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ABSTRACT

Using firm level data from eight Sub-Saharan Africa countries we examine credit constraint differentials between male and female manufacturing entrepreneurs. Enterprises owned by female entrepreneurs are less likely to be credit constrained compared to their male counterparts. The magnitude of this credit constraint gap varies with constraint and ownership definitions but the direction of the gap does not. Using a generalized Blinder-Oaxaca decomposition, we investigate if the gap is due to differences in observable characteristics or to unexplained variations in the returns to these characteristics. We find the gap to be associated with the unexplained component. We argue that the finding is mainly due to female gender favoritism in loans to micro and small firms because (i) the gap is reversed for medium size enterprises and, (ii) we find no sign of superior female entrepreneurial performance in terms of capacity utilization, labor productivity or firm size growth.

JEL Classification: G21; J16; L25

Keywords: Credit, Entrepreneurship, Gender, Private Sector, SMEs

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1. Introduction

The manufacturing sector in most Sub-Saharan African (SSA) countries has improved its performance in the new millennium but most observers find that the African region could be doing much better. The country rankings in the recent Doing Business Reports clearly illustrate a comparatively poor environment for private sector development and the recent Investment Climate Assessment surveys identify access to credit as one of the key constraints to private sector growth. While tight credit may reflect weak entrepreneurship and poor quality of investment projects, the interest rates in many SSA countries often appear higher than economic fundamentals merit. Understanding the financial system in these countries is therefore important when examining key financing constraints facing private firms.

Several SSA countries have common problems and challenges within the financial system. Financial markets are often tight and weak. Commercial banks dominate the financial sector and relatively few banks account for the majority of total bank assets. In most countries, non-bank financial institutions represent a relatively small addition to overall credit availability, average loan sizes are considerably smaller, and interests higher than in the commercial bank sector. Moreover, the coverage of informal (local moneylender) and semi-informal (trade-credit) loan markets is also rather restricted in most SSA countries. The limited competition has resulted in a rigid financial system with low levels of financial intermediation, high profit margins—often helped on its way by excessively high fees on banking services—and a large interest rate spread between deposits and loans. Adding to the problem, domestic financing of public budget deficits also put an upward pressure on interest rates and crowd-out funds to the private sector in many of the countries.

If the poor performance of the financial sector is the main cause of lack of credit in the manufacturing sector then identifying and describing credit constrained firms can help policy makers target the firms that are more likely to face binding financial constraints. Such targeting is one of the explicit instruments for economic growth and increased employment in Africa. A key issue in the targeting has been to ensure credit to female entrepreneurs as they are found to be less likely to get financing from the formal financial sector (see Klapper and Parker, 2010 for a recent survey of gender issues in entrepreneurship). However, as highlighted in the most recent World Development Report “Gender Equality and Development” (WDR, 2011), data on access need to be interpreted with caution because they could reflect gender differences in the demand for credit. Moreover, it is apparent from the report that although we have numerous studies on the gender-credit relationship

at the household level, less is known about gender discrimination in credit allocation among formal entrepreneurs in Africa.

Currently, a group of bilateral donors are in the process of establishing an African Guarantee Fund (AGF) in collaboration with the African Development Bank with the explicit aim of increasing the financial resources available for small and medium size enterprises (SMEs). The AGF will mainly provide guarantees to the already existing African financial institutions who are lending to SMEs. Thus the AGF is not aimed at changing the structure of the financial system as such. Instead, the facility will influence the lending decisions within the banks so as to increase the access to credit for SMEs. As the AGF facility is working through the existing financial institutions, it is important to understand the current credit policies of the commercial banks. Specifically, as donors often value gender balance in the growth process, the current policies vis-à-vis male and female entrepreneurs must be analyzed. If SMEs owned by women are more credit constrained because of higher risks associated with observable factors such as experience, education or lack of concrete business plans, then the AGF should focus on developing tools to support the demand side, i.e., provide support for development of business plans and exchange of experience within SMEs owned by women. On the other hand, if the commercial banks are simply discriminating or favoring SMEs owned by women then the AGF must push the banking sector to change the current credit policies.

In this paper we use firm level data from eight Sub-Saharan Africa countries to examine credit constraint differentials between male and female manufacturing entrepreneurs. Rather than analyzing the extent of formal financing we apply a direct approach to measuring credit constrained firms using specific credit questions in the Investment Climate Assessment (ICA) surveys conducted by the World Bank in 2006/7. As the classification of firms into credit constrained and unconstrained is not simple in empirical work we make use of two definitions. The first definition classifies firms as constrained or unconstrained solely based on firm responses to specific credit questions. By the second definition we reclassify constrained firms to being unconstrained if the survey data show they already have credit involvement with the formal financial sector.

A sharp distinction between male and female entrepreneurship is also difficult because firms may have several owners. Therefore, we also work with two different samples; one large sample of all enterprises in which we identify a firm as having female ownership if at least one of the owners is a woman, and a smaller sample, in which we only analyze single ownership firms. Focusing on single ownership firms the gender of the owner is unambiguous. We report results for both credit

constraint definitions and both enterprise samples because several results are dependent on the combination of choices.

By our stringent definition of being credit constrained, enterprises owned by female entrepreneurs are on average about 3 to 5 percentage points less likely to be credit constrained compared to their male counterparts, depending on the sample used. However, changing either the constraint definition or the sample this gap drops to about 2 percentage points, or lower. Results like these are not uncommon in the literature, see Klapper and Parker (2010), and they are comparable to the results in Aterido et al. (2011) who also use the ICA data.

Using the generalized Blinder-Oaxaca decomposition, we investigate the extent to which the gender credit constraint gap is due to differences in observable characteristics between female and male operated firms (the explained component), or to variations in the returns to these characteristics (the unexplained component). The results show that the credit gap is mostly due to differences in the unexplained component. We look into possible explanatory factors for the result and we note that the gender credit constraint gap is closely associated with firm size. Splitting the samples into micro/small and medium size enterprises we show how the gap is reversed for medium size enterprises. Furthermore, generalized Blinder-Oaxaca decompositions show that for micro/small enterprises the gap (favoring female owned firms) is mainly due to the unexplained component while the gap (favoring male owned firms) is more due to differences in characteristics for medium size enterprises. Hence, the overall result is driven by the large fraction of micro and small enterprises in the data.

