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# Gender-Based Discrimination in Business Loan Markets [1]

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## Abstract

*The aim of this paper is to examine the existence of discrimination against female owned sole proprietorship firms in loan markets based on firm level cross country evidence from EBRD countries. We examine discrimination in credit markets via probability of a firm getting loan. In order to measure the discrimination we also take into account the firms those are discouraged from borrowing as dependent variable in addition to firms with female top managers. The results of the probit analyses indicate higher mean values of rejection rates for female firm owners' credit applications, however this difference is not statistically significant. As we control for the firm and country level differences in the multivariate analysis, the significance of financial discrimination against female owned firms mostly disappears. Additionally the innovative firms with higher numbers of full time workers, and the firms with lower unpaid debts are more likely to receive credits from financial institutions. Moreover the probability of a firm having a rejected credit application is lower in countries with higher gross domestic product per capita.*

**Keywords:** *Discrimination, Credit Markets, Credit Rationing, Gender.*

[1] *This paper is reproduced from chapter 4 of the PhD thesis of the author which is available on* http://eprints-phd.biblio.unitn.it/985/1/Thesis_.pdf

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# Ticari Krediler Piyasasında Cinsiyet Ayrımcılığı

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## Öz

*Bu makalenin amacı, EBRD ülkelerinden toplanan firma düzeyinde verilere dayanarak, tek bir kadın girişimciye ait firmaların kredi piyasasında ayrımcılığa uğrayıp uğramadığını araştırmaktır. Kredi piyasasında kadın girişimcilerin maruz kaldığı ayrımcılığı bir firmanın kredi alma olasılığı ile ölçüyoruz. Ayrımcılığı ölçmek için bağımlı değişken olarak ayrıca firmanın kredi başvurusuna cesaret edememesi incelenmiştir. Çalışmanın temel bağımsız değişkeni olarak sadece kadın girişimcileri ifade eden kukla değişken değil, kadın üst yöneticiye sahip firmalar da dikkate alınmıştır. Yapılan analizler sonucunda kadın firma sahiplerine ait kredi başvurularının geri çevrilme oranları daha yüksek olduğu gözlemlenirken, bu fark istatistiksel olarak çok da anlamlı olmadığı ortaya çıkmıştır. Çok değişkenli regresyonlar sayesinde firma ve ülke düzeyinde farklılıkları kontrol ettiğimizde, kadın girişimcilere karşı finansal ayrımcılığın çoğunlukla ortadan kalktığı gözükmektedir. Bununla beraber tam zamanlı çalışan sayısının fazla, yenilikçi ve ödenmemiş borçların az olduğu firmaların finansal kurumlardan borç alma olasılıkları daha yüksektir. Ayrıca kişi başına düşen gayri safi yurt içi hasılanın yüksek olduğu ülkelerde firmaların kredi başvurularının daha düşük olasılıklarla reddedildiği gözlemlenmektedir.*

**Anahtar Kelimeler:** *Ayrımcılık, Kredi Piyasaları, Kredi Tayınlaması, Cinsiyet*

## Introduction

Gender is one of the primary drivers of economic disparities between people. Although females are being more and more visible in business and financial environments nowadays, there are still only few female examples of the "richest" people or the "biggest businesses" in all around the world. As of 2019 we only see Francoise Bettencourt Meyers as the 15th biggest billionaire after 14 male billionaires according to Forbes Magazine[2]. This situation is a call for research for the systematic differences between the male and female entrepreneurs.

Women are stereotyped differently from men in general *e.g.* women have more emotional and risk-averse image as compared to men. Previous literature shows that female owned enterprises are more likely to be smaller, they operate in labour intensive and service sectors as compared to their male counterparts (Carter and Rosa, 1998). Female owned businesses are more likely to use retained earnings and have lower percentage of debt finance (Haines, Orser and Riding, 1999). These differences may have three different explanations: First female firm owners do not prefer to borrow because of their risk preferences. Second discriminatory lenders do not prefer to extend loans to female owned businesses. Third, market and cultural structures are not suitable enough to allow female owners to get loans.

Previous studies attach more risk aversion to females as compared to males (Powell and Ansic, 1997; Jianakoplos and Bernasek, 1998; Watson and Robinson, 2003; Croson and Gneezy, 2009) and this risk averse nature of females might be one explanation for their lower ratios of debt finance. Croson and Gneezy (2009) present a review of the experimental studies on gender based preference differences. In this framework women entrepreneurs are more likely to use retained earnings rather than using external finance not because they are discriminated in loan markets but due to their own preferences. Schubert, Brown, Gysler and Brachinger (1999) provide contradictory experimental evidence to the studies that find females more risk averse as compared to their male counterparts. Different from the other experimental studies Schubert, Brown, Gysler and Brachinger (1999)

[2] https://www.forbes.com/billionaires/#419126c3251c

control for economic conditions and finds that female subjects do not generally make less risky financial choices than male subjects. Their findings suggest that the source of gender-specific risk behaviour found in the other studies may be due to differences in male and female opportunity sets rather than stereotypic risk attitudes.

