

Access to Credit by Firms in Sub-Saharan Africa: How Relevant is Gender?[†]

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Firm performance can be impeded by many factors, including lack of finance, corruption, political instability, and poor infrastructure. The overall business and institutional environment, especially the legal environment, is important for a firm's performance (Beck and Demirgüç-Kunt 2006; Ayyagari, Beck, and Demirgüç-Kunt (2007); Beck, Demirgüç-Kunt, and Maksimovic 2005, 2008). The existing empirical evidence specifically suggests that the lack of access to financing is one of the most important constraints to firm growth (Beck and Demirgüç-Kunt 2006; Nkurunziza 2010). To the extent that the private sector is an engine of growth, it is important to identify the extent to which firms are financially constrained and the factors that ease or exacerbate the financial obstacles faced by firms. Such an analysis is particularly important for developing countries, especially for countries in sub-Saharan Africa (SSA) where private sector development lags behind other regions. Due to a paucity of data, research on the determinants of firms' financing constraints has focused on firms in developed economies (Asiedu et al. 2013). The World Bank's Enterprise Survey (WBES) of 2006 provided the first set of reliable data on firms in developing countries.

This paper examines the importance of the gender of the firm's owner as a determinant of the

firm's access to finance in developing countries, with a focus on SSA. To the best of our knowledge, this is the first study that considers the gender of the firm's owner as a factor of firms' financing constraints across countries and regions. A few policy papers have discussed the gender gap in access to credit, but they provide only anecdotal evidence (e.g., Hallward-Driemeier 2013). The study most closely related to our work is the paper by Aterido, Beck, and Iacovone (2011). While these authors also use data from WBES, their focus is different. Specifically, they examine whether the gender of the firm's owner affects the firm's use of financial services.

In this study we investigate whether female-owned firms are more financially constrained than male-owned firms. We run separate regressions for firms in four developing regions: SSA, Latin America and Caribbean, East Asia and Pacific, and East and Central Europe. There are four important reasons for running separate regressions for SSA. First, if the determinants of firms' financing constraints vary systematically across SSA and non-SSA countries, then results from pooled samples may be misleading. Second, private sector development in Africa has lagged behind other developing regions, which is an important factor for the relatively poor long-term economic performance of the region. It is therefore important to investigate the factors that inhibit firm performance in the region. Third, women contribute a large share to national output in African countries. Most important, it has been proven that women's economic empowerment has substantial beneficial effects on household welfare. Hence, constraints to female-owned firms have important implications for social and economic development in Africa. Finally, an analysis that takes into account the specificity of SSA countries yields results that are more relevant for policy than those derived from analyses using global pooled data.

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I. Data and Regression Variables

Our main source of data is the WBES. Our sample includes 34,342 nonagricultural formal firms with at least five employees from 90 developing countries over the period 2006–2011. Following Beck et al. (2006), we measure financing constraints based on answers to the survey question “To what degree is access to finance an obstacle to the current operations of this establishment?” The five possible answers are: not an obstacle, minor obstacle, moderate obstacle, major obstacle, and very severe obstacle. We construct two dependent variables. The first, f_con , corresponds to the five responses and takes on values zero to four where a higher number implies that a firm is more credit constrained. The second measure, f_con1 , is a dichotomous version of f_con1 which equals one if a firm reported that access to finance was a moderate, major, or very severe obstacle, and zero otherwise.

The WBES database does not have detailed information about firm ownership, such as the gender composition of the owners, the number of owners, and the distribution of shares among owners. Thus, following Aterido, Beck, and Iacovone (2011), we derive an indicator of female ownership, f_par , from answers to the question “Amongst the owners of the firm, are there any females?” The indicator equals to 1 if a firm has at least one female owner and zero otherwise. Defined as such, this indicator does not accurately represent female ownership. An alternative option would be to restrict the sample to sole proprietorship firms. However, this would severely reduce the number of usable observations. As pointed out by Aterido, Beck, and Iacovone (2011), f_par overstates female ownership, and therefore the results may be interpreted as a lower bound of the extent to which gender determines firms’ financing constraints. To facilitate the discussion, we will use the terminology female-owned firms to refer to firms with at least one female owner and male-owned firms to refer to those which have no female owner.

