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Estimates of gender differences in firm's access to credit in Sub-Saharan Africa

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HIGHLIGHTS

- We estimate gender differences in credit constraints in Sub-Saharan Africa.
- We show how the choice of constraint measurement determines the estimated gender imbalance.
- We, thus, explain why the recent literature has reached conflicting results.

ARTICLE INFO

ABSTRACT

Based on firm level data from 16 Sub-Saharan African countries we show how three different measures of credit constraints lead to three different estimates of gender differences in manufacturing firms' credit situation. Using a perception based credit constraint measure female owned firms appear relatively more constrained than male owned firms. Using formal financial access data we find no gender effect. Finally, using direct information on credit constraints, male owned small firms appear disadvantaged. Furthermore we show a strong size gradient in the gender gap for the two measures for which we find significant gender differences.

1. Introduction

The World Development Report "Gender Equality and Development" (World Bank, 2011) has sparked increased research looking at gender differences in access to credit in the manufacturing sector in Sub-Saharan Africa (SSA). Existing studies of credit constraints can generally be classified into three categories based on the way they define the credit measure. We have (1) perception based studies (2) credit access studies and (3) studies using direct credit constraint measures. These different credit definitions are represented in three recent studies; Aterido et al. (2013), Asiedu et al. (2013) and Hansen and Rand (2013). Using almost identical data the three papers reach rather different conclusions regarding gender differences in credit constraints. We show how these different results are driven by the way in which researchers measure credit constraints.

2. Data and definitions

We use the World Bank investment climate assessment surveys (ICAs) of 2006 and 2007 for 16 SSA countries (Angola, Burundi, Cameroon, Congo, Ethiopia, Ghana, Guinea, Kenya, Mali, Mozambique, Nigeria, Senegal, South Africa, Tanzania, Uganda and Zambia). We focus exclusively on non-state manufacturing firms with 5–300 permanent full-time employees. Due to lack of information about the total number of manufacturing firms in each country we use population sizes from 2008 as weights in the stratified

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Table 1
The sample of firms classified by the three credit constraint definitions.

Perceives access to credit as an obstacle	Yes 3023 (63)				No 1788 (37)			
Do not have a line of credit/overdraft facility or a loan	Yes 2274 (75)		No 749 (25)		Yes 1052 (59)		No 736 (41)	
Credit constrained based on credit application information	Yes 1225 (54)	No 1049 (46)	Yes 71 (9)	No 678 (91)	Yes 356 (34)	No 696 (66)	Yes 29 (4)	No 707 (96)

Note: Percentages in parenthesis.

sample. For additional information regarding the data, see Hansen and Rand (2013).

2.1. Credit perceptions

In the perception based approach to credit constraints firms are asked if credit is an obstacle to firm growth and given categorized choices (from no constraint to a very severe constraint) to rate the degree of the constraint faced (see for example Beck and Demirgüç-Kunt, 2006 and Asiedu et al., 2013). Based on the firms' answers to the questions we generate a binary credit constraint variable taking the value one if firms state that credit is either a moderate, severe or very severe obstacle to firm growth.[1]

2.2. Use of financial services

Credit access studies distinguish between firms that use formal financial services and those who do not. Following Muravyev et al. (2009) and Aterido et al. (2013) we identify firms using formal credit as firms with access to an overdraft facility, a credit line and/or a formal bank loan. To bring the credit access notion in line with the two other measures we generate a binary indicator variable taking the value one for firms who are not currently using formal credit.

2.3. Direct credit application information

Studies using direct credit constraint information use questions about formal loan applications and stated reasons for not applying for loans to generate a credit constraint measure, which takes into account that not all enterprises have credit demand. Following Bigsten et al. (2003) and Hansen and Rand (2013) we categorize firms as credit constrained if they (i) applied for and was denied formal credit or (ii) did not apply for credit due to reasons such as "application procedures to complex", "collateral requirements unattainable", or "possible loan size and maturity insufficient". If firms had formal credit or did not apply for credit for other reasons they are classified as unconstrained.

3. Results

Table 1 classifies each of the 4811 firms in our sample as credit constrained, or not, according to the three definitions. As seen, 63% of the firms perceive credit as an obstacle for firm growth, while 69% of the firms are not currently using formal credit and 35% of the firms are credit constrained when using the direct constraint definition. In addition to the differences in the ratios, the three definitions lead to quite different classifications of the firms. Some 25% of the firms perceiving that they are constrained

in credit markets are not constrained by the second measure as they have access to financial services and only 54% of the firms who perceive themselves as constrained and who are not using formal financial services (the common set of definitions 1 and 2) are credit constrained according to the direct credit constraint measure.

