When They Work with Women,

Do Men Get All the Credit?

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Abstract: We study discrimination against female entrepreneurs. We analyze bank lending to 6,422 firms in 22 transition countries, both at the extensive and intensive margin. We find that gender discrimination occurs only if a firm is *both* managed *and* owned by females, especially in localities where gender bias is acute or more domestic banks are present. In contrast if either the top manager or owner is male, we find no evidence of discrimination. Importantly, these results are not driven by females having inferior skills to males. (85 words)

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JEL codes: G21, J16, L26

1. Introduction

Economic growth strongly relies on firm performance, which itself is impeded by many factors, especially the lack of access to credit (Beck and Demirguc-Kunt, 2006; Nkurunziza, 2010). To this extent, it is central to identify the extent to which firms are credit constrained and the factors that might limit their access to credit. Among these factors, discrimination on the basis of race, ethnicity and gender exists, which is called taste-based discrimination by Becker (1957). This strand of literature focuses widely on labor market outcomes. For example, many authors have looked into the effect of racial discrimination on the wage gaps (Neal and Johnson, 1996; Rodgers and Spriggs, 1996; Bertrand and Mullainathan, 2004). Various physical attributes also play important roles. Hamermesh and Biddle (1994) and Mobius and Rosenblat (2006) find that physical attractiveness has a positive impact on incomes in general, while Johnston (2010) finds a similar beauty premium for blonde females. In contrast, weight significantly lowers the wages of white females (Cawley, 2004). Persico et al. (2004) and Case and Paxson (2008) both find a positive impact of height on earnings.

Out of these, some researchers specifically examine the outcomes of gender discrimination on the wage gap between females and males. This research in general confirms the existence of a sizeable earnings gap between genders. For example, Bayard et al. (2003) show that around one-half of the wage gap remains attributable to gender bias, even after segregating women in lower-paying positions and industries. Altonji and Blank (1999) also indicate that the observable characteristics such as education, occupation and sector together only explain around a quarter of the gender wage gap. Therefore, gender discrimination remains an important issue.

Then a natural question is: Does gender discrimination also exists in corporate lending? There are several papers that already investigate the relationship between the gender of a firm owner and credit market outcomes, but the results are mixed. Asiedu et al. (2012) for example find

that gender is not a significant predictor for access to credit. Similarly, Asiedu et al. (2013) show that a gender gap only exists in Sub-Saharan Africa, but not in other developing regions. In contrast, using the same region of Sub-Saharan countries, Aterido et al. (2013) find no evidence of such gender gap. Focusing on Italy, Bellucci et al. (2010) find that female owned firms are more likely to be credit constrained in terms of rejection rates, but these firms do not pay higher interest rates for the granted loans. However, Alesina et al. (2013) find the opposite results after explicitly controlling for entrepreneurial risk, i.e., that banks charge higher interest rates for female entrepreneurs. Using a cross-country sample, Muravyev et al. (2009) find that female owned firms are more likely to be rejected in their loan applications and that they also pay higher rates. Ongena and Popov (2016) find that in high-gender-bias countries, female entrepreneurs are more likely to be discouraged from applying any credit, even though banks do not actively discriminate against them.

We revisit gender discrimination in a particular setting, i.e., in emerging economies. Such an analysis is particularly important for the emerging countries, because development in the private sector there lags other regions (Asiedu et al., 2013). Therefore, this paper studies a sample that covers 6,422 firms across 22 transition countries from Europe, the Baltic States and Caucasus that are surveyed jointly by the European Bank for Reconstruction and Development (EBRD) and the World Bank during 2013-14.

This paper builds on the literature to examine the discrimination against female entrepreneurs during the bank lending process, both at the extensive margin (by discouraging or rejecting loan applications) and at the intensive margin (by charging higher interest rates). This paper utilises the most recent round of the Business Environment and Enterprise Performance Survey (BEEPS V), which enables us to analyse the impact of gender bias in two dimensions simultaneously: the gender of the top manager and the gender of the owner. The current literature only focuses on one of these two aspects, which may give misleading results. One

reason is that for many of the enterprises, the top manager and the owner are usually not the same person. But both of their qualifications may matter when banks make their loan decisions (Mukhtar, 2002; Mc Cartan-Quinn and Carson, 2003). Therefore, it is essential to focus on both people when investigating gender bias issues during bank lending.

We make a unique contribution to the literature on the role of gender in teamwork, which is still an underexplored theme in economics. In the psychology literature Heilman and Hayne (2005) for example rely on experiments to show that females in joint tasks are underrated as compared with their otherwise similar male counterparts: Females were rated as being less competent, less influential, and less likely to have played a leadership role in work. Terjesen, Sealy, and Singh (2009) also suggest that the recognition of a female's contribution to firm value is still below "fair value". In the academic area, Sarsons (2017) test whether coauthored and solo-authored publications matter differently for the tenure decisions between men and women in economics. Her results indicate that when women coauthor with men, women get less credit for the coauthored papers in their tenure evaluations. Therefore, it is interesting to investigate when a firm is jointly managed and owned by a female and a male, whether banks similarly assess the role that the female plays and consequently treat this firm as a male managed-owned firm. Indeed, we find that gender discrimination only occurs when an enterprise is both managed and owned by females. In contrast, if either the top manager and/or the owner of a firm are males, the firm does not face any discrimination by banks.

One possible concern for the explanation is that female entrepreneurs might differ from male entrepreneurs in ways that explain the estimation results absent any taste-based discrimination (Ongena and Popov, 2016). For example, females are more risk-averse (Powell and Ansic, 1997; Jianakoplos and Bernasek, 1998), which might undermine the growth opportunities of their firms. In addition, gender bias might over time trigger changes in the skill composition of female entrepreneurs or lower their inputs in human capital through self-selection (Mulligan

and Rubinstein 2008; Klumpp and Su, 2013). As a result, the skill required to run a firm might be inferior among female entrepreneurs, which leads to lower access to credit. However, we find no statistical difference in firms' realized sales growth (three years ahead) between female and male firms. Even stronger than that, we demonstrate that there is also no statistical difference in the growth rates between credit constrained female firms and credit unconstrained male firms. This evidence on the lack of difference combined with the findings that female entrepreneurs are more likely to be credit constrained, implies the existence of taste-based discrimination.

We use the third round of the Life in Transition Survey (LiTS) conducted in 2016, to build on the work by Ongena and Popov (2016). Our improvements in measurement compared to their paper are two-fold. First, by connecting firms with households by their exact geographical locations, our paper is able to identify the impact of gender bias at the locality level, rather than at the country level. Second, instead of measuring gender bias broadly and linked to the traditional role of gender, we apply a more specific measure that directly captures gender bias with respect to female entrepreneurship. As such, we can investigate the direct gender effects and do not need to make any inferences about the implications of a general gender bias for credit markets.

Based on precise geo-coordinates we match each firm with nearby households, within a radius of 20 km. We formally test whether the relationship between the gender of a firm's top manager or owner and access to credit varies across localities with high or low level of gender bias. We find that differences in the local gender bias explain a substantial proportion of the variation in the credit constraints faced by female entrepreneurs, but are not reflected in the interest rates of the granted loans. In particular, gender discrimination then only occurs in localities with a higher gender bias.

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Finally, based on the findings that discrimination against female entrepreneurs mostly occurs in localities with a higher gender bias, this paper further examines whether gender discrimination is more common in localities with more domestic banks, which may be more affected by the gender bias locally. Information on the local banking market is obtained from the second round of the Banking Environment and Performance Survey (BEPS II), with information on both the foreign ownership of a bank and the geographical coordinates of all bank branches across the sample countries. After matching the firms with nearby bank branches, this paper finds that in contrast with foreign banks, domestic banks are more likely to discriminate female entrepreneurs.

The remainder of the paper proceeds as follows. Section 2 presents the data and summary statistics. Section 3 introduces the empirical methodology. Section 4 describes the results and Section 5 concludes.

2. Data and Summary Statistics

To empirically identify the gender bias during the corporate lending process, we utilise firm-level information to measure both the conditions of firms' access to credit and the gender of a firm's owner and top manager. All the firm-level data come from the fifth round of the Business Environment and Enterprise Performance Survey (BEEPS V) conducted jointly by European Bank for Reconstruction and Development (EBRD) and the World Bank during 2013-14. The sample covers 6,422 firms across 22 transition countries from Europe, the Baltic States and Caucasus.[1] The detailed variable definitions and data sources are listed in Table 1.

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[1] The 22 countries include: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Latvia, Lithuania, FYR Macedonia, Moldova, Montenegro, Poland, Romania, Serbia, Slovak Republic, Slovenia and Ukraine.

