were about 2.5 mln. SMEs in Spain.<sup>11</sup> According to the BEEPS, 19% of these are female-owned, or 475,000. Out of these, 61% have enough internal funds to finance their investment needs. Of the 39% female-owned firms with a strictly positive need of bank credit, 20% are discouraged from applying for a loan, which amounts to 37,000 firms in the aggregate. Our estimates imply that if Spain had as low gender bias as Ireland, an additional 2200 female-owned firms would be applying for bank credit each year. Of course, this is a conservative calculation which disregards the fact that with lower gender bias, there could be many more female-owned firms to begin with.

Finally, the estimate of the coefficient on the interaction term in column (4) is not statistically significant (although economically relevant, too). This implies that the banking sector in high-gender bias countries does not discriminate against female firm-owners that actually apply for lines of credit. To take once again the example of Spain, our evidence suggests that if a female-owned SME with a positive need of bank credit were to apply for a line

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<sup>10</sup> Female owners in strong gender bias countries may be discouraged from applying for a loan, not because they correctly anticipate rejection due to taste-based discrimination, but because they “internalize” the gender bias and feel less confident applying *per se*. As obtaining trade credit is also often a matter of requesting and negotiating it (yet we observe trade credit to increase) we do not think such a lack of confidence necessarily applies to the female owners in our sample.

<sup>11</sup> See the European Commission’s “Enterprise and industry SBA Factsheet 2012: Spain”.



of credit, it would face the same application approval rate (98%) as a male-owned SME. We conclude that in high-gender bias countries, female entrepreneurs appear to be more likely to opt out of the loan application process, even though banks do not discriminate against females that end up applying for credit.

### ***A.2. Inherited cultural bias, gender, and loan terms***

Next we assess if the inherited cultural bias has an impact on the loan terms firms with female owners obtain (versus firms owned by males). We extend the framework in Alesina, Lotti, and Mistrulli (2013) who reject the hypothesis that banks do not price discriminate against females. However, we go beyond previous studies that focused on loan rates, by also looking at the effect of the firm owner's gender on the time it takes to negotiate the loan, on the loan's collateral, and on its currency denomination. Crucially, we compare these effects across high and low gender bias countries.

For a start, we find that some of the variables which matter for credit access (as in Table 6) also have an impact on the terms of granted loans. In particular, small firms pay higher rates on bank loans (column (5)), but these loans are less likely to require collateral (column (2)) and take a shorter time to negotiate (column (1)). On the contrary, exporters are charged lower rates by their bank (column (5)) and are more likely to have a loan in foreign currency (column (4)), potentially in order to reduce exchange rate risk vis-à-vis their export destination.

In terms of some of the time-varying country-level variables included in this regression, loan conditions are easier to negotiate banks in countries with better protection of creditors rights (column (1)), and banks charge on average higher rates in countries with higher restrictions on new business entry (column (5)).

< Table 7 >

Turning to the variables of interest, in sharp contrast to our earlier findings on credit access, the estimated coefficients on the interaction term of the "Traditional gender roles" and

“Female owner” is statistically insignificant in all but one case when a loan term is the dependent variable. For example, female-owned firms are no more likely to be charged higher rates on loans, both in high and in low gender bias countries (column (1)). This finding is somewhat at odds with Alesina, Lotti, and Mistrulli (2013) who detect price discrimination against female entrepreneurs in Italy. We also find that in high-gender bias countries, female- and male-owned firms do not differ in the time it takes to negotiate a loan (column (1)) or in collateralization conditions (columns (2) and (3)), either.<sup>12</sup>

This collection of null results implies that in high-gender bias countries there is no difference in the terms on loans between male- and female-owned firms. Our data thus provide no evidence of discrimination by banks against female firm-owners in high-gender bias countries, both in the dimension of loan rejection rates and in the dimension of terms on granted loans. However, credit access by female-owned firms is statistically lower in high-gender bias countries because female entrepreneurs are more likely to opt out of the formal credit granting process. Consequently, female-owned firms are more likely to resort to informal (and potentially more expensive) credit, such as trade credit. The evidence so far thus implies that if our results are indeed due to the operation of a cultural bias, this bias works through discouraging females from seeking credit access rather than through banks actively denying them such access.

### ***B. Robustness***

There are potentially a number of non-trivial yet surmountable problems with our empirical analysis so far. To begin with, one of the identifying assumptions related to models (1) and (2) is that female- and male-owned firms seeking access to finance are similar in all

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<sup>12</sup> Model (2) can alternatively be written as a two-stage model, whereby in the first stage firms select themselves into or out of the loan application process, and in the second stage are offered loan terms by the bank (see Popov and Udell, 2012, for an example of such empirical strategy). We have run such a version of the empirical model, and the main results are qualitatively unchanged (results available upon request).

respects except for the owner's gender. This assumption is intrinsically questionable. For example, if female entrepreneurs are indeed discriminated against, they are likely to end up running smaller firms. This may bias our results even if we formally control for firm size, if the distribution of firm sizes would suffer from an insufficient overlap across the two groups. Second, our dummy for gender bias is constructed such that countries with gender bias close to 0, according to the estimates in Table 5 (Greece, Germany, and Portugal), are split in two different groups.

The third problem is related to sample size. In particular, our measure of gender bias is calculated across a limited number of countries; we have only 17 countries in the BEEPS dataset. Furthermore, only 12 countries of origin in the GSS dataset which we use to calculate the proxy for gender bias used in the empirical tests. Part of this exercise relies on assigning one measure of gender bias to both the Czech Republic and to Slovakia, and one measure of gender bias to five countries from former Yugoslavia (Bosnia, Croatia, Macedonia, Serbia and Montenegro, and Slovenia). Such extrapolation may not be fully appropriate if these countries exhibited large cultural differences.

We begin by addressing the first problem, namely, that female-owned firms may be systematically different from male-owned ones. To control for that possibility, we borrow from the propensity score literature pioneered by Rosenbaum and Rubin (1983). We first run a logistic regression of the female dummy on the rest of the firm-level variables described in Table 3. We also include country and industry fixed effects in the regression. Panel A of Table 8 clearly indicates that the two types of firms indeed differ across a number of dimensions. In particular, female-owned firms are statistically more likely than male-owned firms to be small and originally private rather than privatized, as well as to face a less competitive environment.

< Table 8 >

We use the set of statistically significant variables from this regression to calculate the propensity score. Next, we choose for each female-owned firm a male-owned one that is most

similar based on this set of observable characteristics, and re-run model (1) on the new, reduced sample derived from this propensity score matching procedure. In the resulting sample, female- and male-owned firms are comparable based on observable firm characteristics. Panel B of Table 8 indicates that our main results are not weakened by this alternative procedure. Female-owned firms are still more likely to be discouraged and to resort to informal sources of finance, such as trade credit, in high gender bias countries. They are also less likely to have their loan application rejected, and this time the result is marginally significant.