In Fig. 1 we show the relationships between firm size and the gender of the firm owner for the three measures of credit constraints. Firm size (the number of permanent full-time employees) is generally found to be a key determinant of access to credit and Fig. 1 clearly illustrates the negative association between firm size and the frequency by which firms perceive access to credit as an obstacle (Panel A), the ratio of firms that do not use formal credit (Panel B) and the incidence of firms who are directly observed as credit constrained (Panel C). The black curve in each plot is for firms with female ownership while the grey curve represents firms with male ownership.[2] Following the literature, we consider a firm to have female ownership if at least one of the firm owners is a female.

The main result in Fig. 1 is the difference in the gender profiles across the three measures. Small firms have the same perception of access to credit being an obstacle to firm growth across gender, while the perceptions differ for larger firms (from about 30 employees and above) such that relatively more firms with female ownership perceive access to credit to be an obstacle. Panel B shows that slightly more male owned firms do not use formal credit compared to female owned firms and this holds for all firm sizes but the gender difference is very small and clearly statistically insignificant. Finally, for credit constrained firms relatively more male owned small firms are constrained while the relation is reversed such that male owned large firms are relatively less constrained. Overall, this illustrates how the actual measurement may well be the determining factor when estimating the degree of gender imbalance in credit restriction regressions for Sub-Saharan Africa. This variation in observed gender differences across measures and firm size is also significant conditional on standard credit access determinants, as we show below.

Table 2 reports results of logit regressions in which we estimate the association between gender and the probability of a firm being credit constrained, using each of the three measures of constraints, conditional on various firm characteristics that have been found important for firm's credit access in previous studies. We use country and industry fixed effects to take account of level differences across countries and sectors and we condition on location in each country by including a dummy taking the value one if the firm is located in the capital (or the main city). We also include information about firm age; experience and education of the current manager (the latter as a dummy taking the value 1 if the manager has at least secondary schooling); a dummy for minority ownership and indicators of the legal status of the firm

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[1] This indicator corresponds exactly to the variable f_con1 in Asiedu et al. (2013).

[2] The rates are estimated by kernel weighed local mean smoothing using the Epanechnikov kernel with a bandwidth of 0.8 and the shaded areas give point-wise 90% confidence intervals.
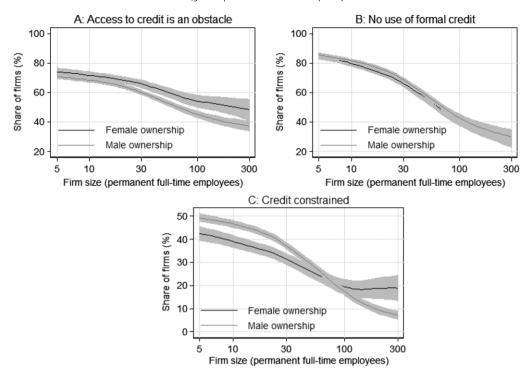
Fig. 1. The association between firm size and credit constraints decomposed by gender for alternative measures of credit constraints.

Table 2
Estimated log-odds ratios for access to formal finance.

	Credit perception		Credit use		Credit constrained	
	(1)	(2)	(3)	(4)	(5)	(6)
Female ownership	0.117[*]	0.003	−0.107	−0.118	−0.157	−0.239[**]
	(0.066)	(0.075)	(0.096)	(0.164)	(0.111)	(0.099)
Size (log)	−0.397[***]	−0.435[***]	−0.596[***]	−0.599[***]	−0.405[***]	−0.455[***]
	(0.072)	(0.079)	(0.056)	(0.078)	(0.056)	(0.061)
Female × Size (log)		0.181[**]		0.015		0.247[***]
		(0.085)		(0.165)		(0.092)
Firm age (Years)	−0.010[**]	−0.010[**]	0.001	0.001	0.005	0.006
	(0.004)	(0.004)	(0.005)	(0.006)	(0.005)	(0.005)
Manager experience (Years)	0.008	0.008	0.004	0.004	−0.015	−0.015
	(0.006)	(0.006)	(0.010)	(0.010)	(0.010)	(0.010)
Manager education (At least sec. school)	−0.411[**]	−0.396[**]	−0.540[***]	−0.540[***]	−0.128	−0.114
	(0.173)	(0.175)	(0.164)	(0.168)	(0.111)	(0.106)
Minority ownership	−0.526[***]	−0.515[***]	−0.164	−0.164	−0.832[***]	−0.815[***]
	(0.115)	(0.115)	(0.150)	(0.152)	(0.147)	(0.147)
Sole proprietorship	−0.075	−0.066	0.375[**]	0.375[**]	0.290[***]	0.304[***]
	(0.095)	(0.094)	(0.164)	(0.161)	(0.091)	(0.092)
Part of larger establishment	0.086	0.096	0.290	0.291	−0.219	−0.208
	(0.161)	(0.162)	(0.231)	(0.226)	(0.171)	(0.173)
Some foreign ownership	0.406[**]	0.406[**]	0.088	0.088	0.534[***]	0.529[***]
	(0.159)	(0.158)	(0.174)	(0.174)	(0.184)	(0.177)
Export directly	−0.243	−0.255	−0.646[***]	−0.646[***]	−0.533[***]	−0.549[***]
	(0.195)	(0.193)	(0.113)	(0.114)	(0.191)	(0.187)
Use informal credit	0.199	0.206	−0.182	−0.182	−0.035	−0.028
	(0.155)	(0.155)	(0.241)	(0.235)	(0.092)	(0.091)
Pseudo R^2	0.133	0.134	0.342	0.342	0.139	0.140
Observations	4811	4811	4811	4811	4811	4811