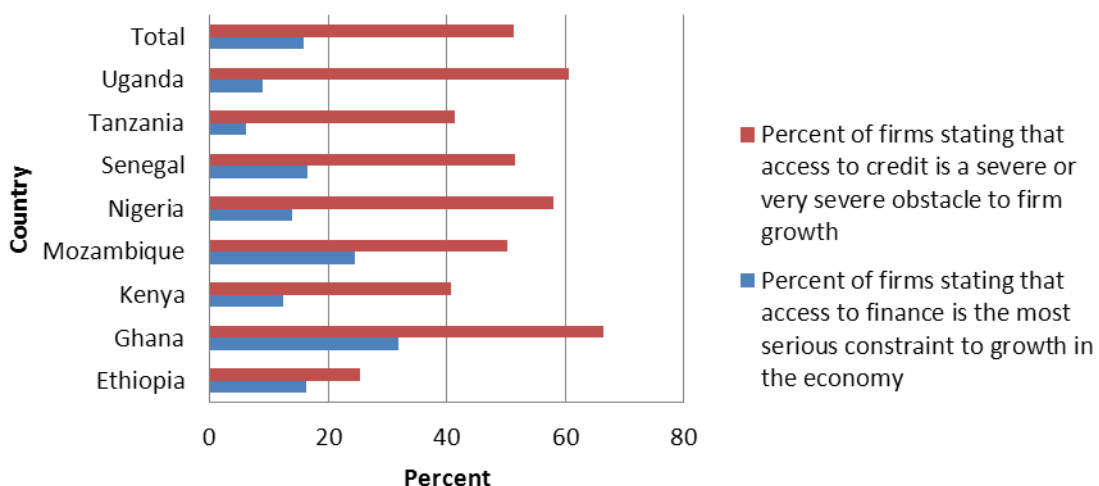
The prime explanation put forward for the female gender favoritism in credit is self-selection into entrepreneurship. By this hypothesis women are, on average, better entrepreneurs than men because they have to be “more capable” than men to become entrepreneurs (see Aterido et al. (2011) for an exploration). We examine this hypothesis indirectly by testing if the gender of the owner has an independent effect on observable productivity outcomes measured by capacity utilization, labor productivity and firm employment growth. As we find no significant gender effect, conditional on firm characteristics and sector fixed effects, we believe the hypothesis to be largely unsupported. We, therefore, conclude that the credit constraint gap is caused by favoritism towards micro and small enterprises with female ownership.

The paper is structured as follows: in Section 2 we define our main variables of interest and describe the data used for the econometric analysis. Section 3 outlines the empirical strategy and presents the results followed by a concluding discussion in Section 4.

2. Data and Definitions

The Doing Business data ranks Sub-Saharan Africa as the region where it is most difficult to carry out business, although several SSA countries have improved their ranking considerably since the publication of the first Doing Business report in 2003. However, the private sector business environment generally remains poor in SSA and several investment climate assessment surveys (ICAs) point to access to credit as one of the key constraints to private sector growth. This holds for the eight countries—Ethiopia, Ghana, Kenya, Mozambique, Nigeria, Senegal, Tanzania, and Uganda—considered in this paper. More than 50 percent of the firms in our sample perceive lack of access to finance to be a serious or very serious constraint to firm growth (Figure 1). The aggregate number masks substantial country variation, with only 25 percent severely credit constrained in Ethiopia as compared to 66 percent in Ghana. However, when asked about whether they believe that access to finance is the most serious obstacle to growth, only 16 percent respond affirmative, again with considerable country variation behind this aggregate figure.¹ Hence, while lack of credit is a severe problem for the enterprises in the eight countries it is not necessarily suffocating them.

FIGURE 1: PERCEIVED CREDIT CONSTRAINTS



¹ Problems with access to electricity are considered as the most serious constraint to growth by almost 50 percent of the enterprises in the sample.

The data on which our analysis is based comes from different Investment Climate Assessment surveys carried out in 2006/7 by the World Bank. We focus exclusively on manufacturing firms and due to differences in sampling approach across the countries we concentrate on firms with 5 or more employees and exclude companies with more than 300 employees. As such we only consider micro (5 to 9 employees), small (10 to 49 employees) and medium (50 to 300 employees) enterprises in the analysis. For a detailed description of the data and the sampling approach we refer to information provided on the World Bank enterprise survey homepage www.enterprisesurveys.org. The original data consists of 3,368 enterprise records. However, after data cleaning we were left with 2,942 observations across the eight countries.

2.1 Defining Credit Constrained Firms

We employ a direct approach to analyzing credit constraints using two slightly different definitions. We recognize that credit constraint studies may be subject to selection bias since not all enterprises have credit demand. We therefore follow Bigsten et al. (2003) and Byiers et al. (2010) in (i) first identifying firms with demand for external finance, and (ii) conditional on such credit demand establishing the characteristics of credit constrained firms. The survey instrument has information explaining why firms did not apply for credit - one being that the firm has “no need for a loan – establishment has sufficient capital”. Table 1 shows reasons for not applying.

Constraint Definition 1

By Constraint Definition 1, we include both applicants and non-applicants by categorizing a firm as credit constrained if it (i) applied and was denied credit (applicants) or (ii) did not apply for credit due to reasons such as “application procedures too complex”, “collateral requirements unattainable”, or “possible loan size and maturity insufficient” (non-applicants). Following Bigsten et al. (2003) we do not include firms responding “interest rates too high” or “did not believe it would be approved” as being part of the constrained firms because such answers may reflect that investment projects simply are not competitive at going interest rates.

Firms applying and being denied credit may not have sustainable business plans and should therefore not be classified as credit constrained. Table 1 reports loan rejection reasons cited by the lender. About 36 percent of the rejections were based on collateral issues. However, several firms answered “Insufficient profitability (of the project proposal and historically)”. We classify these as unconstrained firms as they may just signal weak entrepreneurship.

TABLE 1: NUMBER OF FORMAL LOAN APPLICANTS

	Yes		No	
Applied for a loan	586 (20)		2356 (80)	
Problems getting the loan	Yes 231 (39)	No 355 (61)		
<i>Problem, why?</i>			<i>Did not apply, why?</i>	
Collateral/Cosigners unacceptable	85 (37)		No need for a loan	612 (26)
Insufficient profitability	21 (9)		Application procedures too complex	404 (17)
Problems with credit history	18 (8)		Interest rates too high	610 (26)
Incomplete loan application	22 (10)		Collateral requirements unattainable	355 (15)
Concern about current debt level	7 (3)		Size/maturity of loans insufficient	67 (3)
Other	78 (34)		Did not think it would be approved	115 (5)
			Other	193 (8)
Currently has a line of credit or a loan	Yes 61 (26)	No 170 (74)	Yes 299 (84)	No 56 (16)
			Yes 179 (8)	No 2177 (92)

Note: Percentages in parenthesis

Constraint Definition 2

In classification by Constraint Definition 2 we start from Definition 1 and subsequently re-classify firms from constrained to unconstrained if they (i) currently have a bank loan or a line of credit, (ii) have access to overdraft facilities, and/or (iii) financed (part of) their last investment using a loan from a formal financial institution.

Table 1 also gives an overview of the current loan situation of the firms. The data suggests that financial market involvement (formal borrowing) is rather weak, supporting the findings in Bigsten et al. (2003). Only 19 percent of the sampled firms currently have a line of credit or a loan from a formal financial institution, and only 19 percent of the firms financed their last larger investment using formal bank financing (not reported). In terms of other financial services, the number of firms with an overdraft facility seems to increase with firm size. However, contrary to Bigsten et al. (2003) our data do not suggest that firms use overdrafts more than loans (18 percent have access to an overdraft facility).