There is also a body of literature on the existence of gender-based discrimination against women in lending markets. In general, discrimination in lending markets comes from the desire of lenders to avoid making transactions and/or building relationships with certain demographical groups just because of their personal characteristics. In such cases, lenders have a disutility from granting loans to certain groups of borrowers and this discriminatory lenders may simply reject the loan applications or discourage the borrowers that they have a disutility, via stringent loan contract terms, *i.e.* charging higher interest rates, requiring higher collateral compared to loan size. Discriminatory lenders may decide regardless the riskiness of the alternative projects and they even may forgo profits in order to avoid interaction with the specific demographic groups.

Sometimes lenders avoid providing loans to members of a certain group due to their beliefs and previous information on the demographic group. Literature on discrimination in loan markets is mostly dominated by the studies on racial discrimination and mortgage loan markets (Berkovec, Canner, Gabriel and Hannan, 1998; Han, 2011; Ladd, 1998; Munnell, Browne, McEneaey and Tootell, 1996) while only little evidence found in favour of gender based discrimination in business loan markets in non-developed economies.

Previous studies on racial discrimination present evidence mostly from U.S. data. In general these studies concentrated on racial discrimination in loan markets, while there are only few studies on gender based discrimination in business loan markets.

Bellucci, Borisov and Zazzaro (2009) show that female entrepreneurs in Italy face more difficulties in accessing to credit, even though the interest rates they pay do not differ from those paid by male business owners. They present evidence consistent with the taste-based discrimination theory. Recently, Beck, Behr and Guttler (2011) find that loan officers charge higher interest rates to borrowers of the other gender although there is no

difference in riskiness. They also show that the effect varies across borrower and loan officer characteristics, consistent with the idea of social distance; that is, younger loan officers are more likely to charge higher interest rates to older borrowers. Alesina, Lotti and Mistrulli (2013) find that women in Italy pay higher interest rates for loans as compared to men, although there is no evidence that show women are riskier than men. Using World Bank Enterprise Survey (WBES) data for sub-Saharan African countries Aterido, Beck and Iacovone (2013) underline the low rate of access to formal external financing compared to other firms. Aterido, Beck and Iacovone (2013) imply that the main reason for women being disadvantaged in external financing for their businesses is their small scales. Using the same data set and methodology Hansen and Rand (2014) conduct separate analyses for different business scales. Hansen and Rand (2014) show that male entrepreneurs face smaller financial constraints when compared to female entrepreneurs in small-scale firms. Hansen and Rand (2014) show that this situation is reversed in medium-sized companies.

All these studies examine the female and male owned firms. Kim (2006) examines the equally owned firms in addition to female and male owned firms by using small business data from USA. She finds that female owned firms experience least difficulties in terms of successful loan applications as compared to other groups of firms. Using BEEPS 2005 data, Muravyev, Talavera and Schäfer (2009) provide some evidence in favour of discrimination against female entrepreneurs. They also show that the probability of loan approval for female entrepreneurs increases as financial development level-as measured by percentage of financial institutions' lending to GDP- in the country increases.

Finally market conditions in a country are important to determine the severity of discrimination. Becker (1957) argue that if the firms operate in more competitive product/service markets, they have much less incentives for discrimination. A firm that operates in a competitive environment gets lower profits and in order to survive the tough market conditions, the firm sometimes has to leave its discriminatory behaviour. Accordingly as the competition in lending markets gets tougher, lenders

have much less incentives to discriminate against a certain group of borrowers (See Berkovec, Canner, Gabriel and Hannan 1998; Cavalluzzo, Cavalluzzo and Wolken, 2002).

Our study is similar to that of Muravyev, Talavera and Schäfer (2009) that use BEEPS data to address the financial discrimination faced by female entrepreneurs in loan markets. Unlike Muravyev, Talavera, and Schäfer (2009) we do not only use the 2005 data. We used pooled cross section dataset of 2002, 2005, 2007, 2008 and 2009 BEEPS. Secondly unlike Muravyev, Talavera and Schäfer (2009) we do not have Germany, Greece, Ireland, Spain, Portugal, South Korea and Vietnam[3]. Finally we use different control variables to examine whether the female entrepreneurs are more disadvantaged as compared to their male counterparts in loan markets. The aim of our study is to see whether gender based advantage/disadvantage exists in loan markets and to determine the factors that contribute to rejection of loan applications.

Our calculations indicate higher loan rejection rates and percentage of discouraged enterprises for female-owned businesses. However the financial discrimination against female-owned businesses disappears in the multivariate analysis. We also take into account the effect of top manager's gender in sole proprietorship firms. Our results indicate that the enterprises that have a female top manager are more likely to be discouraged from loan applications. The rest of the paper is structured as follows. The next section provides brief information on data and introduces the variables used in the empirical part. The following section gives descriptive statistics. Then we present the regression results in the next section and the last section concludes.