[Insert Table 1 here]

2.1. Gender

Information on the gender of a firm's top manager and owner is obtained from two questions in BEEPS V. To capture the gender of a firm's top manager, we turn to the question B.7a that asks, "Is the top manager female?" and define the firms accordingly. To distinguish if a firm is owned by females, we seek to the question B.4a that asks, "What percentage of the firm is owned by females?" For firms that at least 50 per cent of their shares are owned by females, we classify them as female owned firms. The other firms are classified as male owned firms. Therefore, combining these two questions together, we can classify the firms into four categories, namely a *Female Managed and Female Owned Firm*, a *Female Managed and Male Owned Firm*, a *Male Managed and Female Owned Firm*, and a *Male Managed and Male Owned Firm*. The detailed information enables us to distinguish firms by the gender of the top manager and owner simultaneously.

Summary statistics are reported in Table 2. Most of the firms are both managed and owned by males, which account for 72 per cent on average. In contrast, only 14 per cent of firms are both managed and owned by females. In addition, 7 per cent of firms are managed by males and are owned by females. Similarly, the other 7 per cent of firms are managed by females and are owned by males.

[Insert Table 2 here]

The data also demonstrate substantial variation across countries. For example, there are almost 20 per cent of firms that are both managed and owned by females in both Estonia and Moldova. However, in Azerbaijan, the number is less than 3 per cent. In addition, in Belarus, there are

many firms that are managed by females and owned by males (20 per cent). There are more than 10 per cent of firms that are managed by males and owned by females in countries like Moldova, Poland, Romania and Serbia. At first sight, there is substantial variation across countries in terms of the gender of firm top managers and owners.

[Insert Table 3 here]

Figure 1 plots all the firms in the sample, which is categorised by the gender of a firm's manager or owner. Panel A presents the firms that are both managed and owned by females, while Panel B (Panel C) shows the firms whose top manager is a female (male) and owner is a male (female). The firms that are both male managed and owned are listed in Panel D. Although the male managed and owned firms are the majority, all these four different types of firms are present in all the sample countries.

[Insert Figure 1 here]

2.2. Access to Credit

To measure firms' access to credit, we follow Popov and Udell (2012) and Beck, Degryse, De Haas and Van Horen (2017) and utilise *Credit Constrained*. We combine three questions in BEEPS V to first distinguish between the firms with and without demand for credit (*Credit Demand*). Among the former group, we then identify the firms that were credit constrained: those that either got rejected by a loan application or were discouraged from applying any loan. This combination allows us to distinguish between firms that do not apply for any loan because they do not need one and those that do not apply because they are discouraged.

We start with question K16: "Did the establishment apply for any loans or lines of credit in the last fiscal year?" For firms that answer "No", we move to question K17, which asks the main reason the establishment did not apply for any line of credit or loan. For firms that answer "Yes", question K18a subsequently asks: "In the last fiscal year, did this establishment apply for any new loans or new credit lines that were rejected?" we group firms that answer both "Yes" to K16 and "No" to K18a as credit unconstrained, and firms are constrained if they answer "Yes" to K18a or answer one of the following "Interest rates are not favorable"; "Collateral requirements are too high"; "Size of loan and maturity are insufficient"; or "Did not think it would be approved" to question K17.

According to the summary statistics in Table 2, virtually half of all sample firms had demand for credit. Among those firms with credit demand, 36 per cent were credit constrained. Thus, bank credit is a vital source of external finance in the sample countries and exerts a major obstacle for the firms that are operating there. Table 3 further reveals substantial variation across the sample countries. Among firms that have demand for credit, the share of credit constrained firms ranges from 13 per cent in Czech Republic to 61 per cent in Montenegro.

The BEEPS V also collects information about the loan characteristics for the borrowing firms' most recent line of credit or loan, including the annual nominal *Interest Rate* (in per cent), the original *Duration* (in months) of the loan and whether the loan required *Collateral*. The summary in Table 2 indicates that the average interest rate was 10.5 per cent with average duration of 39 months. 80 per cent of all borrowing firms were asked to pledge collateral. The interest rates also vary significantly across countries as shown in Table 3. For example, the average interest rate equals 26 per cent in Belarus but is around 5 per cent in Czech Republic, Estonia, Latvia, Lithuania and Slovenia.

Figure 2 shows the heatmaps of firms' access to credit. Each point represents a firm in the sample. In Panel A, darker red indicates a firm that is credit constrained, while darker red

indicates higher interest rate in Panel B. There is substantial variation both across countries and within each country. The combination of these two measures enables us to exploit a firm's access to credit at both the extensive and intensive margin.

[Insert Figure 2 here]

2.3. Firm Characteristics

We then construct other firm-level variables using BEEPS V. *Crime Experience* dummy equals to 1 if a firm experienced loss as a result of theft, robbery, vandalism or arson last year and 0 otherwise. *Sales Growth* measures the realized firm sales growth (in per cent) in the past 3 years. A common set of control variables are further included (i.e., Beck et al., 2017). Specifically, we include *Firm Size*, which is classified into small (1-19), median (20-99) and large (100+) firms based on the number of permanent full-time employees. If a firm's annual financial statement is checked and certified by an external auditor, then this firm is classified as an *Audited Firm. Female Managed Firm* measures whether the top manager of a firm is female. Firm ownerships are also included, including whether a firm is a *Sole Proprietorship Firm*; a *Publicly Listed Firm*; a *Privatized Firm* from a former state-owned enterprise; and a *Foreign Firm* if more than 50 per cent of a firm's shares are foreign-owned. Detailed summary statistics of these variables are provided in Table 2.

2.4. Local Gender Bias

Next, we investigate the impact of local gender bias regarding the relationship between the gender of the top manager or owner and access to credit. To extract information on the local inherited gender bias around each firm, we utilise the third round of Life in Transition Survey (LiTS) conducted by the European Bank for Reconstruction and Development (EBRD) in 2016.

Specifically, we use LiTS question Q426a that asks to what extent a respondent agrees that women are as competent as men to be business executives. The possible answers are: Strongly disagree (1), Disagree (2), Agree (3) and Strongly agree (4). Higher values indicate that there is less gender bias with regards to women as entrepreneurs. Within each of the sample countries, there are approximately 1,500 respondents, as shown in Table 4. Countries as Estonia, Hungary and Slovenia show relatively low level of gender bias, while gender bias is relatively stronger in Belarus, Georgia and Poland. Besides focusing on a full sample of respondents, we also pay special attention to female respondents, who might be able to give a more precise measure of gender bias based on their own experiences. Although the answers are generally in line with each other, females do report a higher level of confidence in female entrepreneurship, which results in less gender bias. Therefore, to account for potential reporting bias, we measure gender bias based on both all the respondents and only female respondents.

[Insert Table 4 here]

To match each firm with nearby households, we draw a circle with a radius equals 20 km around the geo-coordinates of each firm and link the firm to only those households inside that circle.[2] After matching (identifying the households that surround each firm), we then construct variables at the local level that measure the inherited gender bias extracted from question Q426a in LiTS III. *No Gender Bias* measures the local average level of agreement that women can be proficient business executives as men. Then we sort all the localities in the sample based on *No Gender Bias* and classify the top 50 per cent of localities as *Low Gender Bias Locality*.

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[2] The LiTS data and the BEEPS data cannot be matched by the name of the city or town and a circle of 20 km can in general includes both a city and the nearby rural areas. Out of the total 6,422 firms, 5,406 of them can be matched with households within a circle of 20 km.

The rest of localities we classify as *High Gender Bias Locality*. As shown in Table 2, in general, gender bias is not a severe issue and people agree that women are as competent as men to be business executives.

2.5. Local Banking Market

Lastly, we examine whether the domestic banks or foreign banks are more likely to discriminate against female entrepreneurs. To extract information on the local banking market, we turn to the second round of the Banking Environment and Performance Survey (BEPS II), jointly undertaken by EBRD and Tilburg University. We obtain bank information on their ownerships (foreign versus domestic). Furthermore, as part of BEPS II, a specialized team of consultants also collected the geographical coordinates and the establishment dates of all bank branches across the sample countries.