TABLE 2: THE SHARE OF CONSTRAINED ENTERPRISES (%) BY DEFINITION AND COUNTRY

	Constraint Definition 1	Constraint Definition 2	Has Debt	Formal Debt	Trade Credits / Informal Debt	Formal Credit Demand	Obs.
Ethiopia	58.8	35.8	70.8	30.4	58.0	87.6	(257)
Ghana	56.8	45.0	80.9	19.4	78.8	84.9	(278)
Kenya	19.4	7.9	97.3	48.5	95.6	76.6	(367)
Mozambique	26.3	23.3	66.0	7.8	63.6	83.9	(335)
Nigeria	47.3	44.7	88.5	4.2	88.0	79.7	(907)
Senegal	55.9	43.7	80.3	15.4	76.8	84.6	(254)
Tanzania	45.0	35.3	79.9	27.7	78.3	84.3	(249)
Uganda	26.4	22.4	77.6	21.0	74.6	80.7	(295)
Total	41.8	33.8	82.3	18.5	79.5	81.9	(2,942)

Note: Figures are percentages (observations in parenthesis).

Table 2 gives an overview of the share of credit constrained firms according to the two credit constraint definitions. About 42 percent of the firms in the sample are credit constrained according to Definition 1. Excluding firms that currently have a bank loan, overdraft facilities, or financed recent investments using formal loans (Definition 2) reduces the share of constrained firms to 34 percent. From Table 2 it is also transparent that Kenya is somewhat special in that fewer firms are financially constrained in the formal credit market compared to the other countries considered. Finally, we find in Table 2 that although 82 percent of the firms have formal credit demand, only 19 percent of the firms have formal debt, whereas almost 80 percent of the firms are engaged in informal credit arrangements.

2.2 Credit Constraints and Gender of the Firm Owner

Turning, in Table 3, to the association between credit constraints and the gender of the firm owner we operate with two different samples. First, considering all enterprises in the sample, we consider a firm to have female ownership if any of the firm owners are female. Further, recognizing that multiple owner firms with partly female ownership does not ensure that the firm can be classified as a female operated entity, we also use a smaller sample having only firms with a single owner, who is not registered as foreign (2,034 observations).

In our data approximately the same share of female and male operated firms have formal credit demand and use informal debt sources, but a larger share of female operated firms has formal debt. The figures are confirmed by noting that firms with female ownership are on average less credit constrained, regardless of the constraint definition applied or of considering all or only single ownership firms.

TABLE 3: THE SHARE OF CONSTRAINED ENTERPRISES (%) BY GENDER

	All firms		Single owner firms	
	Female	Male	Female	Male
Constraint Definition 1	40.1	42.3	45.7	47.0
Constraint Definition 2	29.8	35.1	38.4	40.9
Has debt	82.8	82.1	80.6	80.4
Formal debt	23.6	16.8	14.0	11.4
Trade credits/Informal debt	79.3	79.6	78.0	78.5
Formal Demand	83.1	81.5	82.0	83.3
Observations	734	2,208	422	1,612

Note: Figures are percentages.

2.3 Credit Constraint Determinants

According to Bigsten et al. (2003) a model of credit demand should be able to capture differences between the capital returns and the cost of capital. Ideally we would proxy capital returns by the gross profit share of total assets (profit rate). However, due to missing data we only include location and sector indicators as controls for shocks to the conditions faced by firms in the different areas of the economies. The distribution of the data across countries, capitol/non-capitol, and industry sectors is given in Table 4.

To model the cost of capital side, we need to include variables capturing (i) the opportunity cost of capital, (ii) collateral requirements, and (iii) loan transaction costs. For opportunity costs we include a number of different proxies for the availability of alternative sources of funds. Several studies (see Bigsten and Söderbom (2006) for an overview) have found informal loans and trade credit as an important source of especially working capital financing, and we therefore include an indicator for having access to trade credit and/or informal credit sources and another indicator for being a subsidiary/part of another firm. Further, van Biesebroeck (2005) documents that exporting firms use trade credit more frequently, and we therefore also include an export participation indicator.

In addition we include proxies for access to collateral and loan transaction costs. Due to missing asset data we cannot fully cover important aspects of access to collateral. However, we include a wide range of variables representing various aspects of transaction costs: (i) an indicator representing whether the firm is a sole proprietorship, (ii) an indicator for partly foreign ownership, (iii), the owners experience (in years), and finally (iv) firm age. The distributional features in form of shares and means of all the credit constraint determinants are given in Table 4.

TABLE 4: FIRM CHARACTERISTICS BY CONSTRAINT CLASSIFICATION

	Total		Constrained		Unconstrained	
	Mean	sd	Mean	sd	Mean	sd
<i>Firm specific determinants</i>						
Gender (Female ownership = 1)	0.249	0.433	0.239	0.427	0.257	0.437
Single owner firms: Gender Female ownership = 1)	0.207	0.406	0.203	0.402	0.211	0.409
Ethnicity (Minority = 1)	0.148	0.355	0.074	0.262	0.200	0.400
Firm size (Number of employees)	30.2	43.7	21.8	34.4	36.3	48.4
Firm age (Years)	15.1	11.2	13.9	9.7	16.1	12.1
Location (Capitol = 1)	0.515	0.500	0.468	0.499	0.549	0.498
Legal ownership form (Sole proprietorship = 1)	0.614	0.487	0.706	0.456	0.547	0.498
Part of firm under foreign ownership (Yes = 1)	0.080	0.271	0.047	0.212	0.103	0.304
Firm part of a larger establishment (Yes = 1)	0.090	0.286	0.059	0.236	0.112	0.316
Export directly (Yes = 1)	0.093	0.291	0.059	0.236	0.118	0.323
Manager experience (Years)	13.7	9.4	13.3	9.1	14.0	9.6
Firm use informal credit sources (Yes = 1)	0.795	0.403	0.798	0.401	0.793	0.405
<i>Sectors</i>						
Food and Beverages	0.288	0.453	0.234	0.423	0.327	0.469
Garments and Textiles	0.235	0.424	0.288	0.453	0.196	0.397
Chemicals and Non-metallic minerals	0.058	0.235	0.040	0.200	0.072	0.258
Wood and metalwork	0.237	0.425	0.269	0.443	0.215	0.411
Other manufacturing	0.182	0.386	0.170	0.376	0.190	0.392
<i>Countries</i>						
Ethiopia	0.087	0.282	0.123	0.328	0.062	0.241
Ghana	0.094	0.293	0.129	0.335	0.070	0.255
Kenya	0.125	0.330	0.058	0.233	0.173	0.378
Mozambique	0.114	0.318	0.072	0.258	0.144	0.351
Nigeria	0.308	0.462	0.349	0.477	0.279	0.449
Senegal	0.086	0.281	0.116	0.320	0.065	0.247
Tanzania	0.085	0.278	0.091	0.288	0.080	0.271
Uganda	0.100	0.300	0.063	0.244	0.127	0.333
Number of observations	2,942		1,229		1,713	

Note: The categorization is based on Constraint Definition 1. Single owner firms (row 2) have 2,034, 951 and 1,803 observations, respectively.