We address the second problem in two different ways. First, we replace the dummy variable for gender bias that we have used so far with the continuous variable estimated in Table 5. While the latter is clearly subject to measurement error, its advantage is that it does not separate in different groups medium-bias countries that are very close to each other in terms of numerical estimates (e.g., Germany and Greece). The estimates of these regressions are reported in Table 9, Panel A, and they imply that our main results are robust to this alternative specification. In Panel B, we address the same problem by simply dropping the three medium-bias countries (Germany, Greece, and Portugal). The estimates continue to suggest that in high-gender bias countries, female firm owners are more likely to be discouraged from applying for bank credit and to resort to informal finance.<sup>13</sup> Numerically, for example, the estimate reported in column (3) implies that females are statistically more likely to be discouraged from applying than men in countries where the continuous gender bias variable is higher than -0.02, a groups which includes 12 countries rather than the 8 countries in the treatment group in our tests so far.

< Table 9 >

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<sup>13</sup> In unreported regressions we exclude the 5 countries of former Yugoslavia that were given the same value for gender bias in the empirical procedure in Table 5; the magnitude of the effect of gender bias on discouragement increases by 50% and becomes significant at the 1% level.

While the procedure in Table 9 goes some way in addressing the concern that our results may be contaminated by credit market experience in medium-bias countries, it only exacerbates the third problem which is related to the small size of our sample of countries. To that end, we next resort to the Global Entrepreneurship Monitor (GEM) to extract alternative measures of male and female entrepreneurial tendencies. The GEM collects survey data from current and potential entrepreneurs in 67 countries, ranging from Western Europe to Sub-Saharan Africa. While there are no questions related to access to finance, there are questions on entrepreneurial intentions summarized, by gender for each country. In particular, one of the questions in the survey asks non-entrepreneurs: “Do you intend to start a business in the next three years?” We hypothesize that if potential female entrepreneurs are less likely to start a business in the future – relative to male counterparts – in high gender bias countries, this could be interpreted as corroborative evidence to the one we have presented so far.

There are 28 countries which are present both in the GEM as a country of residence, and in the GSS as a country of origin. We repeat on this larger sample our test aimed at extracting exogenous measures of inherited gender bias (See Section 3.A.).<sup>14</sup> This allows us to extract measures of inherited gender bias for each of the 28 countries, as the coefficient on the country-of-origin dummy. Next, we calculate the variable *Intention to start a business,  $\Delta$  (Male – Female)* as the difference in average entrepreneurial intentions for males and for females, for each country. This difference ranges from 0.02 in Sweden (where 12% of males intend to start a business in the next three years and 10% of females do) to 15% in Romania (where 35% of males intend to start a business in the next three years and 20% of females do). We then correlate this measure of relative entrepreneurial tendencies to our measure of inherited gender bias.

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<sup>14</sup> We now include the following countries, in addition to the ones included in the initial test reported in Table 5: Austria, Belgium, Denmark, Finland, France, Italy, Japan, Mexico, Netherlands, Norway, Sweden, Switzerland, and the UK. The Czech Republic and Lithuania are not included in the GEM.

< Table 10 >

In Table 10, we report the estimates from this test. Column (1) suggests that gender bias alone explains about 21% of the variation in entrepreneurial intentions between males and females. The correlation itself is statistically significant at the 1% level. In column (2), we add the rest of the country-level variables employed in Table 7. The male-female gap in entrepreneurial tendencies widens with GDP growth and with good institutions for protection of creditors and for enforcement of contracts, and it is larger in countries with fewer entry barriers. Crucially, the male-female gap is still positively and statistically significantly (at the 5% level) correlated with our measure of gender bias derived from the GSS. Encouragingly, the limited set of country-level variables included in the regression has a very high explanatory power (R-squared of 0.68), suggesting that the correlation between gender bias and the male-female gap in entrepreneurial tendencies is unlikely to be driven by an omitted factor.

### **C. *Interpretation of the results***

Our results so far indicate that credit access is far more problematic for female than for male firm-owners in countries where the gender bias is strong. This is especially true in the case of discouragement from applying for bank credit. Loan rejection rates and loan terms, on the other hand, are not different between female- and male-owned firms.

Do these findings imply that there is taste-based discrimination against female entrepreneurs in countries with high gender bias? This question crucially depends on the nature of discouragement and on differences in ability across genders in those countries. Focusing on the first question, out of the five possible reasons for discouragement, only one deals with beliefs about access (“the firm did not think their application would be approved”), while two deal with beliefs about credit terms that would be offered if the firm were to apply for a bank loan (“collateral requirements are too strict” and “interest rates are too high”). It is possible that in high-gender bias countries, female entrepreneurs are less wealthy, in which

case their being discouraged by adverse credit terms would be a rational response to their inability to pledge collateral rather than a sign of discrimination.

< Table 11 >

To address this issue, we split the reasons for discouragement in the four categories for which there are sufficient number of answers (this procedure leads to the exclusion of discouragement due to the fact that “it is necessary to make informal payments to the bank”), and re-estimate Model (3). The estimates in Table 11 indicate that the discouragement of female entrepreneurs is driven by the belief that their application would not be approved rather than by their perception of adverse credit terms. This finding strongly points in the direction of a belief-based “abstention” from partaking in the process to obtain credit. To the extent that this result may reflect a mechanism related to the fear of social stigma, it is reminiscent of microfinance studies which have found a tendency of female heads of households to underreport debt relative to males (e.g., Karlan and Zinman, 2010).

Turning to the question of differences in ability across genders, if male and female entrepreneurs are indeed of equal ability, then our results point to taste-based discrimination before the loan application stage where females are mostly discouraged from applying, and resort to informal finance, such as trade credit. At the loan application stage itself, the financial system does not seem to be discriminating, resulting in similar terms on granted loans.<sup>15</sup>

Alternatively, men and women could differ in other salient ways. For example, women tend to be more risk-averse (Powel and Ansic, 1997; Jianakoplos and Bernasek, 1998). More recent experimental evidence has suggested that gender-specific risk behaviour may be due to

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<sup>15</sup> Once access to credit through a non-discriminatory loan officer is possible, potentially because the loan officer herself is a female (Beck, Behr, and Madestam, 2012), similar loan terms suggest that female-owned firms are deemed to be similar to male-owned firms. However, we do not have information on the loan officer to investigate this possibility further.

differences in opportunity sets rather than risk attitudes (Schubert, Brown, Gysler, and Brachniger, 1999), implying that women may be particularly more risk-averse in high-gender bias countries. In addition, women tend to dislike competition (Niederle and Vesterlund, 2007). These considerations might explain our result that female entrepreneurs are more likely to be discouraged from applying for a loan, especially in high-gender bias countries. In addition, they also imply that in countries with a high gender bias, where women are discriminated against, only the most capable and competitive females start a business and therefore can survive to the loan application stage. In this case, the average female entrepreneur would be more skilled than the average male entrepreneur. If so, then equal loan conditions would also point to taste-based discrimination, this time at the loan approval stage.