Following Beck et al. (2017), we connect firms and bank branches in two ways. First, we match firms with bank branches by locality (city or town). The underlying assumption is that a firm ensures access to all the bank branches in the locality where it operates. Second, we draw a circle with a radius that equals 5 km around the geo-coordinates of each firm and link the firm to only those bank branches inside that circle.[3] After matching (identifying the bank branches that surround each firm), we construct a variable at the locality (or circle) level to measure the *Share of Foreign Banks*. This locality level variable is an average that is weighted by the number of branches that a bank operates within a locality or circle. This enables us to distinguish between firms that are surrounded by more foreign versus domestic banks. Then we sort all the localities in the sample based on *Share of Foreign Banks* and classify the top 50

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[3] According to the literature, the median Belgian SME borrower in Degryse and Ongena (2005) is located 2.5 km from the lending bank's branch. In the US data of Petersen and Rajan (2002) and Agarwal and Hauswald (2010) this median distance is 3.7 km and 4.2 km, respectively.

per cent of localities as *Foreign Bank Locality* and the rest as *Domestic Bank Locality*. As shown in Table 2, foreign ownership of banks is a key characteristic of the banking sector in transition countries. Following the privatization policies, the market share of foreign banks is rather high. At the locality level or 5 km circle level, more than 50 per cent of all the bank branches are foreign-owned on average.

3. Methodology and Hypotheses

To estimate the gender bias during the lending process, we first exploit the impact of the gender of a firm's top manager and owner on firms' access to credit by the following model:

$$Access\ to\ Credit_{ics} = \alpha_c + \alpha_s + \beta Gender_{ics} + \gamma X_{ics} + \varepsilon_{ics} \tag{1}$$

for firm *i* operating in country *c* in industry sector *s*. *Access to Credit* either measures if a firm is credit constrained from the extensive margin (Credit Constrained) or captures the *Interest Rate* of the most recent loan or line of credit last year at the intensive margin. The *Gender* of firm owner/manager captures whether the owner or the top manager of a firm is a female, including a *Female Managed and Female Owned Firm*, a *Female Managed and Male Owned Firm*, and a *Male Managed and Female Owned Firm*. *X* represents the firm-level control variables including *Firm Size*, *Audited Firm*, *Female Managed Firm*, *Sole Proprietorship Firm*, *Publicly Listed Firm*, *Privatized Firm* and *Foreign Firm*. When identifying the impact from the intensive margin, we also control for the loan characteristics as *Duration* and *Collateral*. The country and industry fixed effects are also included to control for (un)observed variation at the country and industry level, which is crucial for the identification. In strictest specifications, country-sector interacted fixed effects are also included. According to Ongena and Popov (2016), the comprehensive matrix of the country and sector fixed effects control for

the fact that industries or countries are likely to have disproportionate concentration of female entrepreneurs. For example, stories of "female-run agriculture vs. male-run manufacturing" might be very applicable to developing economies like the sample in this paper, so we wish to fully account for such possibilities. Although there is only one loan per firm, this regression at the intensive margin has a panel component because loans were received at different points in time, which allows us to control for the time-varying component of developments by including the loan issuance year fixed effects in addition.

The main coefficient of interest is β, which identifies the impact of the gender of a firm's owner or top manager on firms' access to credit. Based on the literature, we hypothesize that if a firm *i* operating in country *c* in industry *s* is either owned or managed by females, this firm *i* would experience more limited access to credit, from both the extensive and intensive margins. Hence, a significantly negative β would be expected.

However, in the sample a firm's credit constraint is only observable if the firm needs a loan. This raises the issue of selection bias and the β estimate may be not reliable. To address this issue, I utilize both *Crime Experience* and *Product Losses* as two selection variables that are excluded from Model (1) to identify the model (Heckman, 1979). *Crime Experience* equals to 1 if a firm experienced loss as a result of theft, robbery, vandalism or arson. *Product Losses* is a dummy equals to 1 if a firm's product was lost in transit due to breakage or spoilage. From the firm's perspective, both of the incidents are unanticipated, exogenous, and likely to cause temporary reductions in available liquidity (Gorodnichenko & Schnitzer, 2013). Thus these indicators should be strong predictors of a firm's credit demand. However, the exogenous, and plausibly random, nature of these events make them unlikely to directly affect a firm's access to bank credit. Thus these two selection variables are valid economically. The first-stage Heckman selection model is as below:

$$Credit\ Demand_{ics} =$$

$$\alpha_c + \alpha_s + \beta_1 Crime\ Experience_{ics} + \beta_2 Product\ Losses_{ics} + \gamma X_{ics} + \varepsilon_{ics} \qquad (2)$$

for firm i operating in country c in industry sector s. The same sets of control variables X are included, as well as country and industry fixed effects. The hypothesis is that if firm i operating in country c in industry s experienced losses as a result of crime last year, this firm i would need more credit. Therefore, we would expect a significantly positive β_1 and β_2. The Inverse Mills' ratio is first obtained from Model (2), then it is included in Model (1) to address the selection bias.

Then, we would like to further tease out the causal effect of culture on credit market outcomes by evaluating the effect of gender on access to credit accounting for local inherited gender bias as suggested by Ongena and Popov (2016). For simplicity of illustration, we assume that localities can be divided into those with a low and a high gender bias. To be more specific, we first create a dummy variable, *Low Gender Bias Locality*, equal to 1 if the local residents around a firm have a lower gender bias than the country average. Similarly, we create another dummy variable, *High Gender Bias Locality*, equal to 1 if the local residents around a firm have a higher than average gender bias. Then, we estimate the following equations:

$$Access\ to\ Credit_{ilcs} = \alpha_c + \alpha_s + \beta_1 Gender_{ilcs} * Low\ Gender\ Bias\ Locality_l$$

$$+ \beta_2 Gender_{ilcs} * High\ Gender\ Bias\ Locality_l + \gamma X_{ics} + \varepsilon_{ics} \qquad (3)$$

for firm i operating in locality l in country c in industry sector s. A same sets of control variables X, as well as country and industry fixed effects are included. The underlying hypothesis is that if a firm i operates in locality l in country c in industry s, where gender bias in locality l is relatively high, the impact of gender on credit access would be more pronounced.

Lastly, if gender discrimination is valid and mostly occurs in localities with higher gender bias, the discrimination against female entrepreneurs is more likely to occur in localities with more domestic banks. The intuition is that compared to foreign banks, the domestic banks are more affected by the gender bias in the local culture. This is also due to the fact that most of the foreign banks in these countries come from Western European countries where gender bias is less severe. Specifically, we sort all the localities in the sample based on *Share of Foreign Banks* and classify the top 50 per cent of localities as *Foreign Bank Locality* and the rest as *Domestic Bank Locality*. Then, we estimate the equations below:

$$Access\ to\ Credit_{ilcs} = \alpha_c + \alpha_s + \beta_1 Gender_{ilcs} * Foreign\ Bank\ Locality_l$$

$$+ \beta_2 Gender_{ilcs} * Domestic\ Bank\ Locality_l + \gamma X_{ics} + \varepsilon_{ics} \quad (4)$$

for firm *i* operating in locality *l* in country *c* in industry sector *s*. A same sets of control variables *X*, as well as country and industry fixed effects are included. The underlying hypothesis is that if a firm *i* operates in locality *l* in country *c* in industry *s*, where there are relatively more domestic banks in locality *l*, the impact of gender on credit access would be more pronounced.

4. Empirical Results

4.1. Gender Discrimination

This section starts with Table 5, which provides a vivid illustration that link firms' access to credit with the gender of the firm's top manager and owner. We focus on two aspects of credit access: the extensive margin which captures the credit constraints of a firm and the intensive margin about the interest rate of the most recent loan in the last fiscal year. Firms are classified into four groups: the *Female Managed and Female Owned Firm* (417/225 firms), the *Female Managed and Male Owned Firm* (222/144 firms), the *Male Managed and Female Owned Firm*

(229/188 firms), and the *Male Managed and Male Owned Firm* (2,250/1,374 firms). Compared with the firms that are both managed and owned by males, female managed and owned firms are about 8 per cent more likely to be credit constrained and pay an interest rate that is 1.24 percentage point higher. The differences are highly significant at the 5 per cent level under a two-sample t-test with unequal variances. In contrast, for firms that either the top manager or the owner is a female, there is not significant difference when compared to the male managed and owned firms in terms of credit access. These results are in line with the Heilman and Hayne (2005) evidence that females were undervalued as compared with their male counterparts in joint work, so do banks during their lending process. From the bank's perspective, females are still discriminated in this case, but this discrimination only occurs before the loan decision. As a result, firms that are both managed and owned by females are mostly likely to be discriminated against during the corporate lending process, both extensively and intensively.