Several studies have shown that minority groups in Africa are often in a better position to get credit than the African majority, see for example Fafchamps (2000), Fisman (2003), and Biggs and Shah (2006). Table 4 shows that the minority group (India/Middle East/Asian/European) is noticeably less credit constrained than the majority group of African firm owners in our sample, confirming the findings of the previous studies.

Finally, we include firm size (the number of employees) allowing us to analyze if there is a firm size bias in credit allocation even when controlling for different aspects of firm heterogeneity.²

² In addition to the included variables we also have information (although only for 2,627 enterprises) on firm growth, if the firm keeps external audited accounts and if the firm is located in an industrial processing zone. Including these variables in the analysis did, however, not change the results qualitatively.

3. Empirical Strategy and Results

The empirical analysis is divided into three parts. First, we investigate the association between gender and the probability of being credit constrained using a traditional probit model, controlling for the factors described above. The model is standard in the literature as the main focus has been on the definition of credit constraints. We take a close look at the gender gap for the average shares of credit constrained firms and try to disentangle the gap into explained and unexplained components by applying a generalized Blinder-Oaxaca decomposition. Next, we illustrate that firm size is an important determinant of the probability of being credit constrained and, importantly, firm size has differential impacts on male and female owned firms. We investigate the importance of this size dependence by splitting the sample into micro/small and medium size enterprises. We show how the gender gap is reversed for medium size firms compared to micro and small firms and further that the gap for medium size firms is in part explained by differences in firm characteristics while this is not the case for micro and small firms. Finally, we look into the question if the favorable treatment of female owned micro and small firms is related to discrimination in the entrepreneurship selection. We find no support for that hypothesis in terms of gender differentials in capacity utilization, labor productivity growth, or firm growth. Hence, we find no observable, or revealed, capability differences amongst male and female owned firms.

3.1 *Conditional Gender Effects on the Probability of Being Credit Constrained*

Table 5 presents estimated average marginal effects on the probability of being credit constrained for both credit constraints definitions and both firm ownership samples. Country and sector indicators are included in all regressions and they are highly significant (as groups).

As suggested by the bivariate associations in Table 4, we obtain a negative coefficient estimate on the gender indicator, showing that female ownership is also associated with a lower probability of being constrained conditional on other credit constraint determinants, although the estimate is not well-determined using Constraint Definition 1. This result is contrary to the conclusion reached in Muravyev et al. (2009) using the cross-country Business Environment and Enterprise Performance Survey (BEEPS) focusing on Central and Eastern European (and a few Western European and Asian) countries, where they find credit discrimination against women at lower levels of financial development. However, due to missing information in the data set the analysis in Muravyev et al. (2009) does not take into account the fact that firms not applying for formal bank loans are not

necessarily financially constrained. Female owners may be less likely to apply and get formal credit without being more constrained if they for example are more likely to operate smaller businesses or in sectors with an innate lower demand for external financing or if female entrepreneurs are more likely to have access to non-bank credit than their male counterparts. In addition, WDR (2011) documents that female entrepreneur's in Africa are as likely to access credit compared to their male counterparts, indicating that Sub-Saharan Africa credit markets may be different in terms of gender discrimination.

Regarding ethnicity, our results indicate that minority operated firms are less credit constrained than firms owned by Africans. And this is independent of the constraint definition used and whether we consider single ownership firms only. This is consistent with the credit-ethnicity results obtained in Biggs and Shah (2006), Fafchamps (2000) and Fisman (2003).

TABLE 5: CREDIT CONSTRAINT DETERMINANT: MARGINAL EFFECTS ON PROBABILITY OF BEING CONSTRAINED

	Constraint Definition 1		Constraint Definition 2	
	All firms	Single owner firms	All firms	Single owner firms
Gender (Female ownership = 1)	-0.022 (0.022)	-0.046 (0.029)	-0.034* (0.020)	-0.054** (0.028)
Ethnicity (Minority = 1)	-0.075** (0.032)	-0.146*** (0.051)	-0.091*** (0.032)	-0.142*** (0.051)
Firm size (Number of employees, log)	-0.053*** (0.011)	-0.065*** (0.015)	-0.086*** (0.011)	-0.098*** (0.015)
Firm age (Years)	-0.001 (0.001)	-0.001 (0.002)	0.001 (0.001)	0.000 (0.002)
Location (Capitol = 1)	0.010 (0.020)	0.009 (0.025)	0.009 (0.019)	0.015 (0.025)
Legal ownership form (Sole proprietorship = 1)	0.028 (0.022)	0.037 (0.033)	0.026 (0.020)	0.039 (0.032)
Firm part of a larger establishment (Yes = 1)	-0.037 (0.032)	-0.009 (0.046)	-0.015 (0.033)	-0.014 (0.046)
Export directly (Yes = 1)	-0.009 (0.035)	-0.004 (0.056)	-0.112*** (0.034)	-0.087 (0.056)
Manager experience (Years)	-0.002* (0.001)	-0.001 (0.002)	-0.002 (0.001)	-0.001 (0.002)
Firm use informal credit sources (Yes = 1)	0.032 (0.022)	0.059** (0.027)	-0.016 (0.021)	0.026 (0.026)
Part of firm under foreign ownership (Yes = 1)	0.020 (0.039)		0.014 (0.042)	
Observation	2,942	2,034	2,942	2,034
Pseudo R-squared	0.09	0.07	0.13	0.08

Note: Dependent variable: Indicator variable taking the value one if the firm is credit constrained, zero otherwise. Probit estimates, average marginal effects. Robust standard errors reported in parentheses. *, **, *** indicate significance at a 10 percent, 5 percent and 1 percent level, respectively. Sector and country factors are included in all regressions.

The negative association with firm size is the only additional effect that is well-determined for all four specifications reported.

Turning to the generalized Blinder-Oaxaca decomposition, the method essentially identifies two components of the unconditional credit gap, i.e., the difference between the share of credit constrained firms with female ownership and the share of credit constrained firms with male ownership, as they are given in Table 4. The first component is a measure of the importance of differences in observable characteristics between female and male owned firms. Following the literature, we refer to this component as the “characteristics effect”. The second component is a measure of the importance of differences in parameters for the two groups. It is often described as capturing variation in the returns to the characteristics between female and male firms. In the following it is denoted the “coefficient effect” or the unexplained component. Algebraically, the credit gap between female and male firms can be described by the following decomposition into two components where Δ is the expected credit constraint gap given both gender specific characteristics and coefficients (the “average difference”, or gap):

$$\begin{aligned} \Delta &= \left[E_{\beta_F} (C_{iF} | X_{iF}) - E_{\beta_F} (C_{iM} | X_{iM}) \right] + \left[E_{\beta_F} (C_{iM} | X_{iM}) - E_{\beta_M} (C_{iM} | X_{iM}) \right] \\ &= \left[E_{\beta_M} (C_{iF} | X_{iF}) - E_{\beta_M} (C_{iM} | X_{iM}) \right] + \left[E_{\beta_F} (C_{iF} | X_{iF}) - E_{\beta_M} (C_{iF} | X_{iF}) \right] \end{aligned} \quad (1)$$

Focusing on the first line, the first term in brackets on the RHS is difference in expected constraints for female (F) and male (M) owed firms where the expectation is evaluated under the female parameters (β_F). This is the explained component as it is extracting the importance of differences in endowments and weighing these using the same weights (the female parameters). The second term in brackets is the difference in expected constraints for male owned firms when the expectation is evaluated under the female parameters and the male parameters, respectively. This is the unexplained component of the credit gap. For linear regression models the expression is simply the two-way Blinder-Oaxaca decomposition. The general formulation in (1) is explained and exemplified in Bauer and Sinning (2008).