Following previous studies, we consider various firm characteristics that have been found to affect a firm’s access to credit, notably firm size, ownership structure (foreign versus domestically owned), and the legal status of the firm. We classify firms as small, medium, and large if the number of employees is between five and 19, 20 and 99, and 100 or more, respectively. A firm is

classified as foreign owned if a foreign company has a financial stake in the firm. The categories of a firm’s legal status are sole proprietorship, publicly traded, privately traded and partnership. We consider two additional determinants, indicators that have not been used in previous studies: (i) a dummy variable that reflects a firm’s technological capability which equals one if the firm has a website and zero otherwise; (ii) a dummy variable that reflects financial transparency which equals one if the firm’s annual financial statements were checked and certified by an external auditor the previous year. We also take into account country characteristics that may affect access to credit: macroeconomic stability measured by inflation, institutional development captured by the efficiency of the legal system, and the level of financial development measured by domestic banking credit to the private sector as a share of GDP. The data on these indicators are from World Bank’s *World Development Indicators*. The variables are averaged over 2006–2011 to coincide with the period covered by the WBES.

There are several notable points from the data (detailed descriptive statistics are available in an online Appendix). First, the share of firms that are female owned is significantly lower in SSA than in the other regions: about 29 percent for SSA, 40 percent for LAC, 52 percent for EAP and 40 percent for ECA. Second, the extent of financial constraints is higher for both male-owned and female-owned firms in SSA than in other regions. Third, the gender gap (the difference between f_con for male-owned and female-owned firms) in SSA is more than twice the average gap in the sample. The data clearly suggest that the gender of the firm’s owner is an important determinant of a firm’s financing constraints in SSA and less so in other regions. We examine whether this conjecture holds after controlling for relevant determinants of firms’ financing constraints.

II. Estimation Procedure and Results

We explore the above conjecture by estimating variants of the following equation:

$$(1) \text{fin_con}_{ij} = \alpha + \beta f_par_{ij} + \mathbf{X}_i \Gamma + \varepsilon_{ij},$$

where for the firm i in region j , fin_con is a measure of financial constraints (f_con and f_con1 alternatively), f_par is a dummy variable for female ownership, and \mathbf{X} is a vector of the

control variables described above. Our estimation strategy takes into account the following features of the data: (i) the dependent variables are categorical variables; (ii) survey data typically tend to have outlier observations due to coding mistakes and/or measurement errors; (iii) there may be sampling and survey differences across countries; (iv) credit constraints and the gender gap may be affected by observed and unobserved firm, industry, and country characteristics (e.g., cultural norms that may prevent women from obtaining credit). We address these issues in several ways. First, we take into account the nature of the dependent variables by estimating an ordered probit model and a probit model. One limitation of the probit model is that it does not allow us to use fixed effects estimations to control for unobserved country characteristics, possible bias due to omitted variables, differences in survey techniques across countries, and potential country-level biases in survey responses. We address this issue in three ways. First, we include country dummy variables in the probit regression. Second, we use the conditional logit specification to capture fixed effects in a discrete choice model, while remaining consistent with the dichotomous nature of the dependent variable. Third, we run a fixed-effects ordinary least square (OLS) regression. Finally, we use the iteratively reweighted least squares (IRLS) procedure to mitigate the influence of outlier observations. The results from the four different estimation procedures are qualitatively similar, suggesting that possible biases in our estimations are minimal. Finally, in all the regressions, we include two-digit-level industry dummy variables to control for industry-specific effects and year dummy variables to control for time-specific global shocks.

A. Benchmark Regressions

We start by estimating equation (1) as an ordered probit model for the pooled sample and each of the four regions. The results are reported in Table 1. We report the results for the pooled sample to highlight the importance of running separate regressions by region. To keep the paper focused and to economize on space, we focus on the results for SSA and refer to the results for the other regions only for comparison purposes.