Country and sector fixed effects and a location dummy are included in all regressions. Standard errors in parentheses are clustered on sectors within countries.
[*] $p < 0.10$.
[**] $p < 0.05$.
[***] $p < 0.01$.

in the form of dummies if the firm is a sole proprietorship, part of a larger establishment and if it is partly foreign owned. Alternative

sources of credit are taken into account by including an indicator if the firm is engaged in exports (giving options for trade credits)
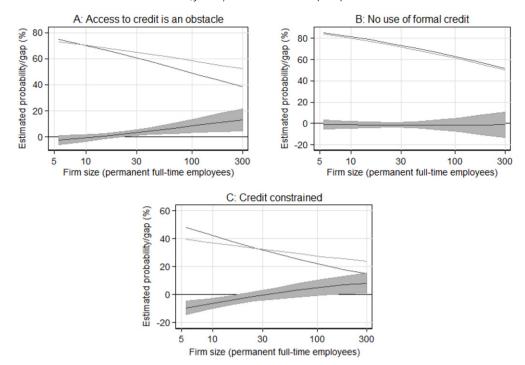
Fig. 2. The estimated association between firm size and credit constraints decomposed by gender for alternative measures of credit constraints.

and an indicator if the firm uses informal credit. Naturally, we also condition on firm size and we include an interaction between firm size and gender to allow for different gender profiles in the size dependence.

We find a marginally significant gender difference for the credit perception, indicating that female owned firms perceive credit as a more severe obstacle to growth (regression 1). The interaction effect in regression (2) is statistically significant, indicating that the gender difference is increasing in firm size. This is confirmed in Panel A of Fig. 2 in which the estimated probabilities of perceiving credit as an obstacle for male and female owned firms are plotted as functions of firm size (black lines for female ownership, grey for male). The estimated gap is also included with a 95%-point-wise confidence band (grey shade). The regressions for the second credit constraint definition in regressions (3) and (4) show statistically insignificant gender differences and the marginal effects in Panel B of Fig. 2 illustrate that the estimated difference is also economically unimportant. Finally, the results for directly observed credit constraints in regressions (5) and (6) and Panel C of Fig. 2 illustrate the shift in the estimated gender difference – whereby female owned small firms are less constrained than male owned small firms – while this ordering is reversed for larger firms. Overall, we find strong agreement between the directly observable, marginal associations in Fig. 1 and the model-based, conditional associations in Fig. 2.

4. Conclusion

Credit constraints in formal financial markets are not directly observable from firms' interactions with the financial institutions. Therefore, studies of manufacturing firms in Sub-Saharan Africa (and elsewhere) use indirect measures when firms are classified as being credit constrained or not. We show that the choice of credit constraint measurement determines the outcome in terms of the estimated gender imbalance in the probability of being credit constrained in Sub-Saharan Africa.

Needless to say, our results do not show if there is a gender bias in credit to manufacturing firms in Sub-Saharan Africa. First of all, the three measures do not measure the same constraint, that is why we need not get the same results in the constraints' regressions. Second, the regressions only include information about existing firms whereby firm survival is not taken into account. As formal credit is important for firm survival and growth there may be a survivor bias, which could affect the estimated gender difference. Finally, the size distribution of firms may also be related to the gender of the owners such that the large size effect in the prevalence of credit constraints is also generating a gender bias in formal credit provision.

Thus, in effect our results simply explain how the dissimilarities in the estimated gender differences in firm's access to credit in Sub-Saharan Africa in the papers by Aterido et al. (2013), Asiedu et al. (2013) and Hansen and Rand (2013) are fully explained by their different choices of constraints measure.

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