The first line in the decomposition in (1) is formulated from the viewpoint of female firms, which means that group differences in the characteristics are weighted by the coefficients of female firms to determine the endowments effect. For the unexplained component, the difference in expectations for the two different coefficient sets are weighted by male firm characteristics, i.e. the

coefficient effect measures the change in expectations of male firm outcome, if they had female firm coefficients. In the second line the male and female coefficients and determinants are simply interchanged, showing the standard result that different weighting leads to different component estimates for a given average gap. Below we report results using both female and male firm coefficients as reference parameters.

TABLE 6: GENERALIZED BLINDER-OAXACA DECOMPOSITION OF THE GENDER GAP

	Constraint 1				Constraint 2			
	All firms		Single owner firms		All firms		Single owner firms	
Difference in means	-0.023 (0.020)		-0.012 (0.028)		-0.052*** (0.020)		-0.025 (0.027)	
Characteristics	0.020 (0.019)	-0.004 (0.013)	0.041 (0.031)	0.041** (0.017)	0.016 (0.020)	-0.028** (0.013)	0.038 (0.030)	0.025 (0.017)
Coefficients	-0.042 (0.027)	-0.019 (0.021)	-0.053 (0.040)	-0.053* (0.031)	-0.068*** (0.025)	-0.024 (0.021)	-0.063* (0.037)	-0.050* (0.030)
Reference Coefficients	Female	Male	Female	Male	Female	Male	Female	Male

Note: Bootstrapped standard errors (500 replications) reported in parenthesis. *, **, *** indicate significance at a 10 percent, 5 percent and 1 percent level, respectively.

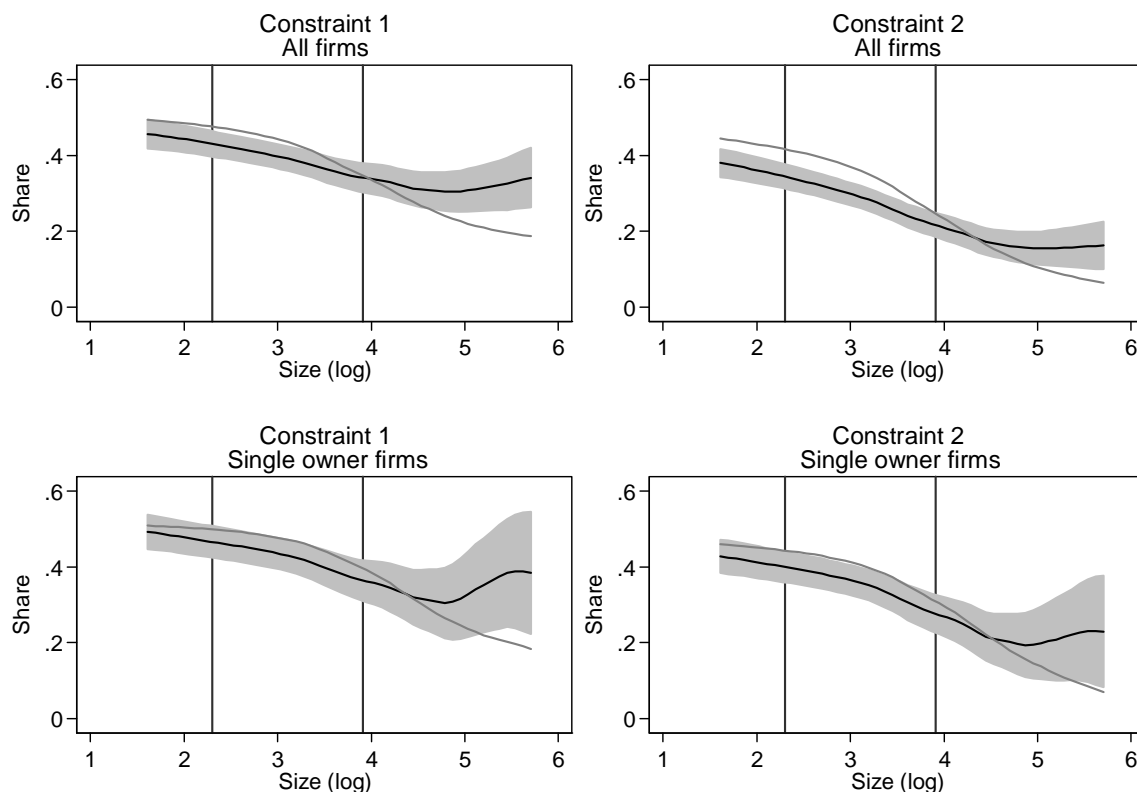
Table 6 shows the results of generalized Blinder-Oaxaca decompositions by gender and constraint definition. The differences are negative as they match the differences, which can be computed from Table 4. In terms of magnitude, the differences are fairly small ranging from -1.2 to -2.5 percentage points in three cases—for Constraint Definition 1 and the full sample and in both cases using Definition 2. Applying Definition 2 and including all firms we find a statistically significant difference of -5.2 percentage points. For single ownership firms the characteristics effect is generally positive, indicating that if credit was allocated based on differences in observable characteristics, female operated firms would be more constrained than male operated ones. The observation that female owned firms are on average less constrained in formal credit markets is, thus, driven by the unexplained effect. Hence, the results in Tables 5 and 6 lead to the conclusion that gender differences in credit constraints are small and, if anything, there is female favoritism rather than discrimination in the formal African credit markets, a result also reached in Aterido et al. (2011).

3.2 Credit Constraints, Gender, and Firm Size

The small and often insignificant, average gender credit constraint gap may be a result of a composition effect. If government (and donor) supported credit programs are targeting micro/small firms and also enterprises with female ownership then small female owned firms may well end up

being less constrained than the male owned counterparts. In Figure 2 we look into this composition effect. The Figure shows the association between firm size and the share of credit constrained firms, split by gender. The black curve is the share of credit constrained firms with female ownership while the gray curve is the share of constrained firms with male ownership. The shaded area indicates the point-wise 90 percent confidence interval for the firms with female ownership. The two vertical lines in the plots indicate the upper limits on the size of micro and small enterprises using the standard World Bank definition.³

FIGURE 2: THE ASSOCIATION BETWEEN FIRM SIZE AND CREDIT CONSTRAINTS DECOMPOSED BY GENDER



Note: Kernel weighed local mean smoothing using the Epanechnikov kernel and a bandwidth of 0.8. Black curves are for female owned firms; gray curves are for male owned firms. Shaded areas are point-wise 90% confidence intervals for the female estimates. Vertical lines are at 2.30 and 3.91 indicating 10 and 50 employees, respectively

Figure 2 clearly illustrates the negative association between firm size and the probability of being credit constrained. The figure also indicates a difference in the association for firms with male and female ownership. For micro/small firms female ownership is associated with a lower probability of being credit constrained than male ownership. For medium size firms the relationship is reversed indicating easier access to formal credit for firms with male ownership.