[Insert Table 5 here]

We then formally test the relationship between gender and access to credit by employing an exact matching strategy. This approach is to match out both the observed firm characteristics and (un)observed variables at both the country and the sector level (Ioannidou and Ongena, 2010). Specifically, each of the female managed/owned firms is matched with all the other types of firms based on country, sector and a set of firm characteristics. The average treatment effect for the treated (ATET) is reported accordingly in Table 6. The results in columns (1) and (4) suggest that both female managed and owned firms are more limited in their credit access and pay higher interest rates than other similar firms. Economically, a *Female Managed and Female Owned Firm* is 6.7 per cent more likely to be credit constrained, and pays a 1.9

percentage point higher interest rate. Again, no statistical differences are found for firms that are managed or owned by females and males together.

[Insert Table 6 here]

However, the matching results may be biased due to the potential self-selection issue. That is, a firm's credit constraint is only observable if the firm needs a loan. To address this issue, we point to Table 7 where a two-stage Heckman selection equation is applied with regards to the credit constraints of a firm. The first-stage Heckman selection results are reported in the first three columns. The dependent variable is a *Credit Demand* dummy and the selection variables are *Crime Experience* and *Product Losses*. The same set of firm control variables is also included in the equation, as well as the country and sector fixed effects (or country-sector interacted fixed effects). Model (1) presents the most basic specification that do not control any firm characteristics, as well as country and sector fixed effects. Model (2) includes all of these controls and model (3) further controls for country-sector interacted fixed effects. As expected, both *Crime Experience* and *Product Losses* are significantly and positively related with *Credit Demand*. In other words, if a firm experienced loss as a result of crime or breakage or spoilage in product transition in the last fiscal year, this firm would demand for more credit (by 8 per cent economically) to cover the resulted financial loss.

The second-stage results are presented in columns (4) to (9) of Table 7, where the *Inverse Mills' Ratio* is included to correct for the selection bias. The *Inverse Mills' Ratio* enters significantly in some of the specifications, suggesting the existence of a selection bias and hence that the estimates obtained through regressions without such a correction may be inconsistent. Models (4) to (6) only include *Female Managed and Female Owned Firm* as the main independent variable. So, the control group includes firms that are both managed and owned by males, as

well as firms that are managed or owned by females and males together. In comparison, models (7) to (9) further include *Female Managed and Male Owned Firm* and *Male Managed and Female Owned Firm* as independent variables, where the control group now only includes firms that are both managed and owned by males. The same set of control variables and fixed effects are applied. The results show that the likelihood of being credit constrained is about 5 per cent significantly higher for female managed and owned firms. In contrast, if either the top manager or owner is a male, this firm does not face discrimination during the bank lending process at the extensive margin. Consistent with the prior literature we find that, all else equal, smaller firms are more likely to be credit constrained, potentially indicating a lower capability to tap alternative capital markets. Besides, audited firms are found to be less credit constrained, implying gains from the reduction of information asymmetry in terms of credit access.

To get an idea of the aggregate effect, consider the following back-of-the-envelope calculation. In 2015, according to the European Commission's "Enterprise and industry SBA Factsheet 2016: Poland", Small and Medium Enterprises (SMEs) amount to 1.54 million in Poland.[4] According to BEEPS V, 14 per cent of these firms were female owned, or 215,571 firms. Out of these, 35 per cent had demand for bank credit, of which 30 per cent are credit constrained, or 32,336 firms in the aggregate. The results imply that if there is no discrimination against female entrepreneurs, an additional 3,772 female managed and owned firms would be able to gain access to bank credit each year. Of course, this is a conservative calculation that ignores the fact that with no gender discrimination taking place, there could be many more female entrepreneurs in the first place.

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[4] The BEEPS survey mainly focus on SMEs and according to the European Commission's "Enterprise and industry SBA Factsheet 2016: Poland", in 2015, SMEs in Poland account for 99.8 % of businesses in the Polish 'non-financial business economy'.

[Insert Table 7 here]

Table 8 represents the results on the intensive margin where the dependent variable is *Interest Rate*. We start with a sample that includes all loans that were issued in the past years as shown in models (1) to (6). Again, in models (1) to (3), we only include *Female Managed and Female Owned Firm* as the main independent variable, while models (4) to (6) in addition also include *Female Managed and Male Owned Firm* and *Male Managed and Female Owned Firm* as independent variables. Besides the same set of control variables and country or sector fixed effects, these specifications also control for the loan issuance year fixed effects. The results indicate that the female managed and owned firms pay interest rates that are on average higher by almost 1 percentage point. What is more, in models (7) to (12), we restrict the sample to include only those loans that were issued within one year. This enables us to tease out the historical information which may bias the results. The estimates show an even more severe gender discrimination both statistically and economically. Female managed and owned firms now pay around 2 percentage point higher interest rates. Similarly, if a firm is managed and owned by females and males together, this firm does not face any discrimination during their lending at the intensive margin. Regarding the control variables, large firms are persistently found to pay lower interest rates, which indicates a higher ability to access alternative capital markets.

We again utilise Poland to get an idea of the economic impact by the following rough calculations. According to Narodowy Bank Polski (National Bank of Poland), in 2015, loans to SMEs amount to 47 billion US dollars in Poland. According to BEEPS V, 14 per cent of these loans were issued to firms that were female managed and owned, or 6.6 billion US dollars. The results imply that if the discrimination against female entrepreneurs is eliminated, then an additional 132 million US dollars interest payment would be "saved" each year.

[Insert Table 8 here]

The results so far indicate that credit access is far more problematic for female than for male firm entrepreneurs, both at the extensive and intensive margin. Do these findings imply the existence of taste-based discrimination against female entrepreneurs during the bank lending process? This question crucially depends on the nature of discrimination and on the differences in ability across genders in those countries. For example, if male and female entrepreneurs are indeed of equal ability, then the findings indicate that the banking market indeed discriminates against female entrepreneurs, resulting in the higher probability of being credit constrained, as well as the higher interest rates on granted loans.

However, female entrepreneurs could differ from male entrepreneurs in ways that explain the findings absent any taste-based discrimination. For example, women are found to be more risk-averse (Powell and Ansic, 1997; Jianakoplos and Bernasek, 1998). So female entrepreneurs may forgo valuable investment opportunities in order to take less risk, which might undermine the growth opportunities of their firms. In addition, if women are discriminated against, their inputs in human capital such as education might be of lower quality than those of men (Mulligan and Rubinstein, 2008). Klumpp and Su (2013) also argue that the belief that females' human capital distribution has a lower variance than the male distribution can be self-fulfilling, resulting in a "glass ceiling" effect with fewer "elite" females. Therefore, female entrepreneurs might face more limited access to credit not because of direct discrimination, but because of differential skill accumulation leading to lower expected growth or higher expected risk of their firms. The firm-level control variables and the sector and country fixed effects included in the analysis so far only imperfectly control for the firm growth or risk.

To investigate this point more formally, we now analyze the difference in firm growth across the dimensions of gender and credit access. In Table 9, we run a version of the main tests where the independent variable is the realized firm sales growth in the past 3 fiscal years (*Sales Growth*). The results in models (1) to (3) imply no differences between female and male entrepreneurs in terms of sales growth. This goes somewhat against the idea of non-taste-based discrimination whereby access to finance reflects the inferior skills of female entrepreneurs. In addition, we also zoom in to only focus on a sample of credit constrained female firms and credit unconstrained male firms to further investigate this issue. The evidence in models (4) to (6) is similar as in the first three models and suggests that we cannot reject the existence of taste-based discrimination against female entrepreneurs. Taken together, there is no evidence suggesting females are having inferior skills to males. It is also worth mentioning that even though female entrepreneurs are discriminated during the bank lending process, their firms still perform similar to male owned and managed firms. This indicates that if gender bias disappears, female firms can perform even better than male firms, which will further contribute to the economic growth.

[Insert Table 9 here]

4.2. Local Gender Bias

In order to tease out the causal effect of culture on credit market outcomes, we follow Ongena and Popov (2016) to evaluate the effect of gender on credit market outcomes while accounting for gender bias. This paper contributes to the literature in two ways. First, by connecting firms in BEEPS V with the households surveyed in LiTS III by their exact geographical locations (geo-coordinates), this paper is able to identify the impact of gender bias at the locality level,

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instead of at the country level. This analysis builds on the notion that culture (gender bias) not only varies across countries, but also differs within a specific country. Second, instead of measuring gender bias on a very broad sense about the traditional role of gender, this paper applies a more specific measure that directly captures gender bias on female entrepreneurships. As such, we can investigate the direct gender effects and do not need to make any interference about the implications of the general gender bias on the credit market.