However, female entrepreneurs could differ from male entrepreneurs in ways which would explain our results absent taste-based discrimination. For example, if women are discriminated against, their inputs (such as education and training) might be of lower quality than those of men. Klumpp and Su (2013) argue that the belief that the human capital distribution exhibits less variation across females can be self-fulfilling, resulting in fewer “star” females and leading to a “glass ceiling” effect. Female firm owners might therefore face lower access to credit not because of direct discrimination at that stage, but because of differential skill accumulation leading to lower expected growth or higher expected risk. Consistent with this idea, Cavaluzzo and Cavaluzzo (1998) and Blanchflower, Levine, and Zimmerman (2003) do not find significant evidence of gender based discrimination in the US credit market once proxies for firm risk are taken into account. The firm-level variables and interactions of sector and country dummies we have included in our tests so far only imperfectly control for firm growth or risk.

To investigate this point more formally, we now analyse the difference in firm growth across the dimensions of gender, gender bias, and access to credit. In Table 12, we run a



version of our main tests where the independent variable is realised firm sales growth in the past three years.<sup>16</sup>

< Table 12 >

Column (1) suggests that conditioning on firm-level observables and on country and industry fixed effects, there are no differences between male-owned and female owned in terms of sales growth. If anything, female-owned firms tend to grow faster, but the difference is not significant in the statistical sense. In addition, the evidence in Column (2) implies that female-owned and male-owned firms exhibit similar growth rates in high-gender bias countries as well. This goes somewhat against the idea of statistical discrimination in high-gender bias countries whereby access to finance reflects the inferior skills of female entrepreneurs due to gender discrimination which starts early on in their lives.

However, it could still be that only the most capable females become entrepreneurs, so their firms should grow faster, but because they are constrained, their firms grow as fast as male-owned ones. To that end, in the next two columns we perform even stricter tests where we construct a dummy variable equal to 1 if the firm is female-owned *and* it does not have a bank loan because it was rejected or was discouraged from applying, and to 0 if the firm is male-owned *and* its loan application was approved. Essentially, we are comparing the performance of otherwise identical firms which vary both in the dimension of gender and credit experience. The evidence suggests that we cannot reject the null hypothesis that the two types of firms grow at different rates, not even in high-gender bias countries (Column (4)). The fact that constrained female-owned firms grow as fast as unconstrained male-owned firms suggests that there is no evidence to females having inferior skills to males in high-gender bias countries.

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<sup>16</sup> Our results are qualitatively unchanged when we repeat the tests for the logarithm of sales growth, in order to account for outliers.

Therefore, it is reasonable to conclude that the evidence in Tables 6-11 is suggestive of credit barriers to female entrepreneurs in countries with a high gender bias.

Of course, we have no way of fully eliminating alternative mechanisms related to unobservable differences between male and female entrepreneurs. One such mechanism can be related to spatial mismatch. For example, Rosenthal and Strange (2012) show that female entrepreneurs can be less networked than male counterparts, and they may face greater domestic burdens, leading them to choose locations that are farther from agglomeration and are associated with shorter commuting distances. With such mechanism in place in gender bias countries where domestic burdens may be particularly high, female entrepreneurs may be less experienced in dealing with banks, and as a result be more reluctant to apply for credit. While we cannot entirely rule out this possibility, we think that this mechanism may not be as strong in most countries in our sample as these have fairly low birth rates, a recent communist past of gender equality when it comes to labor participation, and wide availability of child crèches.

## **5. Conclusion**

We analyse differential credit access and terms across 17 countries for female- versus male-owned firms using responses from 5,905 small family firms in the 2004/2005 wave of the Business Environment and Enterprise Performance Survey (BEEPS). We find that in high-gender bias countries, firms owned by females have lower access to bank credit than otherwise similar firms owned by males. This phenomenon is fully explained by the fact that in high-gender bias countries, female entrepreneurs are more likely to opt out of the formal credit granting process, largely because they believe their loan application will be denied. In contrast, there are no statistical differences between female- and male-owned firms in loan rejection rates or in the terms on granted loans, such as rates or collateral required by the bank. We also find that female-owned firms do not underperform male-owned firms in terms of sales growth, even when not obtaining credit or when based in high gender-bias countries, alleviating concerns that our results are driven by statistical discrimination.

Our findings suggest taste-based gender discrimination that limits credit access of firms owned by females through the mechanism of self-selection out of the credit granting process. Once the credit application is made, similar approval rates and loan terms suggest female-owned firms are assessed to be identical to male-owned firms, and this assessment is correct because their credit worthiness also turns out to be statistically similar. The evidence thus suggests that there is no taste-based discrimination at the level of the bank, i.e., it is not the case that loan officers select only the best female-owned firms while lending also to mediocre male-owned firms.

The contribution of our paper therefore consists in linking the severity of the inherited cultural gender bias as it exists across countries to one specific economic outcome (credit access). Our results are consistent with taste-based gender discrimination whereby female entrepreneurs tend to shy away from the formal credit granting process in countries where cultural attitudes favour males, even though credit markets are not actively discriminating against them. One potentially effective policy aimed at addressing this issue is to stimulate banks to recruit and train female loan officers that may be viewed as less subject to a gender bias (Beck, Behr, and Guettler, 2013), which in turn could encourage female entrepreneurs to apply for loans or lines of credit.

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Table 1. Credit access, by country

Country	# firms	Share working capital financed with bank credit	Share working capital financed with trade credit	Firm discouraged from applying for a loan	Loan application rejected
Bosnia	141	0.18	0.04	0.17	0.01
Croatia	141	0.15	0.06	0.10	0.02
Czech Republic	253	0.07	0.06	0.36	0.16
Germany	778	0.13	0.11	0.10	0.08
Greece	498	0.10	0.12	0.11	0.01
Hungary	462	0.12	0.05	0.25	0.03
Ireland	395	0.24	0.09	0.02	0.02
Lithuania	141	0.10	0.13	0.24	0.05
Macedonia	153	0.04	0.06	0.53	0.04
Poland	763	0.06	0.04	0.42	0.09
Portugal	370	0.08	0.04	0.31	0.03
Romania	393	0.12	0.06	0.25	0.12
Russia	434	0.04	0.07	0.42	0.08
Slovakia	142	0.06	0.02	0.15	0.03
Slovenia	132	0.15	0.03	0.08	0.01
Spain	501	0.12	0.00	0.14	0.02
Yugoslavia	208	0.08	0.05	0.39	0.03
Total	5,905	0.11	0.06	0.23	0.05

Note: This table presents statistics on firm credit access, by country. *Share working capital financed with bank credit* is the proportion of the firm's working capital that has been financed by borrowing from private commercial banks in the past 12 months. *Share working capital financed with trade credit* is the proportion of the firm's working capital that has been financed with trade credit from suppliers or customers in the past 12 months. *Firm discouraged from applying for a loan* is a dummy equal to 1 if the firm did not apply for a bank loan because it thought it felt discouraged by credit market conditions, and equal to 0 otherwise (all dummies will have these two values; so the "equal to 0 otherwise" will no longer be included below). *Loan application rejected* is a dummy equal to 1 if the firm applied for credit and had its loan application rejected. See Appendix for variable definitions and data sources.