³ The World Bank SME Department operates with three groups of small and medium-sized enterprises: micro, small, and medium scale firms. Micro firms have up to 10 employees, small enterprises up to 50 employees, and medium companies up to 300 employees.

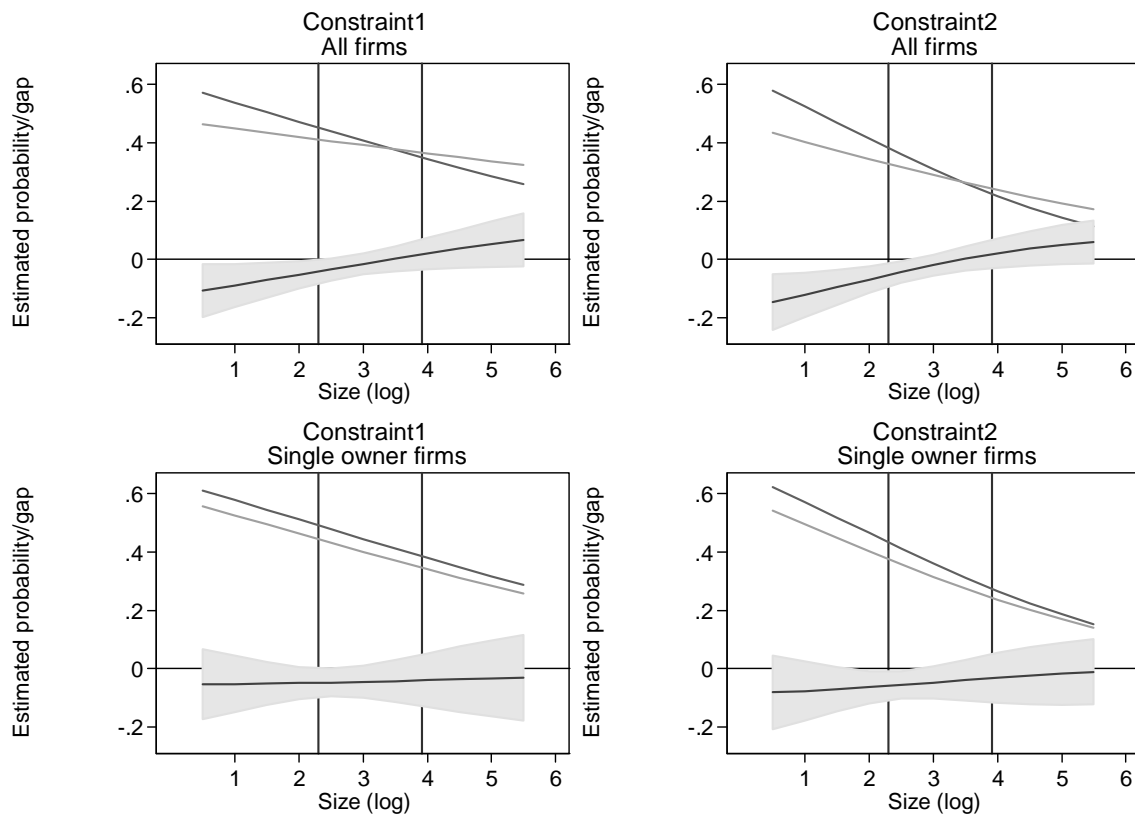
TABLE 7: AVERAGE MARGINAL EFFECTS ON PROBABILITY OF BEING CONSTRAINED WITH GENDER AND FIRM SIZE INTERACTION

	Constraint Definition 1		Constraint Definition 2	
	All firms	Single owner firms	All firms	Single owner firms
Gender (Female ownership = 1)	-0.025 (0.022)	-0.046 (0.029)	-0.038* (0.020)	-0.054** (0.028)
Ethnicity (Minority = 1)	-0.070** (0.032)	-0.145*** (0.051)	-0.087*** (0.032)	-0.141*** (0.051)
Firm size (Number of employees, log)	-0.054*** (0.011)	-0.065*** (0.015)	-0.087*** (0.011)	-0.098*** (0.015)
Firm age (Years)	0.000 (0.001)	-0.001 (0.002)	0.001 (0.001)	0.000 (0.002)
Location (Capitol = 1)	0.011 (0.020)	0.009 (0.025)	0.010 (0.019)	0.015 (0.025)
Legal ownership form (Sole proprietorship = 1)	0.030 (0.022)	0.037 (0.033)	0.028 (0.020)	0.039 (0.032)
Firm part of a larger establishment (Yes = 1)	-0.034 (0.033)	-0.009 (0.046)	-0.013 (0.033)	-0.013 (0.046)
Export directly (Yes = 1)	-0.012 (0.035)	-0.004 (0.056)	-0.114*** (0.033)	-0.087 (0.056)
Manager experience (Years)	-0.002 (0.001)	-0.001 (0.002)	-0.002* (0.001)	-0.002 (0.002)
Firm use informal credit sources (Yes = 1)	0.033 (0.022)	0.059** (0.027)	-0.014 (0.021)	0.026 (0.026)
Part of firm under foreign ownership (Yes = 1)	0.019 (0.039)		0.013 (0.042)	
Firm size at which gender gap is zero (log)	3.420*** (0.707)	14.98 (115.3)	3.438*** (0.592)	6.932 (13.17)
Observation	2,942	2,034	2,942	2,034
Pseudo R-squared	0.09	0.07	0.13	0.08

Note: Dependent variable: Indicator variable taking the value one if the firm is credit constrained, zero otherwise. Probit estimates, average marginal effects. Robust standard errors reported in parenthesis. *, **, *** indicate significance at a 10 percent, 5 percent and 1 percent level, respectively. Sector and country factors are included in all regressions.

In Table 7 we report average marginal effects on the probability of being credit constrained when the gender of the owner is interacted with firm size. The Table shows that the estimated average marginal effects are practically identical with the results reported in Table 5. Still, Figure 3 illustrates that the estimated probabilities of being credit constrained vary strongly with firm size and that this dependence varies with the gender of the owner.

FIGURE 3: THE MODEL BASED ASSOCIATION BETWEEN FIRM SIZE AND CREDIT CONSTRAINTS DECOMPOSED BY GENDER



Note: Estimated probabilities of being credit constrained by size and gender. Upper black curves are for female owned firms; gray curves are for male owned firms. Lower black curves are the estimated credit gaps: the estimated gain of having female ownership. Shaded areas are point-wise 90% confidence intervals for the gaps. Vertical lines are at 2.30 and 3.91 indicating 10 and 50 employees, respectively

Figure 3 illustrates the estimated probabilities of being credit constrained, similarly to Figure 2, but in Figure 3 the probabilities are model-based and, hence, conditional on firm characteristics and sector/country factors. The upper black curves are for female owned firms while the gray curves are for male owned firms. The curves in the lower parts of the plots are the estimated gaps (the differences between the gender specific probabilities of being credit constrained), which is the estimated marginal effect of female firm ownership. The shaded area indicates the 90%-point-wise confidence intervals for the gaps.