## Data and Variables

To address our research question we use firm-level data from The Business Environment and Enterprise Performance Surveys (BEEPS). BEEPS

[3] *Muravyev, Talavera & Schäfer (2009) include the following 34 countries into their analysis: Korea, Turkey, Vietnam, Armenia, Azerbaijan, Georgia, Kyrgyzstan, Moldova, Tajikistan, Uzbekistan, Belarus, Kazakhstan, Russia, Ukraine, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia and Montenegro, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, Germany, Greece, Ireland, Portugal, Spain.*

are joint projects of the European Bank for Reconstruction and Development (EBRD) and the World Bank which consist of firm-level data on 27 countries in Eastern Europe and Central Asia. The BEEPS database covers firms of various legal types, *i.e.* shareholding companies (both listed and shares traded privately), sole proprietorship firms, partnership and limited partnership firms… For the purpose of our analysis, we are only interested in the firms that has only one owner, and in the firms that we have information on the gender of their sole owner. Accordingly our sample shrinks to 5025 enterprises.

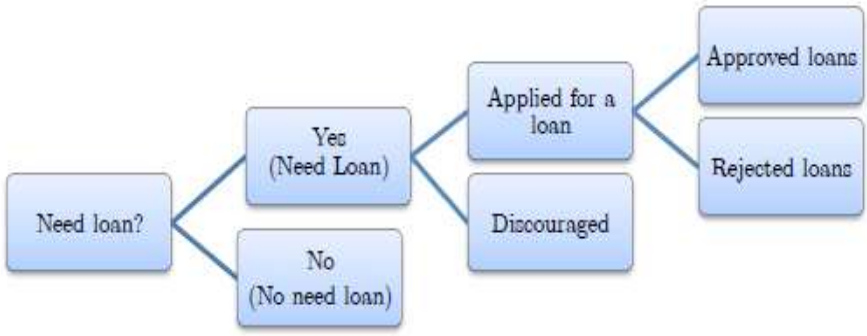
***Table 1. Variable Definitions***

| Variable | Definition | Source |
|---|---|---|
| *RJCT* | Dummy=1 if the firm has a rejected loan application, zero if the firm has an approved loan application. | BEEPS |
| *DISC* | Dummy=1 if the firm is a discouraged borrower *i.e.* give up borrowing because credit conditions are not suitable for the firm and/or the firm didn't think it would be approved, equals to zero if the firm is a loan applicant (*RJCT*=1 or *RJCT*=0). | BEEPS |
| *CRDT* | Dummy=1 if the firm gets a loan, zero if *DISC*=1 or *RJCT*=1. | BEEPS |
| *FEMALE* | Dummy=1 if the owner is female, zero otherwise. | BEEPS |
| *EMP* | The number of the fulltime employees. | BEEPS |
| *OPYR* | The number of years that the firm has been operating. | BEEPS |
| *QLTY* | Dummy=1 if the firm has an internationally recognized quality certification such as ISO 9000, 9002 or 14000, zero otherwise. | BEEPS |
| *EXP* | Dummy=1 if the firm is an exporter firm, zero otherwise. | BEEPS |
| *INN* | Dummy=1 if the firm has introduced new products or services within the last three years, zero otherwise. | BEEPS |
| *UNPD* | Dummy=1 if the firm has utilities payments overdue by more than 90 days, zero otherwise. | BEEPS |
| *CRM* | Dummy=1 if the firm has experienced losses due to theft, robbery, vandalism or arson in the previous year, zero otherwise. | BEEPS |
| *CITY* | Dummy=1 if the firm is located in the capital or in a city with population over one million, zero otherwise. | BEEPS |
| *CON* | Asset share of the three largest banks within the commercial banks. | BEEPS |
| *LGDP* | Natural logarithm of the GDP per capita. | EBRD |

We have three binary dependent variables in this study. First we have *RJCT* which equals to one if the loan application of the firm is rejected, zero if the firm has an approved loan application. As we see in the sum-

mary statistics of the rejection rates are only slightly higher for female entrepreneurs. This direct comparison of rejection rates may underestimate the disadvantages of female entrepreneurs as previous studies address females to be more risk averse (Croson and Gneezy, 2009; Jianakoplos and Bernasek, 1998; Powell and Ansic, 1997; Watson and Robinson, 2003) and overconfident as compared to their female counterparts (Barber and Odean, 2001; Beck, Behr and Guttler, 2009). Accordingly female entrepreneurs may refrain from applying credit by thinking their loan application would be turned off. If this is the case, then using only *RJCT*, as the dependent variable may lead to underestimation of the disadvantages of female entrepreneurs in loan markets. The second dependent variable is *DISC*,— conditional on the firm needs credit— which equals to one if the firm is a discouraged borrower *i.e.* give up looking for a loan because credit conditions are not suitable for the firm and/or the firm didn't think it would be approved. If the firm is a loan applicant (*RJCT*=1 or *RJCT*=0). *DISC* equals to zero. Our third dependent variable is *CRDT*, which takes 1 if the firm gets credit, zero if is the firm is discouraged from borrowing or the loan application of the firm is rejected.

Table 1 gives the definitions of these variables as well as the other variables. Our independent variable of interest is the *FEMALE* dummy, which equals to one if the firm owner is female, zero otherwise, we examine the effect of *FEMALE* on our dependent variables using the many control variables.