The results are presented in Table 10. *Low Gender Bias Locality* is a dummy equals 1 if the local residents around a firm have a lower gender bias than the country average and 0 otherwise. Similarly, *High Gender Bias Locality* is another dummy equals to 1 if the local residents around a firm have a higher than average gender bias and 0 otherwise. These two dummy indicators are measured based on the answers either from all respondents or from female respondents only. We start by zooming in on the *Credit Constrained* measure, which captures the to which extent a firm is completely shut out from bank credit, either being discouraged from applying any credit or the application got rejected. The estimates confirm evidence for a link between gender bias and credit access. Regardless of basing on all respondents or only female respondents, a female managed and owned firm is more likely to be credit constrained in localities with higher gender bias. The results are also economically significant. For example, a female entrepreneur in a high gender bias locality would be about 8 per cent more likely to be credit constrained than a male entrepreneur, ceteris paribus. In contrast, in low gender bias localities, a female entrepreneur, at least statistically, is not discriminated during the lending process. Numerically, to take once again the example of Poland, the estimates suggest that if all the localities had low gender bias compared to the case of high gender bias, an additional 1,293 female entrepreneurs would be able to obtain bank credit each year.

Lastly, we move to the *Interest Rate*, which captures access to credit at the intensive margin. The coefficient estimates are not statistically significant. This implies that once decided to grant

a loan, the banking sector in the high gender bias localities does not discriminate against female entrepreneurs. Or in other words, the evidence suggests that if a female managed and owned firm successfully obtained a bank loan, it would face the same interest rates as male managed or owned firms. The weaker results for interest rates are also documented by previous papers. For example, Cavalluzzo et al. (2002) find that African Americans and women are less likely to obtain a loan but are not charged a significantly higher interest rate in commercial/industrial loan markets. They notice that Stiglitz and Weiss's adverse selection hypothesis can explain this. That is, in relatively risky commercial/industrial loan markets, the approval decision is probably a better screening mechanism. A high interest rate may encourage risk-taking behavior, and hence is not always in lenders' interests. To conclude, in the high gender bias localities, banks only discriminate female entrepreneurs at the extensive margin (by discoursing or rejecting their loan applications), but not at the intensive margin (by charging higher interest rates).

[Insert Table 10 here]

4.3. Local Banking Market

The results so far indicate that discrimination against female entrepreneurs archetypally occurs in localities with higher gender bias. Therefore, the gender discrimination should be more likely to occur in localities with more domestic banks, which are more affected by the gender bias in the local culture. The results in Table 11 support this hypothesis that domestic banks are more likely to discriminate against female entrepreneurs by limiting their access to credit. The results are both valid no matter the firms and bank branches are match by locality or by a circle with a radius of 5 km. Economically, a female managed and owned firm in the domestic bank locality is at least 7 per cent more likely to be credit constrained than male firms, ceteris paribus.

In case of Poland, where 50 per cent of the banks are foreign-owned, the estimates imply that if all the banks had been foreign-owned, 1,293 more female entrepreneurs would be able to gain access to bank credit each year.

In terms of *Interest Rate*, the coefficient estimates are statistically significant in both foreign and domestic banking markets, no matter firms and bank branches are connected by the city or town. But the economic impact is a bit larger in domestic banking market after considering the firm-level controls and fixed effects. These results partially indicate that the domestic banks discriminate more against female entrepreneurs at the intensive margin by charging higher interest rates (around 2.1 per cent higher). Foreign banks are less of the case (around 1.8 per cent higher). Therefore, compared to foreign banks, the domestic banks discriminate female entrepreneurs both at the extensive margin and at the intensive margin.

[Insert Table 11 here]

5. Conclusions

Using 6,422 firms across 22 transition countries from the Europe, the Baltic States and Caucasus that are covered by the fifth wave of Business Environment and Enterprise Performance Survey (BEEPS V) during 2013-14, this paper examines the discrimination against female entrepreneurs during the bank lending process, both at the extensive and intensive margin. We find that gender discrimination mostly occurs when a firm is both managed and owned by females. In contrast, if either the top manager or the owner of a firm is a male, there exists no discrimination against this firm. One possible explanation is that females, either as managers or owners, are undervalued in their contribution and importance to the firm. This phenomenon is mostly pronounced in those localities either where gender bias is higher or where there are more domestic banks. We also find that female managed and owned firms

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do not underperform male firms in terms of sales growth, even when not obtaining credit, alleviating concerns that the results are driven by statistical discrimination.

Our findings are also policy relevant. First, our results suggest that those firms that are jointly managed and owned by females and males together do not face direct discrimination during their lending process. So a good mix of females and males within a corporation would not harm, and may even help in some cases. Second, and as also proposed by Beck et al. (2013) and Ongena and Popov (2016), by encouraging banks to recruit more female loan officers that are as less subject to a gender bias, credit constraints faced by female entrepreneurs could be mitigated and more female entrepreneurship could be encouraged. Third, the efforts to alleviate inherited gender bias of the local residents through education or training will contribute to the development of female businesses by loosening extant credit constraints. Last, opening domestic banking market for foreign banks could inspire more female entrepreneurs and ultimately stimulate the growth of the domestic economy. We leave further explorations of these findings to future research.

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Table 1. Variable Definitions and Sources

This table includes the variable definitions and sources. BEEPS V is the fifth wave of the Business Environment and Enterprise Performance Survey (BEEPS) conducted in 2013-2014. DB is the Doing Business Database from the World Bank. LiTS III is the Life in Transition Survey (LiTS) conducted in 2016. BEPS II is the second round of the Banking Environment and Performance Survey (BEPS).

Variable	Definitions	Sources
Gender		
Female Managed and Female Owned Firm	= 1 if the top manager and the controling owner of a firm are both female, = 0 otherwise	BEEPS V
Female Managed and Male Owned Firm	= 1 if the top manager of a firm is female and the controling owner of a firm is male, = 0 otherwise	BEEPS V
Male Managed and Female Owned Firm	= 1 if the top manager of a firm is male and the controling owner of a firm is female, = 0 otherwise	BEEPS V
Male Managed and Male Owned Firm	= 1 if the top manager and the controling owner of a firm are both male, = 0 otherwise	BEEPS V
Access to Credit		
Credit Constrained	=1 if a firm either got a loan application rejected or was discouraged from applying any loan in the last fiscal year, = 0 otherwise	BEEPS V
Credit Demand	=1 if a firm either applied for a loan or did not apply for a loan for reasons other than no need in the last fiscal year, = 0 otherwise	BEEPS V
Interest Rate	annual nominal interest rate (in per cent) of the most recent line of credit or loan	BEEPS V
Duration	original duration of the most recent line of credit or loan in months	BEEPS V
Collateral	=1 if the most recent line of credit or loan required collateral, = 0 otherwise	BEEPS V
Firm Characteristics		
Crime Experience	=1 if a firm experienced losses as a result of theft, robbery, vandalism or arson in the last fiscal year, = 0 otherwise	BEEPS V
Product Losses	dummy =1 if a firm's product was lost in transit due to breakage or spoilage in the last fiscal year, = 0 otherwise	BEEPS V
Firm Size	indicator for firm size based on number of employees in the last fiscal year: small (1-19), median (20-99), large (100+)	BEEPS V
Audited Firm	= 1 if a firm had its annual financial statements checked and certified by an external auditor in the last fiscal year, = 0 otherwise	BEEPS V
Sole Proprietorship Firm	= 1 if a firm is a sole proprietorship, = 0 otherwise	BEEPS V
Publicly Listed Firm	= 1 if a firm is publicly listed, = 0 otherwise	BEEPS V
Privatized Firm	= 1 if a firm is privatized from state-owned enterprise, = 0 otherwise	BEEPS V
Foreign Firm	= 1 if more than 50 per cent of the firm's shares are foreign owned, = 0 otherwise	BEEPS V
Sales Growth	realized firm sales growth (in per cent) in the past 3 years	BEEPS V
Local Gender Bias		
No Gender Bias (All Respondents)	opinion that women are as competent as men to be business executives w/i a 20 km circle around each firm based on all respondents	LiTS III
No Gender Bias (Female Respondents)	opinion that women are as competent as men to be business executives w/i a 20 km circle around each firm based on female respondents	LiTS III
Low Gender Bias Locality (All Respondents)	= 1 if a locality is in the bottom 50 per cent of the localities in terms of gender bias within a country based on all respondents, = 0 otherwise	LiTS III
Low Gender Bias Locality (Female Respondents)	= 1 if a locality is in the bottom 50 per cent of the localities in terms of gender bias within a country based on female respondents, = 0 otherwise	LiTS III
High Gender Bias Locality (All Respondents)	= 1 if a locality is in the top 50 per cent of the localities in terms of gender bias within a country based on all respondents, = 0 otherwise	LiTS III
High Gender Bias Locality (Female Respondents)	= 1 if a locality is in the top 50 per cent of the localities in terms of gender bias within a country based on female respondents, = 0 otherwise	LiTS III
Local Banking Market		
Share of Foreign Banks (w/i Locality)	share of foreign bank branches w/i the same city or town of the firm	BEPS II
Share of Foreign Banks (w/i 5 km)	share of foreign bank branches w/i a radius of 5 km around the firm	BEPS II
Foreign Bank Locality (w/i Locality)	= 1 if a locality is in the top 50 per cent of the localities in terms of share of foreign banks w/i the same city or town, = 0 otherwise	BEPS II
Foreign Bank Locality (w/i 5 km)	= 1 if a locality is in the top 50 per cent of the localities in terms of share of foreign banks w/i a radius of 5 km, = 0 otherwise	BEPS II
Domestic Bank Locality (w/i Locality)	= 1 if a locality is in the bottom 50 per cent of the localities in terms of share of foreign banks w/i the same city or town, = 0 otherwise	BEPS II
Domestic Bank Locality (w/i 5 km)	= 1 if a locality is in the bottom 50 per cent of the localities in terms of share of foreign banks w/i a radius of 5 km, = 0 otherwise	BEPS II