Table 2. Loan-level variables

Country	Days to negotiate loan	Loan not collateralized	Collateral as % of loan	Loan in foreign currency	Annualized loan rate
Bosnia	18.48	0.05	203.48	0.01	10.30
Croatia	27.02	0.25	160.36	0.29	8.13
Czech Republic	32.91	0.18	122.20	0.03	10.04
Germany	18.72	0.06	123.69	0.02	7.74
Greece	17.42	0.44	132.72	0.04	7.35
Hungary	22.53	0.06	168.04	0.21	13.22
Ireland	16.12	0.37	158.22	0.02	4.74
Lithuania	27.30	0.19	135.15	0.33	5.93
Macedonia	22.00	0.05	198.05	0.45	11.37
Poland	22.77	0.20	153.18	0.12	13.06
Portugal	10.99	0.41	120.12	0.00	7.02
Romania	21.21	0.06	153.12	0.38	17.94
Russia	19.80	0.11	148.91	0.13	18.07
Slovakia	35.67	0.23	144.31	0.02	8.07
Slovenia	14.22	0.44	157.24	0.22	6.48
Spain	8.22	0.28	134.79	0.01	6.51
Yugoslavia	22.40	0.07	193.36	0.17	13.66
Total	19.52	0.20	148.85	0.11	9.85

Note: This table presents statistics on firm financing, by country. *Days to negotiate loan* is the number of days it took to negotiate the loan with the bank from the day of application. *Loan not collateralized* is a dummy equal to 1 if the financing of the loan did not require collateral. *Collateral as % of loan* is the value of the collateral required as a percentage of the loan value. *Loan in foreign currency* is a dummy equal to 1 if the loan is denominated in foreign currency. *Annualized loan rate* is the loan's annual rate of interest. See Appendix for variable definitions and data sources.

Table 3. Firm-level explanatory variables

Country	Female owner	Small firm	Large firm	Originally private	Exporter	Competition	Subsidized	Audited
Bosnia	0.26	0.67	0.04	0.83	0.32	0.62	0.01	0.45
Croatia	0.20	0.82	0.06	0.80	0.30	0.51	0.15	0.35
Czech Republic	0.22	0.87	0.03	0.92	0.22	0.45	0.06	0.27
Germany	0.20	0.85	0.06	0.99	0.13	0.00	0.13	0.47
Greece	0.25	0.83	0.06	0.99	0.17	0.00	0.09	0.46
Hungary	0.40	0.81	0.02	0.88	0.31	0.65	0.15	0.70
Ireland	0.41	0.86	0.03	0.99	0.29	0.58	0.08	0.94
Lithuania	0.26	0.74	0.04	0.79	0.32	0.64	0.06	0.36
Macedonia	0.18	0.82	0.06	0.84	0.27	0.65	0.02	0.24
Poland	0.34	0.87	0.02	0.95	0.21	0.65	0.08	0.30
Portugal	0.50	0.91	0.04	0.99	0.10	0.00	0.04	0.74
Romania	0.28	0.72	0.04	0.85	0.20	0.41	0.05	0.35
Russia	0.28	0.75	0.07	0.86	0.13	0.22	0.01	0.35
Slovakia	0.18	0.80	0.03	0.93	0.27	0.82	0.06	0.43
Slovenia	0.35	0.92	0.02	0.86	0.42	0.68	0.10	0.20
Spain	0.19	0.88	0.06	0.97	0.14	0.00	0.03	0.27
Yugoslavia	0.25	0.82	0.06	0.89	0.25	0.56	0.05	0.24
Total	0.29	0.83	0.04	0.93	0.21	0.35	0.08	0.44

Note: This table presents firm-level statistics, by country. All firms in the final sample are individually- or family-owned. *Female owner* is a dummy equal to 1 if the principal owner (or one of the principal owners) is a female. *Small firm* is a dummy equal to 1 if the firm has less than 20 employees. *Large firm* is a dummy equal to 1 if the firm has more than 100 employees. *Originally private* is a dummy equal to 1 if the firm was founded as a private company rather than through privatization of a previously state-owned one. *Exporter* is a dummy equal to 1 if the firm has access to foreign markets. *Competition* is a dummy equal to 1 if the firm faces “fairly”, “very”, or “extremely” strong competition. *Subsidized* is a dummy equal to 1 if the firm has received subsidies during the last 3 years from the central or local government. *Audited* is a dummy equal to 1 if the firm employs external auditing services. Omitted category for firm size is *Medium firm*. See Appendix for variable definitions and data sources.

Table 4. Country-level explanatory variables

	Traditional gender roles	Private credit to GDP	Bank concentration	Information sharing	Log GDP per capita	GDP growth	Creditors' rights	Contract enforcement	Inflation	Entry time
Bosnia	0.202	16.38	0.53	0.74	8.46	1.17	3.29	6.83	2.82	63
Croatia	0.202	50.73	0.63	0.00	9.36	3.06	4.18	5.61	3.77	22
Czech Republic	-0.028	32.00	0.60	1.92	9.85	1.78	7.00	6.63	2.59	17
Germany	-0.008	115.44	0.68	6.00	10.28	0.62	8.00	4.03	1.50	18
Greece	0.018	59.16	0.93	4.00	10.06	4.58	3.00	8.19	3.23	38
Hungary	0.111	40.34	0.65	4.04	9.65	1.98	7.00	3.35	5.23	16
Ireland	-0.041	125.52	0.56	5.00	10.51	4.40	8.00	5.15	2.90	13
Lithuania	-0.027	22.48	0.78	3.00	9.36	3.28	5.00	2.10	1.91	26
Macedonia	0.202	19.39	0.79	2.05	8.76	0.93	7.00	5.21	1.51	15
Poland	0.029	26.92	0.59	2.76	9.44	1.80	8.00	9.98	3.24	31
Portugal	-0.001	137.24	0.88	4.00	9.88	-0.39	3.00	5.77	3.03	7
Romania	0.109	13.04	0.64	3.88	8.96	3.02	7.00	5.37	17.36	9
Russia	-0.036	19.86	0.22	0.00	9.34	3.38	3.00	2.81	19.26	29
Slovakia	-0.028	33.35	0.83	2.81	9.61	1.85	9.00	6.02	4.91	27
Slovenia	0.202	43.97	0.67	2.90	9.98	1.93	5.00	14.25	3.99	60
Spain	0.088	108.62	0.87	5.00	10.22	3.12	6.00	5.15	3.10	47
Yugoslavia	0.202	19.37	-----	0.00	8.64	2.15	7.00	9.40	14.43	23
Total	0.046	61.85	0.67	3.43	9.71	2.28	6.16	6.04	5.59	25