***Shape 1 Loan Application Process*** *Source: Muravyev, Talavera, & Schäfer (2009)*

We employ the number of full–time employees as a measure of firm size (*EMP*). *OPYR* is the number of years that the firm has been operating. Older firms are more likely to have longer relationship with lenders, as shown by Berger and Udell (1995); accordingly, we expect these more established firms to get credit as compared to younger firms. *QLTY* is a dummy variable that is set equal to one if the firm has an internationally recognized quality certification, such as ISO 9000 or ISO 9002, and zero otherwise. As the firms that have quality certifications are more likely to perform better we expect to observe these firms to be less financially constrained as compared to the firms that do not have quality certifications. Additionally we consider innovative and exporter firms—as captured by binary variables of *INN* and *EXP*—to be less financially constrained and as we expect these firms to perform better. As proxies for firm level risk and firm level financial distress *UNDP* and *CRM* are employed in the regressions. We expect lenders to be less willing to grant loans to the firms that have more than ninety days unpaid utility bills and/or if the firm is located in environments that feature intense criminal activity. *CITY* is a dummy variable, which equals to one if the firm is located in the capital or in a city that has over one million inhabitants. This variable controls for potential differences in availability of financial services in larger versus smaller cities.

As the lenders have market power, they may charge higher interest rates and lead to lower loan to GDP ratios in more concentrated lending markets. Accordingly higher concentration ratios can be associated with higher loan rejection probabilities. However this view is challenged by recent studies in relationship banking. In Petersen and Rajan's (1995) seminal paper presents evidence on the strength of relationship banking to the degree of that banks' market power. Accordingly, as the concentration rates in banking increases, banks are more likely to build closer relationships with their borrowers that will results in lower loan rejection rates especially for young and small firms. Survey results show that private commercial banks are the biggest source of external finance to cover the fixed asset investments. They provide loans for 12.31% of the fixed asset, together with the state owned commercial banks and government agencies this share increases to 14.45%. Since banks are the primary lending institutions banking sector concentration measures can be considered as a

good proxy for loan market concentration. In our study we use *CON*, the share of commercial bank assets that are owned by the three largest commercial banks, as a measure of banking concentration to control for differences in concentration in the lending markets of the examined countries. Finally we use the natural logarithm of the GDP per capita to control for the macroeconomic environment in each country.

**Descriptive Statistics**

Before presenting regression results, we examine the effects of gender on financing behaviours using descriptive statistics. First of all Table 2 shows that the share female owned enterprises on the total number of enterprises decrease as with the size of the enterprises. 34% and 26% of the micro and small sized enterprises are female owned respectively. This share gets smaller for the medium and large enterprises as female entrepreneurs own 22% of the both medium and large enterprises. This picture reveals that female entrepreneurs own smaller businesses as compared to male entrepreneurs.

***Table 2. Gender and Firm Size***

| Size | # of male owned firms | # of female owned firms | Total # of firms | % of female owned firms |
|---|---|---|---|---|
| Micro (smaller than 10) | 1,730 | 896 | 2,626 | 0.34 |
| Small(10-49) | 1,314 | 449 | 1,763 | 0.26 |
| Medium (50-249) | 409 | 116 | 525 | 0.22 |
| Large (250 and over) | 86 | 25 | 111 | 0.22 |
| Total | 3,539 | 1,486 | 5,025 | 0.29 |

Firms are asked several questions regarding their loan applications the most recent loans received (if any) in the BEEPS. BEEPS also collects information on the reasons of firms not having loan (in case of firms answered they had no loan). There can be several reasons for a firm of not having loan. First of all the firm may not need loan. Secondly the firm may have a loan application that is rejected. Finally the firm may be discouraged from loan application. In our study we define discouraged borrowers as the enterprises that need loans but do not apply loan for the following reasons: (1) application procedures for loans or lines of credit are complex,

(2) interest rates are not favourable, (3) collateral requirements are too high, (4) size of loan and maturity are insufficient, (5) it is necessary to make informal payments to get bank loans, (6) did not think it would be approved. In order to understand these sub-groups of firms, the graphical representation of the loan application process is given in Shape 1 in the previous section.

Table 3 presents the data on loan application sub-groups by gender. In this table we grouped firms that need loan and did not need loan by gender of the owner as a first step of the loan application process. We have information on the firms that did not need loan, and we can infer the sub group of the firms that need loan: we can consider the discouraged borrowers, and loan applicants (both resulted in rejected and approved loans) as the firms that need loan. In the second step of the loan application process, we have discouraged and non-discouraged firms (loan applicants). In addition to the discouraged borrower definition that is given above, we define a non-discouraged (loan applicant) firm as the firm that applied for loan. To sum in a nutshell, we have a binary dummy variable that equals to one if the firm is a discouraged from applying for a loan, zero if the firm is a loan applicant conditional on the firm needs loan.