Table 2. Summary Statistics

This table reports the summary statistics for all the variables. Definitions and sources of the variables are provided in Table 1.

Variable	Obs.	Mean	Std.	Min.	Max.
Gender					
Female Managed and Female Owned Firm	6,422	0.14	0.35	0	1
Female Managed and Male Owned Firm	6,422	0.07	0.26	0	1
Male Managed and Female Owned Firm	6,422	0.07	0.26	0	1
Male Managed and Male Owned Firm	6,422	0.72	0.45	0	1
Access to Credit					
Credit Demand	6,422	0.49	0.50	0	1
Credit Constrained	3,118	0.36	0.48	0	1
Interest Rate	1,931	10.54	8.30	0	100
Duration	2,246	39.39	37.17	1	360
Collateral	2,540	0.80	0.40	0	1
Firm Characteristics					
Crime Experience	6,422	0.17	0.37	0	1
Product Losses	6,422	0.16	0.37	0	1
Firm Size	6,422	1.53	0.70	1	3
Audited Firm	6,422	0.36	0.48	0	1
Sole Proprietorship Firm	6,422	0	0	0	1
Publicly Listed Firm	6,422	0.02	0.14	0	1
Privatized Firm	6,422	0.11	0.31	0	1
Foreign Firm	6,422	0.07	0.26	0	1
Sales Growth	4,092	0.51	1.80	-0.90	21.00
Local Gender Bias					
No Gender Bias (All Respondents)	5,406	3.26	0.31	2.05	4.00
No Gender Bias (Female Respondents)	5,406	3.36	0.32	2.08	4.00
Low Gender Bias Locality (All Respondents)	5,406	0.57	0.50	0	1
Low Gender Bias Locality (Female Respondents)	5,406	0.55	0.50	0	1
High Gender Bias Locality (All Respondents)	5,406	0.43	0.50	0	1
High Gender Bias Locality (Female Respondents)	5,406	0.45	0.50	0	1
Local Banking Market					
Share of Foreign Banks (w/i Locality)	6,422	0.54	0.31	0.00	1.00
Share of Foreign Banks (w/i 5 km)	6,422	0.56	0.31	0.00	1.00
Foreign Bank Locality (w/i Locality)	6,422	0.57	0.49	0	1
Foreign Bank Locality (w/i 5 km)	6,422	0.51	0.50	0	1
Domestic Bank Locality (w/i Locality)	6,422	0.43	0.49	0	1
Domestic Bank Locality (w/i 5 km)	6,422	0.49	0.50	0	1

Table 3. Gender and Access to Credit: Across Countries

This table shows the average percentages of firms managed/owned by females and access to credit across countries. Table 1 contains all definitions and Table 2 the summary statistics for each included variable.

Country	Female Managed and Female Owned Firm	Female Managed and Male Owned Firm	Male Managed and Female Owned Firm	Male Managed and Male Owned Firm	Credit Constrained	Interest Rate	Observations
Albania	9.45%	4.36%	1.09%	85.09%	45.68%	12.24%	275
Armenia	8.52%	5.57%	4.26%	81.64%	20.61%	13.24%	305
Azerbaijan	2.39%	0.80%	1.20%	95.62%	55.37%	16.94%	251
Belarus	14.95%	19.63%	7.17%	58.26%	35.79%	26.34%	321
Bosnia and Herzegovina	7.89%	8.52%	5.99%	77.60%	28.00%	7.88%	317
Bulgaria	16.59%	5.38%	8.07%	69.96%	42.48%	8.49%	223
Croatia	18.15%	5.23%	8.62%	68.00%	43.90%	6.79%	325
Czech Republic	10.00%	4.29%	6.67%	79.05%	12.99%	5.54%	210
Estonia	20.00%	10.27%	7.57%	62.16%	16.90%	4.77%	185
Georgia	17.34%	10.48%	8.87%	63.31%	33.04%	14.85%	248
Hungary	15.68%	5.08%	8.05%	71.19%	34.51%	10.16%	236
Latvia	21.93%	8.77%	3.95%	65.35%	42.19%	5.75%	228
Lithuania	17.56%	9.76%	4.39%	68.29%	33.33%	5.29%	205
FYR Macedonia	10.51%	5.71%	9.01%	74.77%	36.73%	8.52%	333
Moldova	19.49%	5.51%	11.76%	63.24%	39.67%	17.06%	272
Montenegro	11.96%	6.52%	2.17%	79.35%	61.22%	11.80%	92
Poland	13.94%	6.36%	11.74%	67.97%	30.34%	10.14%	409
Romania	15.45%	7.73%	12.50%	64.32%	26.26%	11.29%	440
Serbia	16.19%	5.40%	10.79%	67.63%	27.71%	9.45%	278
Slovak Republic	10.13%	8.86%	7.59%	73.42%	27.71%	7.21%	237
Slovenia	13.01%	8.13%	7.32%	71.54%	16.39%	5.14%	246
Ukraine	16.03%	6.62%	3.18%	74.17%	54.47%	17.06%	786

Table 4. Attitudes Towards Female: Across Countries

This table shows the average level of gender bias for women as business executives across countries. Table 1 contains all definitions and Table 2 the summary statistics for each included variable.

Country	All Respondents		Female Respondents	
	No Gender Bias	Observations	No Gender Bias	Observations
Albania	3.12	1,500	3.23	779
Armenia	3.42	1,527	3.56	1,017
Azerbaijan	3.04	1,510	3.14	904
Belarus	2.89	1,504	3.12	874
Bosnia and Herzegovina	3.27	1,499	3.37	752
Bulgaria	3.36	1,500	3.50	810
Croatia	3.37	1,503	3.48	814
Czech Republic	3.27	1,532	3.34	845
Estonia	3.71	1,503	3.72	949
Georgia	2.86	1,508	2.92	951
Hungary	3.53	1,501	3.62	837
Latvia	3.39	1,500	3.45	940
Lithuania	3.42	1,501	3.48	903
FYR Macedonia	3.28	1,500	3.36	773
Moldova	3.11	1,512	3.15	816
Montenegro	3.27	1,503	3.43	790
Poland	2.94	1,500	2.96	887
Romania	3.38	1,512	3.46	878
Serbia	3.27	1,508	3.40	790
Slovak Republic	3.36	1,544	3.44	895
Slovenia	3.50	1,501	3.60	774
Ukraine	3.24	1,507	3.33	934

Table 5. Gender and Access to Credit: Univariate Results

This table reports univariate results on the relationship between the gender of firm manager/owner and access to credit. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively, for a two-sample t-test of a difference in means with unequal variances. For the t-tests we compare the credit constraints among all firms with a female manager/owner with all firms that are both managed and owned by males. Table 1 contains all definitions and Table 2 the summary statistics for each included variable.