Note: The table summarizes various country-level characteristics used in the empirical analysis. *Traditional gender roles* is the estimate of the inherited views on the role of women in society by U.S. descendants of European immigrants (see Table 5 for details). *Foreign bank share* denotes the assets held by all foreign banks as a share of the assets of all commercial banks. *Private credit to GDP* denotes the ratio of private credit by deposit money banks and other financial institutions to GDP. *Bank concentration* denotes the assets held by the three largest banks as a share of the assets of all commercial banks. *Information sharing* denotes the maximum of an index for private credit bureaus and an index for public credit registers. *Log GDP per capita* denotes the natural logarithm of per capita GDP. *GDP growth* denotes annual growth in gross domestic product per capita, average over the past three years. *Creditors' rights* denotes the degree of protection of creditors' rights. *Contract enforcement* denotes the number of days it takes to enforce a legal contract. *Inflation* denotes annual inflation, averaged over the past three years. *Entry time* denotes the time in days necessary to register a new business. See Appendix for variable definitions and data sources.

Table 5. Country of origin and inherited gender bias

	Traditional gender roles	
	Coefficient (1)	Standard error (2)
<i>Demographic characteristics</i>		
Age	0.003**	(0.001)
Age squared	0.004***	(0.001)
Education	-0.029***	(0.001)
Male	0.096***	(0.007)
Catholic	0.116***	(0.011)
Protestant	0.140***	(0.010)
Jewish	0.027	(0.026)
Muslim	0.173***	(0.040)
Other	0.121***	(0.018)
Employed	-0.107***	(0.009)
Unemployed	-0.096***	(0.020)
Retired	-0.073***	(0.014)
Income category	-0.009***	(0.001)
<i>Country of origin</i>		
Czechoslovakia	-0.028	(0.031)
Germany	-0.008	(0.009)
Greece	0.018	(0.052)
Hungary	0.111**	(0.049)
Ireland	-0.041***	(0.011)
Lithuania	-0.027	(0.068)
Poland	0.029*	(0.018)
Portugal	-0.001	(0.059)
Romania	0.109**	(0.053)
Russia	-0.036*	(0.023)
Spain	0.088**	(0.033)
Yugoslavia	0.202**	(0.084)
Observations		20,992
R-squared		0.16

Note: The dependent variable captures the views on the role of women in society inherited by US immigrants from the period 1935-2000. *Traditional gender roles* is measured from the answer to the question: "It is much better for everyone involved if the man is the achiever outside the home and the woman takes care of the home and family." The answers are given on a scale from 1 to 4, which correspond to "Strongly agree," "Agree," "Disagree," and "Strongly disagree." The gender bias indicator is equal to 1 if the respondent agrees or strongly agrees, and equal to 0 if the respondent disagrees or strongly disagrees. The reference group in religion is "Atheist". The reference group in employment is "Inactive". Data come from the General Social Survey. White (1980) robust standard errors, clustered at the country level, are reported in parentheses, where \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level.

Table 6. Culture, gender, and credit access

	Share working capital financed with bank credit	Share working capital financed with trade credit	Firm discouraged from applying for a loan	Loan application rejected
	(1)	(2)	(3)	(4)
Traditional gender roles × Female owner	-0.006 (0.011)	0.016** (0.008)	0.184** (0.083)	0.208 (0.180)
Female owner	-0.027*** (0.006)	0.003 (0.007)	-0.018 (0.055)	0.124 (0.140)
Small firm	-0.046** (0.017)	-0.006 (0.010)	0.614*** (0.130)	0.262*** (0.080)
Large firm	0.026 (0.019)	0.017 (0.020)	-0.109 (0.172)	-0.260 (0.325)
Originally private	0.029** (0.012)	-0.006 (0.012)	-0.120 (0.104)	0.036 (0.217)
Exporter	0.032** (0.013)	0.019*** (0.005)	-0.345*** (0.094)	-0.302* (0.170)
Competition	0.025** (0.010)	0.005 (0.006)	-0.074 (0.108)	-0.129 (0.083)
Subsidized	0.064*** (0.021)	0.016* (0.019)	-0.754*** (0.124)	-0.550** (0.240)
Audited	0.021*** (0.007)	-0.023* (0.014)	-0.291*** (0.110)	-0.297** (0.117)
Fixed effects		Country × Industry		
Observations	5,307	5,307	2,817	1,837
R-squared	0.10	0.09	0.20	0.13

Note: This table presents regression results of indicators of credit market experience by firms on firm-level characteristics. All firms in the final sample are individually owned or family owned. The dependent variable is *Share working capital financed with bank credit* (column (1)), *Share working capital financed with trade credit* (column (2)), *Firm discouraged from applying for a loan* (column (3)), and *Loan application rejected* (column (4)). *Traditional gender roles* is a country-level measure of inherited views on the role of women in society estimated in Table 5. *Female owner* is a dummy equal to 1 if the principal owner (or one of the principal owners) is a female. *Small firm* is a dummy equal to 1 if the firm has less than 20 employees. *Large firm* is a dummy equal to 1 if the firm has more than 100 employees. *Originally private* is a dummy equal to 1 if the firm was founded as a private company rather than privatized. *Exporter* is a dummy equal to 1 if the firm does not have access to foreign markets. *Competition* is a dummy equal to 1 if the firm faces fairly, very, or extremely strong competition. *Subsidized* is a dummy equal to 1 if the firm has received subsidies during the last 3 years from the central or local government. *Audited* is a dummy equal to 1 if the firm employs external auditing services. Omitted category for firm size is *Medium firm*. See Appendix for variable definitions and data sources. All regressions include fixed effects as specified. White (1980) robust standard errors, clustered at the country level, are reported in parentheses, where \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level.