***Table 3. Loan Applications and Gender***

| | # of male owned firms | % of male owned firms | # of female owned firms | % of female owned firms | Total # of firms | % of Total |
|---|---|---|---|---|---|---|
| Need loan | 2,515 | 71 | 1,003 | 68 | 3,518 | 70 |
| No need loan | 1,013 | 29 | 472 | 32 | 1,485 | 30 |
| Total | 3,528 | 100 | 1,475 | 100 | 5,003 | 100 |
| Loan applicants | 870 | 60 | 299 | 54 | 1,169 | 59 |
| Discouraged | 577 | 40 | 252 | 46 | 829 | 41 |
| Total | 1,447 | 100 | 551 | 100 | 1,998 | 100 |
| Approved | 740 | 85 | 247 | 82 | 987 | 84 |
| Rejected | 130 | 15 | 53 | 18 | 183 | 16 |
| Total | 870 | 100 | 300 | 100 | 1,170 | 100 |

Finally, in the third step of the loan application process we have rejected and approved loans, conditional on being applied for a loan. In our sample, 68% of female owned enterprises need loan, 71% of male owned enterprises need loan. This result shows that female entrepreneurs may be

more likely to conduct businesses that do not require external financing. This result also confirms the previous studies to some extend which show that females are more risk averse as compared to males accordingly they are more likely to use internal funds rather than applying for external finance.

Second, the share of discouraged borrowers among female owned enterprises is higher than that of their male counterparts, 46% versus 40%. The loan rejection rates for female owned enterprises are only higher than that of male owned enterprises. Conditional on applying a loan, are rejected in their loan applications, 18% of the female owned enterprises, while 15% of the male owned enterprises. These numbers may show that female entrepreneurs are disadvantaged in loan markets to some extend because they are more discouraged than male entrepreneurs.

Table 4 reports the mean and standard deviations of the variables by gender of the entrepreneurs. The last column of the table reports the p-values for the t-tests of the equality of means between the female and male owned enterprises. In line with tabulations presented in Table 3, statistics in Table 4 reveal that the number of discouraged enterprises (*DISC*)—0.40 for male owned firms and 0.46 for female owned firms—is higher for female entrepreneurs. Moreover the percentage of male owned enterprises that have no need for loan (*NNL*) is 29 while it is 0.32 for female owned enterprises. We observe higher mean values of loan rejection rates for female firm owners—0.18 for female owned firms while it is 0.15 for male-owned firms—however this this 3% difference is not statistically significant.

On the other hand we observe that female owned enterprises tend to be smaller and younger as compared to male owned enterprises. The average number of operating years is 11.9 for male owned firms while it is 10.8 for female owned firms. Size of the firm is measured by the number of full time employees and male owned firms have 31 full time employees while the female owned firms have 21.2 full time employees on average.

Female owned enterprises are less innovative, less likely to have research and development expenditures, less likely to have an internationally recognized quality certification (such as ISO 9000, 9002 or 14000). Moreover they experience higher ratios of losses due to theft, robbery vandalism or arson to the sales and they perceive crime, theft and disorder as

a bigger obstacle to the operations of their enterprise as measured by *CRM.*

**Table 4. Selected Characteristics of Male and Female Owned Firms**

| | Male owned firms | | | Female owned firms | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | mean | Std dev | N | mean | Std dev | N | mean | Std dev | N | p-value |
| NNL | 0.29 | 0.45 | 3528 | 0.32 | 0.47 | 1475 | 0.3 | 0.46 | 5003 | 0.02** |
| RJCT | 0.15 | 0.36 | 870 | 0.18 | 0.38 | 300 | 0.16 | 0.36 | 1170 | 0.26 |
| DISC | 0.4 | 0.49 | 1447 | 0.46 | 0.5 | 551 | 0.41 | 0.49 | 1998 | 0.02** |
| CRDT | 0.51 | 0.5 | 1447 | 0.45 | 0.5 | 551 | 0.49 | 0.5 | 1998 | 0.01** |
| EMP | 31 | 76.7 | 3522 | 21.2 | 57.1 | 1475 | 28.1 | 71.6 | 4997 | 0.00*** |
| OPYR | 11.9 | 9.99 | 3523 | 10.8 | 8.35 | 1473 | 11.6 | 9.5 | 4996 | 0.00*** |
| UNPD | 0.04 | 0.19 | 3168 | 0.03 | 0.16 | 1385 | 0.03 | 0.18 | 4553 | 0.00** |
| QLTY | 0.11 | 0.31 | 3526 | 0.08 | 0.27 | 1483 | 0.1 | 0.3 | 5009 | 0.00*** |
| CITY | 0.3 | 0.46 | 3539 | 0.25 | 0.43 | 1486 | 0.28 | 0.45 | 5025 | 0.00*** |
| CRM | 0.18 | 0.39 | 3535 | 0.18 | 0.38 | 1484 | 0.18 | 0.39 | 5019 | 0.52 |
| INN | 0.38 | 0.49 | 3241 | 0.35 | 0.48 | 1394 | 0.37 | 0.48 | 4635 | 0.02** |
| EXP | 0.18 | 0.39 | 3539 | 0.12 | 0.33 | 1486 | 0.17 | 0.37 | 5025 | 0.00*** |
| LGDP | 8.34 | 0.94 | 56 | 8.41 | 0.87 | 56 | 8.36 | 0.92 | 56 | 0.02** |
| CR | 0.63 | 0.18 | 52 | 0.61 | 0.19 | 52 | 0.62 | 0.18 | 52 | 0.00*** |

*Notes: The last column reports p-values for t-tests of the equality of means between female and male owned enterprises. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. N is the number of observations.*

In BEEPS firms are asked to report the financial source for the percentage of the fixed asset investments in the year preceding the survey. We summarize the answers of the enterprises in Table 5. Our findings are in line with Haines, Orser and Riding (1999) which indicate lower ratios of debt finance for female owned businesses. We see that on average the share of retained earnings and owners' contribution or issued new equity shares in fixed asset investment is higher in female-owned firms, 72.01% versus 68.40% and 6.12% versus 4.65% respectively. The female owned enterprises tend to have a smaller fraction of private bank credit as compared to men 9.74% versus 13.35%. However this gap is decreases in the fraction of state owned bank financing. Finally we see that the female owned enterprises have lower fractions of trade credit and informal credit usage.