	Credit Constrained	Observations	Interest Rate	Observations
Female Managed and Female Owned Firm	43.65%***	417	11.59%**	225
Female Managed and Male Owned Firm	32.88%	222	10.44%	144
Male Managed and Female Owned Firm	31.88%	229	10.77%	188
Male Managed and Male Owned Firm	35.56%	2,250	10.35%	1,374
Total	36.18%	3,118	10.54%	1,931

Table 6. Gender and Access to Credit: Matching Results

This table shows the matching results to estimate the relationship between the gender of firm manager/owner and access to credit. Table 1 contains all definitions and Table 2 the summary statistics for each included variable. Coefficients are listed in the first row, p-values are reported below in the brackets, and the corresponding significance levels are placed adjacently. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Dependent Variable	Credit Constrained			Interest Rate		
Model	(1)	(2)	(3)	(4)	(5)	(6)
Female Managed and Female Owned Firm	0.067**			1.896**		
	[0.046]			[0.041]		
Female Managed and Male Owned Firm		-0.030			-0.064	
		[0.498]			[0.941]	
Male Managed and Female Owned Firm			-0.020			-0.426
			[0.612]			[0.576]
Matching Variables						
Country	Yes	Yes	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes	Yes	Yes
Firm Size	Yes	Yes	Yes	Yes	Yes	Yes
Audited Firm	Yes	Yes	Yes	Yes	Yes	Yes
Sole Proprietorship Firm	Yes	Yes	Yes	Yes	Yes	Yes
Publicly Listed Firm	Yes	Yes	Yes	Yes	Yes	Yes
Privatized Firm	Yes	Yes	Yes	Yes	Yes	Yes
Foreign Firm	Yes	Yes	Yes	Yes	Yes	Yes
Duration	No	No	No	Yes	Yes	Yes
Collateral	No	No	No	Yes	Yes	Yes
Observations	3,048	3,058	3,077	1,774	1,790	1,775

Table 7. Gender and Access to Credit: Heckman Selection Results on Credit Constrained

This table shows both the first-stage and the second-stage Heckman selection regressions to estimate the relationship between the gender of firm manager/owner and credit constraints. Table 1 contains all definitions and Table 2 the summary statistics for each included variable. Coefficients are listed in the first row, p-values are reported below in the brackets, and the corresponding significance levels are placed adjacently. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Dependent Variable	Credit Demand			Credit Constrained					
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crime Experience	0.080***	0.090***	0.087***						
	[0.000]	[0.000]	[0.000]						
Product Losses	0.086***	0.080***	0.076***						
	[0.000]	[0.000]	[0.000]						
Female Managed and Female Owned Firm				0.087***	0.047*	0.054**	0.081***	0.044*	0.054**
				[0.001]	[0.064]	[0.036]	[0.001]	[0.085]	[0.041]
Female Managed and Male Owned Firm							-0.026	-0.006	-0.003
							[0.448]	[0.842]	[0.922]
Male Managed and Female Owned Firm							-0.036	-0.017	-0.000
							[0.278]	[0.589]	[0.991]
Firm Size		0.014	0.016		-0.089***	-0.091***		-0.089***	-0.091***
		[0.140]	[0.103]		[0.000]	[0.000]		[0.000]	[0.000]
Audited Firm		0.047***	0.047***		-0.112***	-0.115***		-0.112***	-0.115***
		[0.001]	[0.001]		[0.000]	[0.000]		[0.000]	[0.000]
Sole Proprietorship Firm		-0.048**	-0.037*		-0.024	-0.020		-0.024	-0.020
		[0.021]	[0.079]		[0.431]	[0.497]		[0.424]	[0.496]
Publicly Listed Firm		0.008	-0.003		-0.046	-0.029		-0.045	-0.029
		[0.856]	[0.941]		[0.428]	[0.618]		[0.433]	[0.620]
Privatized Firm		0.014	0.008		0.003	0.003		0.003	0.003
		[0.503]	[0.696]		[0.897]	[0.924]		[0.917]	[0.923]
Foreign Firm		-0.108***	-0.109***		0.009	0.016		0.009	0.016
		[0.000]	[0.000]		[0.824]	[0.710]		[0.829]	[0.708]
Inverse Mills' Ratio				0.456	-0.099	-0.071	0.446	-0.103	-0.072
				[0.176]	[0.769]	[0.843]	[0.186]	[0.762]	[0.841]
Country Fixed Effects	No	Yes	No	No	Yes	No	No	Yes	No
Sector Fixed Effects	No	Yes	No	No	Yes	No	No	Yes	No
Country-Sector Fixed Effects	No	No	Yes	No	No	Yes	No	No	Yes
R-squared	0.009	0.060	0.062	0.004	0.097	0.111	0.004	0.097	0.110
Observations	6,422	6,422	6,422	3,118	3,118	3,118	3,118	3,118	3,118

Table 8. Gender and Access to Credit: Multivariate Results on Interest Rate

This table shows theOLS regressions to estimate the relationship between the gender of firm manager/owner and the interest rate. Table 1 contains all definitions and Table 2 the summary statistics for each included variable. Coefficients are listed in the first row, p-values are reported below in the brackets, and the corresponding significance levels are placed adjacently. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Dependent Variable	Interest Rate											
	All Loans						Only Loans Issued Within One Year					
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Female Managed and Female Owned Firm	1.288**	0.859*	0.842*	1.351**	0.899*	0.909*	2.542***	1.857***	2.009***	2.693***	1.956***	2.168***
	[0.027]	[0.076]	[0.093]	[0.022]	[0.069]	[0.074]	[0.002]	[0.004]	[0.004]	[0.001]	[0.003]	[0.002]
Female Managed and Male Owned Firm				0.062	-0.163	-0.208				0.065	-0.389	-0.400
				[0.932]	[0.789]	[0.746]				[0.947]	[0.614]	[0.624]
Male Managed and Female Owned Firm				0.510	0.416	0.704				1.235	1.041	1.649**
				[0.428]	[0.431]	[0.197]				[0.160]	[0.127]	[0.025]
Duration	-0.023***	-0.004	-0.005	-0.023***	-0.004	-0.005	-0.031***	-0.014*	-0.016*	-0.030***	-0.014	-0.015*
	[0.000]	[0.368]	[0.297]	[0.000]	[0.374]	[0.297]	[0.003]	[0.088]	[0.078]	[0.003]	[0.103]	[0.094]
Collateral	0.574	-0.005	-0.124	0.581	0.001	-0.115	1.429**	0.325	0.197	1.428**	0.317	0.194
	[0.247]	[0.991]	[0.776]	[0.241]	[0.999]	[0.792]	[0.030]	[0.540]	[0.730]	[0.030]	[0.550]	[0.733]
Firm Size		-0.868***	-0.880***		-0.854***	-0.856***		-1.185***	-1.155***		-1.145***	-1.107***
		[0.000]	[0.001]		[0.000]	[0.001]		[0.000]	[0.001]		[0.000]	[0.002]
Audited Firm		-0.051	-0.183		-0.062	-0.201		0.061	-0.275		0.026	-0.322
		[0.884]	[0.613]		[0.859]	[0.579]		[0.896]	[0.577]		[0.955]	[0.513]
Sole Proprietorship Firm		0.912	0.837		0.916	0.854		0.824	0.805		0.843	0.875
		[0.129]	[0.177]		[0.127]	[0.168]		[0.332]	[0.379]		[0.321]	[0.338]
Publicly Listed Firm		1.150	1.955*		1.136	1.953*		2.098	2.679*		2.094	2.737*
		[0.296]	[0.095]		[0.302]	[0.096]		[0.157]	[0.098]		[0.158]	[0.090]
Privatized Firm		-0.535	-0.321		-0.507	-0.277		0.043	0.522		0.117	0.658
		[0.330]	[0.579]		[0.356]	[0.633]		[0.954]	[0.519]		[0.876]	[0.417]
Foreign Firm		-0.362	-0.359		-0.339	-0.332		0.080	0.136		0.160	0.197
		[0.573]	[0.591]		[0.599]	[0.620]		[0.923]	[0.876]		[0.848]	[0.822]
Country Fixed Effects	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
Sector Fixed Effects	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
Country-Sector Fixed Effects	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Loan Year Fixed Effects	No	Yes	Yes	No	Yes	Yes	No	No	No	No	No	No
R-squared	0.012	0.363	0.369	0.011	0.363	0.369	0.018	0.433	0.426	0.018	0.433	0.429
Observations	1,838	1,838	1,838	1,838	1,838	1,838	1,051	1,051	1,051	1,051	1,051	1,051