Considering the sample of all firms we find the gap to be significantly increasing with firm size and we estimate that the constraint probabilities are equal for firms with 30 employees regardless of the constraint definition (Table 7). For smaller firms, credit constraints are less likely for female owned firms while they are more likely when for firms with more than 30 employees. The gender/size effect is much smaller when using the single ownership sample and the gap is generally not significant for any firm size. Overall, though, we find the results to be supportive of a hypothesis of differential

credit policies for micro/small and medium size firms. Based on the analysis, we cannot say if the association between size, gender and credit constraints is smooth as in Figure 3 (which is smooth by assumption) or if there is a threshold effect. For simplicity we make a sample split along the World Bank definition of small and medium size firms. That is, we look at generalized Blinder-Oaxaca decompositions of the share of male and female credit constrained firms split into two size categories: firms with 5-49 employees (micro/small) and firms with 50-300 employees. The results are given in Table 8.

TABLE 8: GENERALIZED BLINDER-OAXACA DECOMPOSITION OF GENDER GAP – BY FIRM SIZE

	Constraint Definition 1				Constraint Definition 2			
	All firms		Single owner firms		All firms		Single owner firms	
<i>Panel A: Micro/Small firms</i>								
Difference in means	-0.048** (0.023)		-0.039 (0.027)		-0.075*** (0.023)		-0.049* (0.029)	
Characteristics	0.015 (0.023)	-0.012 (0.015)	0.024 (0.032)	0.032 (0.018)	0.011 (0.024)	-0.030** (0.015)	0.018 (0.037)	0.018 (0.019)
Coefficients	-0.063** (0.032)	-0.036 (0.026)	-0.063 (0.040)	-0.071** (0.031)	-0.087*** (0.032)	-0.045* (0.025)	-0.067 (0.045)	-0.067** (0.033)
Reference Coefficients	Female	Male	Female	Male	Female	Male	Female	Male
<i>Panel B: Medium firms</i>								
Difference in means	0.110** (0.046)		0.237*** (0.092)		0.068** (0.034)		0.154** (0.063)	
Characteristics	0.028 (0.070)	0.055* (0.032)	0.036 (0.063)	0.079 (0.061)	-0.028 (0.079)	0.004 (0.025)	-0.160* (0.098)	-0.032 (0.109)
Coefficients	0.082 (0.075)	0.055 (0.050)	0.202*** (0.039)	0.159 (0.112)	0.096 (0.075)	0.064* (0.038)	0.314*** (0.104)	0.186 (0.120)
Reference Coefficients	Female	Male	Female	Male	Female	Male	Female	Male

Note: Bootstrapped standard errors (500 replications) reported in parenthesis. *, **, *** indicate significance at a 10 percent, 5 percent and 1 percent level, respectively.

The new decomposition is interesting because the overall result in Table 6 showing quite small gender differences may well be driven by small enterprises as it is reversed for larger firms. For micro and small firms the difference between the unconditional probabilities of being credit constrained (by Definition 1) is just below 5 percentage points—with female owned firms being the less constrained. In contrast, for the medium sized firms male owned firms have an 11 percentage points lower probability of being constrained. Both differences are of a different order of magnitude compared to the results in Table 6 and they are statistically significant at conventional levels of significance.

This marked size dependence is strengthened when using the single owner sample as the difference is more than 20 percentage points for the medium size firms (the sample size for medium size single

owner firms is quite small, though). Moreover, the pattern is the same using the second definition of being credit constrained.

The decomposition of the differences in the probabilities of being credit constrained reveals an interesting pattern giving rise to our claim that female favoritism in lending to small businesses is the main cause of the outcome for female owned firms. Looking at the micro/small enterprises the part of the difference in the probabilities attributed to differences in mean characteristics between male and female owned firms is very small and typically insignificant regardless of the choice of reference. In contrast, the unexplained effect is statistically significant and about the size of the total difference. Hence, based on the observable characteristics of the firms we would expect to find no difference in the share of constrained firms across gender. The difference we do find is caused by differences in the regression coefficients. As these differences are normally associated with the notions of discrimination and favoritism, we reach the conclusion that small female owned firms are favored in formal loan applications. The conclusion is fairly robust to changes in the definition of being credit constrained and to changes in the sample.

For the medium size firms it is impossible to infer with any confidence is the significant gap is due to characteristics or coefficients. For the sample of single owner firms we find significant coefficient effects when using the female parameters as reference. But, the results are based on few observations and they are not robust to changes in reference coefficients. Hence, the substantial result is that the lending favoritism, observed for micro/small firms, does not cover medium sized firms with female ownership.

3.3 Self-selection into Entrepreneurship and Revealed Capabilities

Apart from favoritism there may be another reason for the decomposition result for the micro/small firms. Aterido et. al. (2011) argue that because of overall discrimination against female entrepreneurs there may be biased self-selection into entrepreneurship as female entrepreneurs need special (unobservable) capabilities in order to enter formal manufacturing as owners. Hence, we would expect female entrepreneurs who are able to break the “glass ceiling”, to have better capabilities, on average, than the average male entrepreneur. The superior capabilities should in turn make female entrepreneurs more likely to obtain formal credit conditional on observable characteristics.

As entrepreneur capabilities are likely to be correlated with both the ability to obtain credit and general firm performance it is interesting that Bigsten and Söderbom (2011) highlight how technology often is not the main determinant of enterprise success in Africa, especially when considering firms producing relatively unsophisticated products. Managerial capacity and capabilities (often unrevealed) are more important and market intelligence has been found to be particularly decisive for firm success.⁴

TABLE 9: PRODUCTIVITY INDICATORS FOR MICRO/SMALL FIRMS

		Capacity utilization (1 (low) to 17 (high))	Labor productivity growth (real, 04-07)	Employment growth 2004-07	Obs.
Total	Mean	11.1	-0.148	0.276	2164
	sd	3.9	0.746	0.393	
Constrained, Def. 1	Mean	10.8***	-0.178*	0.283	977
	sd	3.9	0.695	0.387	
Unconstrained, Def. 1	Mean	11.4***	-0.124*	0.271	1187
	sd	3.8	0.785	0.398	
Constrained, Def. 2	Mean	10.8***	-0.193**	0.284	825
	sd	3.8	0.655	0.369	
Unconstrained, Def. 2	Mean	11.3***	-0.120**	0.272	1339
	sd	3.9	0.796	0.408	
Female, all firms	Mean	11.0	-0.214**	0.263	528
	sd	3.9	0.691	0.399	
Male, all firms	Mean	11.1	-0.127**	0.281	1636
	sd	3.9	0.761	0.391	
Female, single owner firms	Mean	11.2	-0.258**	0.280	346
	sd	3.8	0.694	0.374	
Male, single owner firms	Mean	11.1	-0.167**	0.306	1290
	sd	3.9	0.718	0.381	

Note: *, **, *** indicate significant differences in means using two sample t-test with unequal variance at a 10 percent, 5 percent and 1 percent level, respectively.