Before presenting results of the multivariate analysis we should emphasize that previous literature is critical about the omitted variables

while testing the effect of gender based discrimination as the presence of discrimination are sensitive to omitted-variable bias.

***Table 5 Financial Sources of Fixed Asset Investments by Gender***

| | | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|---|
| | Mean | 68.4 | 4.65 | 13.35 | 2.09 | 2.75 | 8.76 |
| Male | std dev | 40.34 | 18.36 | 28.6 | 11.98 | 13.29 | 23.71 |
| owned firms | N | 2,082 | 2,082 | 2,082 | 2,082 | 2,082 | 2,082 |
| | Mean | 72.01 | 6.12 | 9.74 | 2.39 | 2.67 | 7.07 |
| Female | std dev | 39.37 | 22.15 | 25.7 | 12.13 | 12.43 | 21.97 |
| owned firms | N | 795 | 795 | 795 | 795 | 795 | 795 |
| | Mean | 69.4 | 5.06 | 12.36 | 2.17 | 2.73 | 8.29 |
| | std dev | 40.1 | 19.49 | 27.87 | 12.02 | 13.05 | 23.25 |
| Total | N | 2,877 | 2,877 | 2,877 | 2,877 | 2,877 | 2,877 |

*Notes: (1) Internal funds or retained earnings, (2) Owners' contribution or issued new equity shares, (3) private banks, (4) state owned banks, (5) Purchases on credit from suppliers and advances from customers, i.e. trade credit (6) Other (moneylenders, friends, relatives, nonbanking financial institutions etc.), i.e. informal credit. N is the number of observations.*

Accordingly we include as many as possible variables provided by BEEPS to account for the creditworthiness of the firms and country level differences.

**Regression Results**

Table 6 reports the results of probit models for the three dependent variables. We run two sets of regressions. The difference between them is the inclusion of interaction between *CON* and *FEMALE*. Market conditions in a country may be important in determining the severity of discrimination. In his seminal work Becker (1957) argues that discriminatory firms may forgo profits as they have a taste of discrimination. A firm that operates in a competitive environment gets lower profits and in order to survive in tough market conditions, is likely to leave its discriminatory behaviour. Accordingly the firms that operate under competitive pressure are less likely to discriminate against certain demographic groups. As the competition in lending markets gets tougher, lenders have much less incentives to discriminate against a certain group of borrowers. Following Berkovec, Canner, Gabriel and Hannan(1998), Cavalluzzo, Cavalluzzo and

Wolken(2002), Muravyev, Talavera, and Schäfer (2009) the interaction between *CON* and *FEMALE* allows us to test whether the level of banking concentration affects the gap between male and female entrepreneurs in obtaining credit.

As presented in descriptive statistics the results of univariate analysis indicate some evidence for disadvantage of female entrepreneurs, when the disadvantage is measured by *DISC.* The coefficient estimate for *FEMALE* becomes only statistically significant at 10% when *DISC* and *CRDT* are dependent variables, which indicate a disadvantage for female entrepreneurs in loan markets.

However female ownership has no effect on loan rejections, as the coefficient estimate of *FEMALE* is statistically insignificant on *RJCT*. As seen in Table 6, this disadvantage vanishes when the other factors are controlled in addition to country, year and industry dummies as we find no evidence in favour of presence of a discrimination or disadvantage against female entrepreneurs as measured by the coefficient estimate of *FEMALE*. The statistical insignificance of the coefficient estimate for *FEMALE* increases as we include the interaction term between *CON* and *FEMALE* which again indicate no evidence in favour of discrimination for female entrepreneurs and the insignificance of discrimination gets stronger in the regressions where we include the interaction between *CON* and *FEMALE.*

As for the control variables we see that larger, innovative, exporter firms and the firms that have internationally recognized quality certifications are less likely to be discouraged from applying credit as compared to smaller, non-innovative, non-exporter and to the firms that do not have internationally recognized quality certifications. Although coefficient estimate for *LGDP* is statistically insignificant in the regressions where *RJCT* is the dependent variable, it yield significant estimates in the regressions where *DISC* and *CRDT* are dependent variables.

That is to say, the sole proprietorship firms are less likely to be discouraged from applying credit and more likely to get credit as *LGDP* increases. This result suggests in favour of presence a reduction in financial constraints due to the possible occurrence of credit expansion. We observe that being an exporter firm doesn't have a statistically significant effect on the probability of a loan being rejected.