The effects of the explanatory variables vary by region, suggesting that an analysis based on

pooled data may produce misleading results. The estimated coefficient on the indicator of female ownership is positive and statistically significant at the 1 percent level for SSA, negative and significant only at the 10 percent for LAC, and insignificant for EAP, ECA, and the pooled sample. The coefficient on female ownership is also larger in SSA compared to other regions. This confirms our conjecture that female-owned firms in SSA are more likely to be financially constrained than male-owned firms. There is no evidence of a gender gap in the other regions. Small firms are more likely to be financially constrained than larger firms, and foreign-owned firms are less likely to be constrained than domestically owned firms. The effects of the firm's legal status, financial transparency, and technological capabilities vary by region. In SSA, firms that are sole proprietorships, publicly traded, or nontraded/private traded firms are less financially constrained than partnership firms. In addition, firms with higher financial transparency and better technological capability are less financially constrained than their counterparts.

B. Robustness Tests of the Results for Sub-Saharan Africa

We next examine whether the gender gap in access to credit by SSA firms is robust. The robustness analysis is motivated by the observed wide variation across countries in the extent to which firms are financially constrained (see detailed data description in the online Appendix on the web). This suggests that it is important to control for observed and unobserved country characteristics in order to capture the "true" effects of gender on financing constraints. It is also important to assess the robustness of the results with respect to possible outliers.

First, we test the sensitivity of the results by using alternative estimation methods to the ordered probit model, namely the OLS, conditional logit, and iteratively reweighted least squares (IRLS). Second, we include three country specific variables: inflation, the ratio of private sector credit to GDP, and the efficiency of the legal system. As shown in Table 2, the estimated coefficient on female ownership is positive and significant at the 1 percent level in all regressions, suggesting that the gender gap persists after controlling for observed and

TABLE 1—ORDERED PROBIT REGRESSIONS

Variables	All regions	Sub-Saharan Africa	Latin America	East Asia and Pacific	East and Central Europe
Female owned	0.018 (0.154)	0.085*** (0.003)	-0.045* (0.094)	0.052 (0.140)	-0.013 (0.547)
Small firm	0.146*** (0.000)	0.200*** (0.000)	0.133*** (0.000)	0.173*** (0.001)	0.111*** (0.000)
Medium firm	0.088*** (0.000)	0.085* (0.098)	0.136*** (0.000)	0.185*** (0.000)	0.048* (0.079)
Sole proprietorship	-0.022 (0.287)	-0.115*** (0.004)	0.063 (0.184)	0.013 (0.795)	-0.020 (0.623)
Publicly traded	-0.013 (0.667)	-0.597*** (0.000)	0.006 (0.928)	-0.080 (0.363)	0.060 (0.188)
Private or nontraded	-0.054*** (0.007)	-0.156*** (0.000)	0.119*** (0.009)	-0.099* (0.060)	-0.024 (0.506)
Foreign owned	-0.190*** (0.000)	-0.142*** (0.000)	-0.125*** (0.002)	-0.268*** (0.000)	-0.201*** (0.000)
Financial transparency	-0.071*** (0.000)	-0.231*** (0.000)	-0.022 (0.469)	-0.128*** (0.005)	0.009 (0.690)
Technological capability	-0.049*** (0.001)	-0.181*** (0.000)	-0.044 (0.120)	0.068* (0.088)	-0.008 (0.716)
Firms	34,342	7,718	7,170	4,550	12,105
Countries	90	25	22	10	30

Notes: Dependent variable: index of financing constraints ($f_cons = 0$ to 4). Robust p -values in parentheses. The reference group for firms' legal status is partnerships.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

unobserved country characteristics and potential bias from omitted variable. The derived marginal effects show that, all else being equal, the probability of being financially constrained is about 5.2 percentage points higher for female-owned firms than male-owned firms. The results for the control variables are also robust.

III. Conclusion

The analysis in this paper makes a substantial contribution to the literature in two substantive ways. First, this is the first study to investigate whether female-owned firms are more credit constrained than male-owned firms. Second, the study extends the empirical literature by examining whether firms in sub-Saharan African countries face more credit constraints than in other regions, and whether women-owned firms in SSA are more credit constrained than male-owned firms. The analysis in this study generates robust results that take into account the

specificities of sub-Saharan African countries and therefore are more informative for policy formulation.