Table 7. Culture, gender, and loan terms

	Log days to negotiate loan (1)	Loan not collateralized (2)	Log collateral as % of loan (3)	Loan in foreign currency (4)	Annualized loan rate (5)
Traditional gender roles × Female owner	0.041 (0.091)	-0.101 (0.157)	-0.057 (0.040)	0.388* (0.220)	-0.185 (0.259)
Female owner	-0.124* (0.068)	0.080 (0.067)	0.006 (0.019)	-0.398* (0.206)	-0.063 (0.172)
Small firm	-0.238*** (0.071)	0.248** (0.115)	0.021 (0.032)	-0.014 (0.119)	0.691** (0.238)
Large firm	0.083 (0.136)	0.055 (0.128)	0.012 (0.051)	0.319* (0.178)	-0.921* (0.491)
Originally private	0.099 (0.092)	-0.195* (0.116)	0.043 (0.039)	0.118 (0.160)	0.124 (0.385)
Exporter	-0.089* (0.046)	-0.021 (0.100)	0.052 (0.034)	0.349*** (0.101)	-0.740** (0.359)
Competition	-0.040 (0.062)	-0.194 (0.153)	0.033 (0.022)	0.016 (0.070)	0.344 (0.342)
Subsidized	0.153*** (0.048)	-0.143 (0.155)	-0.037** (0.016)	-0.375** (0.118)	-0.179 (0.444)
Audited	-0.015 (0.057)	0.130 (0.135)	-0.028 (0.034)	0.094 (0.122)	-0.009 (0.310)
Private credit to GDP	-0.002 (0.005)	0.005 (0.005)	0.004** (0.002)	0.003 (0.015)	0.032 (0.036)
Bank concentration	0.195 (0.489)	0.185 (0.540)	-0.077 (0.139)	1.230 (1.025)	0.392 (1.929)
Information sharing	0.070* (0.036)	0.034 (0.032)	0.025 (0.018)	0.065 (0.093)	-0.070 (0.147)
Log GDP per capita	0.063 (0.638)	0.390 (0.823)	-0.359 (0.279)	-2.547 (2.621)	1.281 (3.591)
GDP growth	0.025 (0.025)	-0.001 (0.033)	0.020** (0.009)	0.037 (0.052)	-0.030 (0.093)
Creditors' rights	-0.194** (0.084)	0.068 (0.102)	-0.055 (0.041)	-0.194 (0.338)	0.410 (0.712)
Contract enforcement	0.184*** (0.059)	-0.016 (0.169)	-0.010 (0.039)	-0.296 (0.275)	-0.475 (0.343)
Inflation	-0.007 (0.006)	0.006 (0.012)	0.004 (0.003)	-0.012 (0.012)	0.079 (0.075)
Entry time	-0.018 (0.022)	0.057 (0.102)	0.020** (0.008)	-0.258 (0.306)	0.169* (0.094)
Fixed effects			Country × Industry		
			Year		
Observations	2,158	2,199	1,708	2,114	2,119
R-squared	0.21	0.15	0.17	0.23	0.59

Note: This table presents regression results of loan terms on firm-level and country-level characteristics. All firms in the final sample are individually owned or family owned. The dependent variable is the logarithm of *Days to negotiate loan* (column (1)), *Loan not collateralized* (column (2)), the logarithm of *Collateral as % of loan* (column (3)), *Loan in foreign currency* (column (4)), and *Nominal interest rate* (column (5)). *Traditional gender roles* is a country-level measure of inherited views on the role of women in society estimated in Table 5. *Female owner* is a

dummy equal to 1 if the principal owner (or one of the principal owners) is a female. *Small firm* is a dummy equal to 1 if the firm has less than 20 employees. *Large firm* is a dummy equal to 1 if the firm has more than 100 employees. *Originally private* is a dummy equal to 1 if the firm was founded as a private company rather than privatized. *Exporter* is a dummy equal to 1 if the firm does not have access to foreign markets. *Competition* is a dummy equal to 1 if the firm faces fairly, very, or extremely strong competition. *Subsidized* is a dummy equal to 1 if the firm has received subsidies during the last 3 years from the central or local government. *Audited* is a dummy equal to 1 if the firm employs external auditing services. Omitted category for firm size is *Medium firm*. *Foreign bank share* denotes the assets held by all foreign banks as a share of the assets of all commercial banks. *Private credit to GDP* denotes the ratio of private credit by deposit money banks and other financial institutions to GDP. *Bank concentration* denotes the assets held by the three largest banks as a share of the assets of all commercial banks. *Information sharing* denotes the maximum of an index for private credit bureaus and an index for public credit registers. *Log GDP per capita* denotes the natural logarithm of per capita GDP. *GDP growth* denotes annual growth in gross domestic product per capita, average over the past three years. *Creditors' rights* denotes the degree of protection of creditors' rights. *Contract enforcement* denotes the number of days it takes to enforce a legal contract. *Inflation* denotes annual inflation, averaged over the past three years. *Entry time* denotes the time in days necessary to register a new business. See Appendix for variable definitions and data sources. All regressions include fixed effects as specified. White (1980) robust standard errors, clustered at the country level, are reported in parentheses, where \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level.

Table 8. Culture, gender, and credit access: Propensity score matching results

Panel A. Choosing variables for the estimation of the propensity score				
	Female owner			
Small firm	0.423*** (0.113)			
Large firm	0.254 (0.204)			
Originally private	0.271* (0.144)			
Exporter	-0.044 (0.089)			
Competition	-0.168** (0.084)			
Subsidized	-0.078 (0.132)			
Audited	-0.001 (0.075)			
Fixed effects	Country × Industry			
Observations	5,367			
R-squared	0.09			

  

Panel B. Second stage				
	Share working capital financed with bank credit	Share working capital financed with trade credit	Firm discouraged from applying for a loan	Loan application rejected
	(1)	(2)	(3)	(4)
Traditional gender roles × Female owner	-0.014 (0.012)	0.016* (0.009)	0.172** (0.089)	0.316* (0.167)
Female owner	-0.023*** (0.005)	0.005 (0.008)	0.008 (0.056)	0.075 (0.139)
Firm controls		Yes		
Fixed effects		Country × Industry		
Observations	4,167	4,167	2,088	1,307
R-squared	0.10	0.08	0.18	0.12

Note: This table presents regression results of indicators of credit market experience by firms on firm-level characteristics. All firms in the final sample are individually owned or family owned. The dependent variable in Panel A is *Female owner*. The dependent variable in Panel B is *Share working capital financed with bank credit* (column (1)), *Share working capital financed with trade credit* (column (2)), *Firm discouraged from applying for a loan* (column (3)), and *Loan application rejected* (column (4)). *Traditional gender roles* is a country-level measure of inherited views on the role of women in society estimated in Table 5. *Female owner* is a dummy equal to 1 if the principal owner (or one of the principal owners) is a female. *Small firm* is a dummy equal to 1 if the firm has less than 20 employees. *Large firm* is a dummy equal to 1 if the firm has more than 100 employees. *Originally private* is a dummy equal to 1 if the firm was founded as a private company rather than privatized. *Exporter* is a dummy equal to 1 if the firm does not have access to foreign markets. *Competition* is a dummy equal to 1 if the firm faces fairly, very, or extremely strong competition. *Subsidized* is a dummy equal to 1 if the firm has received subsidies during the last 3 years from the central or local government. *Audited* is a dummy equal to 1 if the firm employs external auditing services. Omitted category for firm size is *Medium firm*. See Appendix for variable definitions and data sources. All regressions include fixed effects as specified. White (1980) robust standard errors, clustered at the country level, are reported in parentheses, where \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level.