***Table 6 Baseline Probit Results***

| | RJCT | DISC | CRDT | RJCT | DISC | CRDT |
|---|---|---|---|---|---|---|
| FEMALE | 0.058 | 0.113 | -0.109 | -0.066 | -0.081 | 0.063 |
| | (0.132) | (0.088) | (0.089) | (0.388) | (0.264) | (0.266) |
| EMP | -0.004** | -0.007*** | 0.007*** | -0.004** | -0.007*** | 0.007*** |
| | (0.002) | (0.002) | (0.001) | (0.002) | (0.002) | (0.001) |
| OPYR | -0.018* | 0.001 | 0.007 | -0.018* | 0.001 | 0.007 |
| | (0.007) | (0.004) | (0.005) | (0.007) | (0.004) | (0.005) |
| UNPD | -0.27 | -0.329 | 0.242 | -0.267 | -0.324 | 0.237 |
| | (0.252) | (0.22) | (0.201) | (0.252) | (0.221) | (0.201) |
| QLTY | -0.13 | -0.314* | 0.268 | -0.131 | -0.313* | 0.268 |
| | (0.209) | (0.151) | (0.146) | (0.209) | (0.151) | (0.146) |
| CITY | 0.099 | -0.036 | -0.028 | 0.098 | -0.036 | -0.027 |
| | (0.144) | (0.095) | (0.096) | (0.144) | (0.095) | (0.096) |
| CRM | 0.012 | -0.219* | 0.176 | 0.014 | -0.220* | 0.177 |
| | (0.139) | (0.100) | (0.100) | (0.139) | (0.100) | (0.1) |
| INN | -0.270* | -0.442*** | 0.462*** | -0.272* | -0.446*** | 0.465*** |
| | (0.121) | (0.081) | (0.081) | (0.121) | (0.081) | (0.081) |
| EXP | -0.219 | -0.283* | 0.336** | -0.218 | -0.285* | 0.337** |
| | (0.165) | (0.123) | (0.117) | (0.165) | (0.123) | (0.117) |
| LGDP | -0.382 | -1.800*** | 1.435** | -0.373 | -1.802*** | 1.434** |
| | (0.921) | (0.480) | (0.471) | (0.923) | (0.48) | (0.472) |
| CON | -0.27 | -0.371 | 0.432 | -0.344 | -0.494 | 0.536 |
| | (0.755) | (0.439) | (0.436) | (0.782) | (0.466) | (0.467) |
| CONxFEMALE | | | | 0.191 | 0.301 | -0.267 |
| | | | | (0.569) | (0.392) | (0.396) |
| Pseudo $R^2$ | 0.16 | 0.23 | 0.24 | 0.16 | 0.22 | 0.23 |
| N | 830 | 1432 | 1435 | 801 | 1399 | 1402 |

*Notes: Moldova, Serbia, Montenegro and Tajikistan are excluded in the regressions due to lack of observations. All regressions include constant terms, country, industry and year fixed effects. Robust standard errors are clustered at firm level and reported in parentheses. *, **, and *** indicate statistical significance at the 5%, 1% and 0.1% levels, respectively. N is the number of observations.*

But having a rejected loan and being an innovative firm as captured by *INN*, are negatively related. Although we do not report in order to save space, all regressions in Table 6, include mostly statistically significant country, industry and year dummies.

**Robustness Checks**

Although a firm is solely owned by a female, its top manager can be another person, *i.e.* a male. In Table 7 in order to see the disadvantages in loan markets faced by female entrepreneurs that have female top managers we employ *FTOP*, (*FEMALE* multiplied by a dummy variable, which equals to 1 if the top manager of the firm is female, zero if the top manager is male) as our independent variable of interest. 1450 sole proprietorship firms provide an answer to the question: *"Is the Top Manager female?"* and these answers show that 24% of this firms have a female top manager while 29.6% of the firms have a female owner. We are interest in the sole proprietorship firms, and they tend to be small in size as compared to companies.

The correlation between having a female top manager and having a female owner is calculated as 67% for the whole sample of sole proprietorship firms. This correlation increases to 78% for the micro sized firms that have less than 11 full time employees. Only 5% of the firms have more than 100 full time employees. SMEs are more likely to be have their owners as the top manager. This valuable information on the gender of the top manager is not available for firms surveyed in 2005 wave of the BEEPS (except in Turkey 32 firms provide an answer to this question) and the response rates for the gender of the top manager is not high

This is why we observe a huge fall in the number of observations in Table 7. Along regressions in Table 7, we observe the enterprises that have a sole female owner–who is also the top manager of the firm–are more likely to be disadvantaged than their male counterparts when the disadvantage is indicated by *CRDT* and *DISC* as the coefficient estimates of *FTOP* are at least statistically significant at 10%. Our results in Table 7 are in line with Muravyev, Talavera, and Schäfer (2009) who uses 2005 BEEPS, the same variable (*FTOP*) to address female entrepreneurship and different control variables than ours. As we include observations from 2008 and 2009 waves of BEEPS we can say that the disadvantaged position of female entrepreneurs are not affected largely from the recent financial crisis.