When managerial capacity and capabilities are important determinants of firm success, the self-selection hypothesis is indirectly testable. Assuming female entrepreneurs have superior capabilities we would expect female entrepreneurs, on average, to outperform male performance on revealed capability indicators such as productivity and efficiency. In Table 9 we report summary statistics for three productivity/efficiency indicators for micro/small firms: (i) capacity utilization, (ii) labor productivity, and (iii) employment growth. As seen, credit constraints and efficiency are related. Both capacity utilization and labor productivity growth have a negative association with being credit

⁴ Market intelligence refers to (i) the ability of managers/owners to communicate and interact efficiently with suppliers and buyers, (ii) knowledge of where to position the firm in relation to existing distribution networks and how to develop new distribution channels, (iii) ability to create a well-organized and efficient working groups, etc. See Sutton (2005) and Bigsten and Söderbom (2011) for references.

constrained, regardless of our credit constraint definition. Employment growth, on the other hand, appears to have little (partial) relation with credit constraints.

Regarding firm ownership we find no relationship between the gender of the owner and capacity utilization or employment growth. For labor productivity, female owned firms have lower growth, on average, than male owned firms and the results hold for both firm samples. The results are interesting as the credit constraint and ownership associations should not be in opposite directions when female owned firms are less credit constrained and, further, when women are better entrepreneurs than men, on average, because of selection, the negative association with labor productivity growth is even more puzzling.

TABLE 10: REVEALED FEMALE CAPABILITIES IN MICRO/SMALL FIRMS

	Capacity utilization		Labor productivity growth		Employment growth	
	All firms	Single owner firms	All firms	Single owner firms	All firms	Single owner firms
Gender	-0.295 (0.210)	-0.276 (0.249)	-0.010 (0.038)	0.019 (0.040)	0.007 (0.018)	-0.013 (0.020)
Ethnicity	0.149 (0.127)	0.211 (0.147)	0.229*** (0.025)	0.222*** (0.027)	-0.311*** (0.015)	-0.315*** (0.015)
Lag firm size	-0.319 (0.339)	-0.284 (0.522)	-0.089 (0.060)	0.056 (0.100)	0.059* (0.032)	0.075 (0.047)
Firm age	-0.002 (0.011)	0.003 (0.015)	0.001 (0.002)	0.001 (0.003)	-0.004*** (0.001)	-0.004*** (0.001)
Location	-0.577*** (0.205)	-0.861*** (0.237)	-0.062* (0.036)	-0.115*** (0.040)	0.054*** (0.018)	0.044** (0.019)
Legal ownership form	-0.081 (0.202)	-0.511* (0.292)	0.072* (0.042)	0.055 (0.057)	-0.033* (0.018)	-0.012 (0.025)
Firm part of a larger establishment	-0.064 (0.377)	-0.444 (0.499)	-0.167** (0.077)	-0.182* (0.103)	0.169*** (0.033)	0.171*** (0.041)
Export directly	-0.096 (0.422)	0.009 (0.520)	-0.033 (0.068)	0.002 (0.108)	0.094** (0.044)	0.188*** (0.057)
Firm use informal credit sources	-0.031** (0.012)	-0.040*** (0.015)	-0.000 (0.002)	0.000 (0.003)	-0.001 (0.001)	-0.001 (0.001)
Manager experience (Years)	0.093 (0.230)	0.280 (0.264)	0.098** (0.041)	0.068 (0.044)	0.011 (0.017)	0.014 (0.019)
Part of firm under foreign ownership	0.270 (0.428)		-0.052 (0.063)		0.020 (0.038)	
Observations	2164	1636	2164	1636	2164	1636
R-squared	0.04	0.05	0.12	0.17	0.35	0.35

Note: OLS regressions, robust standard errors in parentheses. *, **, *** indicate significance at a 10 percent, 5 percent and 1 percent level, respectively. The lag firm size is the log of the number of employees three years prior to the measurement of the dependent variable. Sector and country factors are included.

One explanation for the results in Table 9, often put forward in the literature, could be that men and women enter into different sectors with different growth potentials (see for example Buvinic and Berger (1990) in the case of Peru). To take this possibility into account we in Table 10 therefore test if firms with female ownership are more efficient than their male counterparts conditional on observable characteristics. The results are clear. The female mean effect is both small and statistically insignificant in all regressions. In sum, based on the three productivity/efficiency indicators we find no support for the self-selection hypothesis.

Our regression results are in line with the more general results reached in Croson and Gneezy (2009) reviewing gender related experimental economics literature. According to the review, the evidence suggests that managers and entrepreneurs present an important exception to the rule that women are more risk averse than men. Thus, although gender differences in risk preferences among the general population exist, it does not extend to entrepreneurs/business managers. This result could be due to selection. More risk taking individuals tend to choose the entrepreneurial path. But although fewer women select this path, they have similar risk preferences as men. Our result indicates that female entrepreneurs are like their male counterparts in other respects than risk aversion.

4. Conclusion

Using firm level data from eight Sub-Saharan Africa countries we examine credit constraint differentials between male and female manufacturing entrepreneurs. In line with previous studies (Aterido et al., 2011) we find that enterprises owned by female entrepreneurs are less likely to be credit constrained compared to their male counterparts. We decompose the difference in the probability of being credit constrained by applying a generalized Blinder-Oaxaca decomposition. This decomposition shows that the credit gap is mostly due to differences in the unexplained component. Furthermore, some of our results indicate that if credit was allocated based on differences in observable characteristics, female operated firms should be more constrained than male owned ones.

Understanding the gender credit constraint gap is of central policy importance as many donor funded credit programs in Sub-Saharan Africa target female entrepreneurs. The main explanation in Aterido et al. (2011) for the observed female gender favoritism in credit is self-selection into

entrepreneurship. Women are argued to be (on average) better entrepreneurs—and hence should be allocated more formal external finance—because they have to be “more capable” than men to become entrepreneurs. However, we find this story to be largely unsupported by the data.

First, we illustrate that firm size, besides being an important determinant of the probability of facing credit constraints in the formal financial market, has differential impacts on male and female owned enterprises. Specifically, we show that the gender credit gap is reversed for medium size firms (50 employees and above) compared to their smaller counterparts. Moreover, the credit gap for medium size firms can to larger extent be explained by differences in firm characteristics while this is not the case for micro and small firms.

Second, we question whether the favorable treatment of female owned smaller firms is related to discrimination in the entrepreneurship selection process, as we cannot find gender differentials in capacity utilization, labor productivity growth, or firm growth. Hence, we observe no revealed, capability differences amongst male and female owned firms.

Based on our analysis we conclude that the credit constraint gap is caused by favoritism towards smaller enterprises with female ownership. Consequently we would suggest that donors and policy makers, instead of calling for more credit to small female owned firms, focus the effort on improving the functioning and competitiveness of the financial sector in Sub-Saharan Africa as such, and support female entrepreneurs in other ways than by (more) policy driven bank credit.

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