REFERENCES

- Asiedu, Elizabeth, Isaac Kalonda-Kanyama, Leonce Ndikumana, and Akwasi Nti-Addae. 2013. "Access to Credit by Firms in Sub-Saharan Africa: How Relevant is Gender?" PERI Working Paper.
- Aterido, Reyes, Thorsten Beck, and Leonardo Iacovone. 2011. "Gender and Finance in Sub-Saharan Africa: Are Women Disadvantaged?" The World Bank, Policy Research Working Paper 5571.
- Ayyagari, Meghana, Thorsten Beck, and Asli Demirgüç-Kunt. 2007. "Small and Medium Enterprises across the Globe." *Small Business Economics* 29 (4): 415–34.
- Beck, Thorsten, and Asli Demirgüç-Kunt. 2006. "Small and Medium-Size Enterprises: Access

TABLE 2—ROBUSTNESS REGRESSIONS FOR SSA

Variables	Country fixed effects		Include country variables		
	OLS	Conditional logit	IRLS	Ordered probit	Probit (marginal effect)
Female owned	0.077** (0.033)	0.133** (0.015)	0.134*** (0.001)	0.092*** (0.002)	0.052*** (0.000)
Small firm	0.185*** (0.006)	0.315*** (0.002)	0.176** (0.025)	0.135** (0.017)	0.066** (0.013)
Medium firm	0.084 (0.200)	0.188* (0.060)	0.037 (0.623)	0.043 (0.420)	0.022 (0.376)
Sole proprietorship	-0.151*** (0.003)	-0.212*** (0.006)	-0.084 (0.149)	-0.067 (0.104)	-0.040** (0.041)
Publicly traded	-0.645*** (0.000)	-1.130*** (0.000)	-0.814*** (0.000)	-0.604*** (0.000)	-0.336*** (0.000)
Private or nontraded	-0.182*** (0.001)	-0.251*** (0.001)	-0.216*** (0.000)	-0.145*** (0.001)	-0.075*** (0.000)
Foreign owned	-0.240*** (0.000)	-0.329*** (0.000)	-0.221*** (0.000)	-0.152*** (0.000)	-0.062*** (0.001)
Financial transparency	-0.276*** (0.000)	-0.355*** (0.000)	-0.460*** (0.000)	-0.313*** (0.000)	-0.131*** (0.000)
Technological capability	-0.229*** (0.000)	-0.297*** (0.000)	-0.238*** (0.000)	-0.186*** (0.000)	-0.077*** (0.000)
Inflation			0.027*** (0.000)	0.017*** (0.000)	0.008*** (0.000)
Credit/GDP			-0.006*** (0.000)	-0.005*** (0.000)	-0.002*** (0.000)
Legal system			-0.050*** (0.000)	-0.033*** (0.000)	-0.008*** (0.008)
Countries	25	25	21	21	21
Firms	8,186	8,186	7,123	7,123	7,123

Notes: Dependent variable: f_con (OLS, IRLS, ordered probit), f_con1 (conditional logit). Robust p -values in parentheses.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

to Finance as a Growth Constraint.” *Journal of Banking and Finance* 30 (11): 2931–43.

Beck, Thorsten, Asli Demirgüç-Kunt, and Vojislav Maksimovic. 2005. “Financial and Legal Constraints to Growth: Does Firm Size Matter?” *Journal of Finance* 60 (1): 137–77.

Beck, Thorsten, Asli Demirgüç-Kunt, and Vojislav Maksimovic. 2008. “Financing Patterns Around the World: Are Small Firms Different?” *Journal of Financial Economics* 89 (3): 467–87.

Hallward-Driemeier, Mary. 2013. *Enterprising Women: Expanding Opportunities in Africa*. Washington DC: The World Bank

Nkurunziza, Janvier Desire. 2010. “The Effect of Credit on Growth and Convergence of Firm Size in Kenyan Manufacturing.” *Journal of International Trade and Economic Development* 19 (3): 465–94.