***Table 7 Probit Regression Results for Female Top Managers***

| | RJCT | DISC | CRDT | RJCT | DISC | CRDT |
|---|---|---|---|---|---|---|
| FTOP | 0.194 | 0.286 | -0.281 | 0.676 | 0.756 | -0.914* |
| | (0.226) | (0.154) | (0.152) | (0.66) | (0.432) | (0.449) |
| EMP | -0.002 | -0.005** | 0.005*** | -0.002 | -0.005** | 0.005*** |
| | (0.002) | (0.002) | (0.001) | (0.002) | (0.002) | (0.001) |
| OPYR | -0.023* | -0.001 | 0.009 | -0.023* | -0.001 | 0.009 |
| | (0.01) | (0.007) | (0.007) | (0.01) | (0.006) | (0.007) |
| UNPD | 0.172 | -0.620* | 0.147 | 0.181 | -0.620* | 0.147 |
| | (0.32) | (0.314) | (0.29) | (0.316) | (0.313) | (0.287) |
| QLTY | -0.007 | -0.098 | 0.037 | 0.005 | -0.108 | 0.042 |
| | (0.269) | (0.203) | (0.194) | (0.271) | (0.202) | (0.194) |
| CITY | -0.173 | -0.143 | 0.209 | -0.173 | -0.142 | 0.208 |
| | (0.228) | (0.151) | (0.149) | (0.229) | (0.152) | (0.15) |
| CRM | 0.194 | -0.448** | 0.243 | 0.198 | -0.443** | 0.234 |
| | (0.207) | (0.164) | (0.158) | (0.208) | (0.164) | (0.157) |
| INN | -0.286 | -0.615*** | 0.561*** | -0.27 | -0.601*** | 0.544*** |
| | (0.191) | (0.124) | (0.122) | (0.187) | (0.125) | (0.124) |
| EXP | 0.264 | -0.148 | 0.021 | 0.27 | -0.137 | 0.009 |
| | (0.236) | (0.195) | (0.19) | (0.236) | (0.194) | (0.189) |
| LGDP | -0.224 | 0.86 | -1.843 | -0.179 | 0.848 | -1.893 |
| | (1.839) | (1.042) | (1.792) | (1.837) | (1.047) | (1.815) |
| CON | 0.598 | 5.561 | -7.796 | 0.819 | 5.665 | -8.105 |
| | (4.73) | (3.567) | (4.713) | (4.727) | (3.592) | (4.785) |
| CONxFTOP | | | | -0.682 | -0.662 | 0.887 |
| | | | | (0.895) | (0.586) | (0.597) |
| Pseudo $R^2$ | 0.15 | 0.24 | 0.23 | 0.15 | 0.24 | 0.24 |
| N | 339 | 624 | 634 | 339 | 624 | 634 |

*Notes: Moldova, Serbia, Montenegro and Tajikistan are excluded in the regressions due to lack of observation. All regressions include constant term, country, industry and year dummies. Robust standard errors are clustered at firm level and reported in parentheses. *, **, and *** indicate statistical significance at the 5%, 1% and 0.1% levels, respectively. N is the number of observations.*

As for the control variables we see that the larger and innovative firms are less likely to be disadvantaged in loan markets where *CRDT* and *DISC* are the dependent variables. When *CRDT* is the dependent variable, the coefficient estimate of *CON* is found to be negative. These results show that probability of getting credit for a sole proprietorship firm decreases as the banking industry become more concentrated. This result indicates more severe financial constraints for firms where the share of the three largest banks is higher.

## Conclusion

The aim of this paper is to examine the existence of discrimination against female owned sole proprietorship firms in loan markets. We address this topic by using a firm-level data on 27 countries in Eastern Europe and Central Asia and examining the issue for sole proprietorship firms *i.e.* the firms that have female owner versus the firms that have male owner. We define discrimination via probability of a firm getting loan.

In our sample the percentage of discouraged enterprises and the percentage of enterprises that have no demand for loan are slightly higher for female entrepreneurs as compared to their male counterparts. Although we observe higher mean values of loan rejection rates for female firm owners, this difference is not statistically significant. As we control for the firm and country level differences in the multivariate analysis, the significance of financial discrimination for female owned firms mostly disappears. We also take into account the effect of top manager's gender in order to examine the existence of financial discrimination in loan markets faced by sole proprietorship firms that have female top managers. We have some evidence in favour of the fact that the enterprises that have a female top manager are more likely to be discouraged from loan application than their male counterparts. Encouraging policies for female entrepreneurs in lending markets should be implemented in order to facilitate higher firm growth rates and accordingly economic growth in less-developed countries. To this end less-developed countries will be able to catch up with the developed economies.

Before closing we should mention about the limitations of our study. First BEEPS doesn't provide all necessary information that lenders may require to evaluate the creditworthiness of borrowers. In order to reduce concerns of omitted variables bias we take into account all available information provided in BEEPS. Second the structure of BEEPS doesn't allow us to know the share of female owners. So it would be a more complete analysis of financial discrimination to female entrepreneurs, if we had available information to compare three groups of firms: firms that only have female entrepreneurs, only have male entrepreneurs, and firms that have both male and female owners. A comparison between these groups of firms in other countries can be a direction future research topic as well

as comparisons between developed, less-developed, developing, and/or transition economies.

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