Table 9. Culture, gender, and credit access: Robust measures of gender bias

Panel A. Continuous measure of gender bias				
	Share working capital financed with bank credit	Share working capital financed with trade credit	Firm discouraged from applying for a loan	Loan application rejected
	(1)	(2)	(3)	(4)
Traditional gender roles × Female owner	-0.048 (0.085)	0.108** (0.055)	0.761* (0.406)	1.914 (1.587)
Female owner	-0.027*** (0.005)	0.004 (0.007)	0.015 (0.058)	0.120 (0.143)
Firm controls		Yes		
Fixed effects		Country × Industry		
Observations	5,307	5,307	2,817	1,837
R-squared	0.10	0.09	0.20	0.13
Panel B. Excluding medium-bias countries				
	Share working capital financed with bank credit	Share working capital financed with trade credit	Firm discouraged from applying for a loan	Loan application rejected
	(1)	(2)	(3)	(4)
Traditional gender roles × Female owner	-0.003 (0.011)	0.017* (0.010)	0.187** (0.082)	0.213 (0.226)
Female owner	-0.030*** (0.005)	0.003 (0.009)	-0.025 (0.048)	0.125 (0.197)
Firm controls		Yes		
Fixed effects		Country × Industry		
Observations	3,916	3,916	2,190	1,352
R-squared	0.11	0.08	0.19	0.15

Note: This table presents regression results of indicators of credit market experience by firms on firm-level characteristics. All firms in the final sample are individually owned or family owned. In Panel A, *Gender bias* denotes the continuous measure of gender bias. In Panel B, Germany, Greece, and Portugal are dropped from the tests. The dependent variable is *Share working capital financed with bank credit* (column (1)), *Share working capital financed with trade credit* (column (2)), *Firm discouraged from applying for a loan* (column (3)), and *Loan application rejected* (column (4)). *Traditional gender roles* is a country-level measure of inherited views on the role of women in society estimated in Table 5. *Female owner* is a dummy equal to 1 if the principal owner (or one of the principal owners) is a female. All other variables from Table 6 are included in the regressions (coefficients are not reported for brevity). See Appendix for variable definitions and data sources. All regressions include fixed effects as specified. White (1980) robust standard errors, clustered at the country level, are reported in parentheses, where \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level.

Table 10. Gender bias and entrepreneurship: GEM data

	Intention to start a business, $\Delta$ (Male – Female)	
	(1)	(2)
Traditional gender roles	0.189*** (0.066)	0.122** (0.059)
Private credit to GDP		-0.003 (0.008)
Bank concentration		0.019 (0.021)
Information sharing		0.002 (0.004)
Log GDP per capita		-0.018 (0.010)
GDP growth		0.421* (0.223)
Creditors' rights		0.010*** (0.002)
Contract enforcement		0.007*** (0.002)
Inflation		0.002* (0.001)
Entry time		-0.108*** (0.028)
Observations	28	28
R-squared	0.21	0.68

Note: This table presents regression results of loan terms on firm-level and country-level characteristics. All firms in the final sample are individually owned or family owned. The dependent variable is the difference in the share of male and female non-entrepreneurs who declared an intention to become entrepreneurs in the next three years, from the Global Entrepreneurship Monitor (GEM). *Traditional gender roles* is a country-level measure of inherited views on the role of women in society estimated in Table 5, for all countries in both the GSS and the GEM. *Private credit to GDP* denotes the ratio of private credit by deposit money banks and other financial institutions to GDP. *Bank concentration* denotes the assets held by the three largest banks as a share of the assets of all commercial banks. *Information sharing* denotes the maximum of an index for private credit bureaus and an index for public credit registers. *Log GDP per capita* denotes the natural logarithm of per capita GDP. *GDP growth* denotes annual growth in gross domestic product per capita, average over the past three years. *Creditors' rights* denotes the degree of protection of creditors' rights. *Contract enforcement* denotes the number of days it takes to enforce a legal contract. *Inflation* denotes annual inflation, averaged over the past three years. *Entry time* denotes the time in days necessary to register a new business. See Appendix for variable definitions and data sources. All regressions include fixed effects as specified. White (1980) robust standard errors, clustered at the country level, are reported in parentheses, where \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level.

Table 11. Culture, gender, and credit access: Disentangling the components of discouragement

	Application procedures too burdensome	Collateral requirements too strict	Interest rates too high	Did not think application would be approved
	(1)	(2)	(3)	(5)
Traditional gender roles × Female owner	0.043 (0.208)	0.090 (0.186)	0.169 (0.186)	0.679** (0.349)
Female owner	-0.066 (0.090)	0.140 (0.124)	0.037 (0.109)	-0.182 (0.302)
Firm controls			Yes	
Fixed effects			Country × Industry	
Observations	1,568	1,378	1,428	1,450
R-squared	0.17	0.19	0.19	0.19

Note: This table presents regression results of various reasons for firms' being discouraged from applying for a loan even though they need one. All firms in the final sample are individually owned or family owned. The dependent variable is *Application procedures too burdensome* (column (1)), *Collateral requirements too strict* (column (2)), *Interest rates too high* (column (3)), and *Did not think application would be approved* (column (4)). *Traditional gender roles* is a country-level measure of inherited views on the role of women in society estimated in Table 5. *Female owner* is a dummy equal to 1 if the principal owner (or one of the principal owners) is a female. All other variables from Table 6 are included in the regressions (coefficients are not reported for brevity). See Appendix for variable definitions and data sources. All regressions include fixed effects as specified. White (1980) robust standard errors, clustered at the country level, are reported in parentheses, where \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level.