Table 9. Gender and Firm Performance

This table shows the relationship between the gender of firm manager/owner and the past performance of the firm. Table 1 contains all definitions and Table 2 the summary statistics for each included variable. Coefficients are listed in the first row, p-values are reported below in the brackets, and the corresponding significance levels are placed adjacently. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Dependent Variable	Sales Growth					
	All Firms			Only Credit Constrained Female Firms and Credit Unconstrained Male Firms		
Model	(1)	(2)	(3)	(4)	(5)	(6)
Female Managed and Female Owned Firm	-0.103	-0.052	-0.057	-0.148	-0.077	-0.073
	[0.212]	[0.535]	[0.504]	[0.480]	[0.725]	[0.754]
Controls Variables	No	Yes	Yes	No	Yes	Yes
Country Fixed Effects	No	Yes	No	No	Yes	No
Sector Fixed Effects	No	Yes	No	No	Yes	No
Country-Sector Fixed Effects	No	No	Yes	No	No	Yes
R-squared	0.000	0.042	0.050	0.000	0.037	0.052
Observations	4,092	4,092	4,092	1,342	1,342	1,342

Table 10. Gender and Access to Credit: Heterogeneity Across Locality (Gender Bias)

This table shows the heterogeneous relationship between the gender of firm manager/owner and access to credit across high/low gender bias localities. Firms and households are connected by a circle with a radius equals to 20 km. Table 1 contains all definitions and Table 2 the summary statistics for each included variable. Coefficients are listed in the first row, p-values are reported below in the brackets, and the corresponding significance levels are placed adjacently. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Dependent Variable	Credit Constrained						Interest Rate					
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Female Managed and Female Owned Firm *												
Low Gender Bias Locality (All Respondents)	0.056	0.017	0.017				1.846	1.391	1.222			
	[0.134]	[0.634]	[0.660]				[0.101]	[0.101]	[0.177]			
High Gender Bias Locality (All Respondents)	0.101**	0.070*	0.087**				1.642	0.330	0.701			
	[0.015]	[0.081]	[0.035]				[0.225]	[0.743]	[0.522]			
Low Gender Bias Locality (Female Respondents)				0.045	0.015	0.016				1.396	1.121	1.082
				[0.229]	[0.682]	[0.662]				[0.225]	[0.195]	[0.241]
High Gender Bias Locality (Female Respondents)				0.114***	0.072*	0.087**				2.203*	0.710	0.889
				[0.006]	[0.074]	[0.036]				[0.094]	[0.470]	[0.397]
Low Gender Bias Locality (All Respondents)	0.039*	0.029	0.031				-0.262	-0.230	0.009			
	[0.054]	[0.146]	[0.127]				[0.658]	[0.606]	[0.985]			
Low Gender Bias Locality (Female Respondents)				0.030	0.010	0.013				0.253	0.110	0.433
				[0.140]	[0.593]	[0.512]				[0.669]	[0.803]	[0.371]
Controls Variables	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Inverse Mills' Ratio	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Country Fixed Effects	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
Sector Fixed Effects	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
Country-Sector Fixed Effects	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
R-squared	0.009	0.101	0.113	0.009	0.100	0.113	0.012	0.474	0.470	0.012	0.474	0.471
Observations	2,597	2,597	2,597	2,597	2,597	2,597	938	938	938	938	938	938

Table 11. Gender and Access to Credit: Heterogeneity Across Locality (Banking Market)

This table shows the heterogeneous relationship between the gender of firm manager/owner and access to credit across foreign/domestic bank localities. Firms and bank branches are either connected by the city or town or by a circle with a radius equals to 5 km. Table 1 contains all definitions and Table 2 the summary statistics for each included variable. Coefficients are listed in the first row, p-values are reported below in the brackets, and the corresponding significance levels are placed adjacently. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Dependent Variable	Credit Constrained						Interest Rate					
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Female Managed and Female Owned Firm *												
Foreign Bank Locality (w/i Locality)	0.068**	0.026	0.039				2.752**	1.721**	1.809**			
	[0.040]	[0.413]	[0.241]				[0.012]	[0.044]	[0.048]			
Domestic Bank Locality (w/i Locality)	0.112***	0.076**	0.076**				2.268*	2.077**	2.299**			
	[0.004]	[0.047]	[0.049]				[0.075]	[0.036]	[0.028]			
Foreign Bank Locality (w/i 5 km)				0.068*	0.026	0.038				2.879**	1.785**	1.886**
				[0.051]	[0.446]	[0.276]				[0.010]	[0.042]	[0.044]
Domestic Bank Locality (w/i 5 km)				0.106***	0.070*	0.071*				2.159*	1.980**	2.179**
				[0.004]	[0.052]	[0.051]				[0.080]	[0.039]	[0.032]
Foreign Bank Locality (w/i Locality)	-0.017	-0.013	-0.022				-0.220	-0.054	0.138			
	[0.346]	[0.490]	[0.245]				[0.697]	[0.905]	[0.779]			
Foreign Bank Locality (w/i 5 km)				-0.011	-0.004	-0.008				-0.309	-0.072	0.092
				[0.551]	[0.808]	[0.669]				[0.583]	[0.871]	[0.847]
Controls Variables	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Inverse Mills' Ratio	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Country Fixed Effects	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
Sector Fixed Effects	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
Country-Sector Fixed Effects	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
R-squared	0.008	0.097	0.111	0.008	0.097	0.111	0.016	0.431	0.424	0.017	0.431	0.424
Observations	3,118	3,118	3,118	3,118	3,118	3,118	1,051	1,051	1,051	1,051	1,051	1,051

Figure 1. Firms with Female Manager and/or Female Owner

This firgure reports all the firms in the sample and distinguishes among firms with female top manager and/or female owner. Panel A reports firms with both female top manager and female owner. Panel B reports firms with female top manager and male owner. Panel C reports firms with male top manager and female owner. Panel D reports firms with both male top manager and male owner.

Panel A. Firms with Female Manager and Female Owner

Panel B. Firms with Female Manager and Male Owner

Panel C. Firms with Male Manager and Female Owner

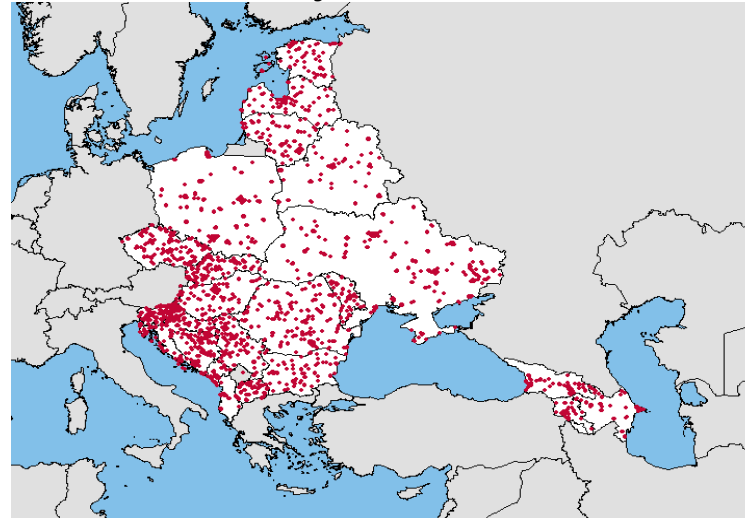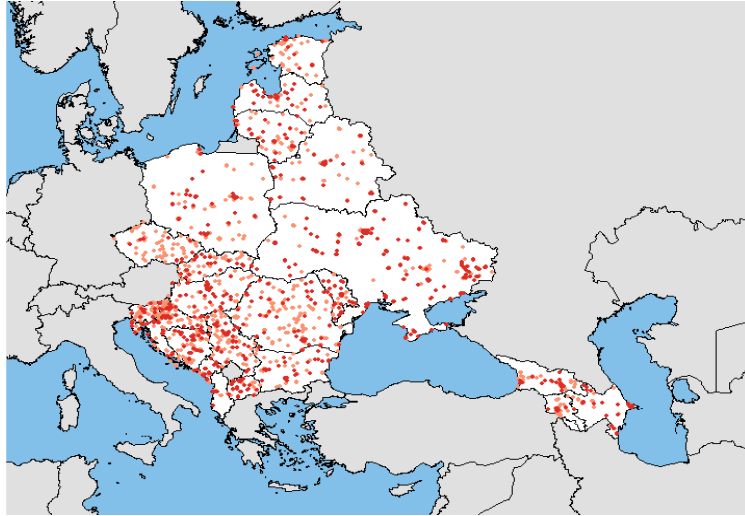*Panel D. Firms with Male Manager and Male Owner*

Figure 2. Heatmap of Credit Constraint and Interest Rate

This heatmap reports the credit constraint and the interest rate of the firms in the sample. In Panel A, darker red indicates a credit constrained firm and lighter red indicates a credit unconstrained firm. In Panel B, darker red indicates higher interest rate for the loan obtained by the firm in the last fiscal year.

Panel A. Credit Constraint

Panel B. Interest Rate