Table 12. Culture, gender, credit access, and firm performance

	Sales growth			
	(1)	(2)	(3)	(4)
Female owner	0.629 (0.742)	1.459 (1.360)		
Traditional gender roles × Female owner		-1.725 (1.356)		
Constrained female vs unconstrained male			-1.709 (1.999)	-1.173 (3.735)
Traditional gender roles × Constrained female vs unconstrained male				-1.098 (4.493)
Firm controls			Yes	
Fixed effects			Country × Industry	
Observations	3,173	3,173	1,251	1,251
R-squared	0.06	0.06	0.11	0.11

Note: This table presents regression results of indicators of credit market experience by firms on firm-level characteristics. All firms in the final sample are individually owned or family owned. The dependent variable in all columns is *Sales growth*. *Female owner* is a dummy equal to 1 if the principal owner (or one of the principal owners) is a female. *Traditional gender roles* is a country-level measure of inherited views on the role of women in society estimated in Table 5. *Constrained female vs unconstrained male* is a dummy variable equal to 1 if the principle owner (or one of the principal owners) is a female and does not have a bank loan because she was rejected or was discouraged from applying, and is equal to 0 if the principle owner (or one of the principal owners) is a male whose loan application was approved. All other variables from Table 6 are included in the regressions (coefficients are not reported for brevity). See Appendix for variable definitions and data sources. All regressions include fixed effects as specified. White (1980) robust standard errors, clustered at the country level, are reported in parentheses, where \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level.

Appendix  
Variables: Definitions and sources

Variable Name	Definition	Source
Firm characteristics		
Female	Dummy = 1 if the principal owner (or one of the principal owners) of the firm is a female.	BEEPS 2004/05
Small firm	Dummy = 1 if firm has less than 20 employees.	BEEPS 2004/05
Medium firm	Dummy = 1 if the firm has between 20 and 100 employees.	BEEPS 2004/05
Large firm	Dummy = 1 if firm has more than 100 employees.	BEEPS 2004/05
Originally private	Dummy = 1 if firm was founded as a private company rather than through privatization.	BEEPS 2004/05
Exporter	Dummy = 1 if the firm has access to foreign markets.	BEEPS 2004/05
Competition	Dummy = 1 if the firm faces fairly, very, or extremely strong competition.	BEEPS 2004/05
Subsidized	Dummy = 1 if the firm has received subsidies during the last 3 years from the central or local government.	BEEPS 2004/05
Audited	Dummy = 1 if the firm employs external auditing services.	BEEPS 2004/05
Sales growth	The percentage change in sales in the past three years.	BEEPS 2004/05
Constrained female vs unconstrained male	Dummy = 1 if the principle owner (or one of the principal owners) is a female who does not have a bank loan because she was rejected or was discouraged from applying, and = 0 if the principle owner (or one of the principal owners) is a male whose loan application was approved.	BEEPS 2004/05
Credit access		
Share working capital financed with bank credit	The proportion of the firm's working capital that has been financed by borrowing from private commercial banks in the past 12 months.	BEEPS 2004/05
Share working capital financed with trade credit	The proportion of the firm's working capital that has been financed with trade credit from suppliers or customers in the past 12 months.	BEEPS 2004/05
Loan application rejected	Dummy = 1 if the firm applied for credit and had its loan application rejected.	BEEPS 2004/05
Firm discouraged from applying for a loan	Dummy = 1 if a firm that declared positive demand for credit did not apply for a bank loan because it was discouraged by adverse credit market conditions. Self-reported reasons for	BEEPS 2004/05



discouragement include: (a) application procedures are too burdensome, (b) collateral requirements are too high, (c) interest rates are too high, (d) informal payments are necessary, or (e) the firm did not think their application would be approved.

Application procedures too burdensome	Dummy = 1 if a firm that declared positive demand for credit was discouraged from applying for credit because application procedures are too burdensome.	BEEPS 2004/05
Collateral requirements too strict	Dummy = 1 if a firm that declared positive demand for credit was discouraged from applying for credit because collateral requirements are too strict.	BEEPS 2004/05
Interest rates too high	Dummy = 1 if a firm that declared positive demand for credit was discouraged from applying for credit because interest rates are too high.	BEEPS 2004/05
Did not think application would be approved	Dummy = 1 if a firm that declared positive demand for credit was discouraged from applying for credit because it did not think that its application would be approved.	BEEPS 2004/05

#### Loan terms

Days to negotiate loan	The number of days it took to negotiate the loan with the bank from the day of application.	BEEPS 2004/05
Loan not collateralized	Dummy = 1 if the financing of the loan did not require collateral.	BEEPS 2004/05
Collateral as % of loan	The value of the collateral required as a percentage of the loan value.	BEEPS 2004/05
Loan in foreign currency	Dummy = 1 if the loan is denominated in foreign currency.	BEEPS 2004/05
Annualized loan rate	The loan's annual rate of interest.	BEEPS 2004/05

#### Country variables

Traditional gender roles	The inherited views on the role of women in society by U.S. descendants of European immigrants. It is measured from the answer to the question: " <i>It is much better for everyone involved if the man is the achiever outside the home and the woman takes care of the home and family.</i> " The answers are given on a scale from 1 to 4, which corresponds to "Strongly agree," "Agree," "Disagree," and "Strongly disagree." The gender bias indicator is equal to 1 if the respondent agrees or strongly agrees, and to 0 if the respondent disagrees or strongly disagrees.	GSS
Private credit	The ratio of private credit by deposit money banks and other financial institutions to GDP.	WB FSDS
Bank concentration	The assets held by the three largest banks as a share of the assets of all commercial banks.	WB FSDS
Information sharing	The maximum of an index for private credit bureaus and an index for public credit registers.	WB DBD

GDP growth	Annual growth in gross domestic product per capita, average over the past three years.	PWT 6.3
Creditors' rights	Degree of protection of creditors' rights.	WB DBD
Contract enforcement	The number of days it takes to enforce a legal contract.	WB DBD
Inflation	Annual inflation, average over the past three years.	EBRD TR
Entry time	Time in days necessary to register a new business.	WB DBD
Intention to start a business, $\Delta$ (Male – Female)	The difference in the share of male and female non-entrepreneurs who declared an intention to become entrepreneurs in the next three years.	GEM

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*Note:* The Table uses the following sources: Business Environment and Enterprise Performance Survey (BEEPS), 2005; General Social Survey (GSS); European Bank for Reconstruction and Development Transition Report (2000-2005 EBRD TR); World Bank Financial Development and Structure Database by Thorsten Beck, Asli Demirguc-Kunt, and Vojislav Maksimovic, 2010 (WB FSDS); Penn World Tables (PWT 6.3); World Bank Doing Business database (WB DBD); Global Entrepreneurship Monitor (GEM).

### Acknowledgements

We would like to thank Thorsten Beck, Allen Berger (FIRS discussant), Andre Guttler, Byeongju Jeong, Stepan Jurajda, and seminar participants at CERGE and at the 2013 FIRS (Dubrovnik) for useful discussion. The opinions expressed herein are those of the authors and do not necessarily reflect those of the ECB or the Eurosystem.

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**ISSN** 1725-2806 (online)  
**ISBN** 978-92-899-1635-6  
**DOI** 10.2866/875691  
**EU catalogue number** QB-AR-15-062-EN-N