

DO INEQUALITY-BASED ENTRY BARRIERS DETER THE FORMATION OF FEMALE-OWNED FIRMS IN NIGERIA?

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In this paper, we consider the role of inequality-based entry barriers on the formation of female-owned firms in Nigeria. With data from the 2010 World Enterprise Survey, we estimate the parameters of a simple model of female-owned firm entry to determine the role of inequality-based barriers on the number of female-owned firms across city-industry clusters in Nigeria. Parameter estimates from count data specifications of firm entry reveal that access to financing, land, and licenses/permits absolutely deter the entry of female-owned firms, as these entry barriers are proportional to the probability of observing no female-owned firms. In general, barriers to securing land constrain the entry of female-owned firms beyond the process determining absolute entry deterrence. This suggests that the market entry and underrepresentation of female-owned among firm-owners and entrepreneurs in Nigeria is, at least in part, caused by gender inequality in general. As private firm output dominates the gross domestic product of modern economies, our findings suggest that the reduction of gender inequality in Sub-Saharan Africa would result in more female-owned and entrepreneurs which would catalyze economic growth

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- Gender inequality in Sub-Saharan African economies has been found to be harmful to human development (Elu, 2013), and one of its determinants—economic growth (Baliamoune-Lutz and McGillivray, 2009)
- The recent finding by Elu (2013) that the elasticity of human development in Sub-Saharan Africa is a function of female access to bank loans suggests that gender inequality in Sub-Saharan Africa could also constrain the formation of female-owned firms, as credit financing is a crucial input for firms as their is evidence that relative to male-owned firms, female-owned firms in Sub-Saharan Africa are credit-constrained (Asiedu et.al, 2013).
- In this paper, we consider the role of inequality-based entry barriers on the formation of female-owned firms in Nigeria.

- The focus on Nigeria is motivated by the fact that as Africa's largest country it has the most females—approximately 80.2 million girls and women—and its human development indicators are worse than those of comparable lower middle-income countries (British Council of Nigeria, 2012).
- With its high female population and low human development, Nigeria provides perhaps an ideal setting to identify the effects of gender inequality in Sub-Saharan Africa on female-owned firm formation, which is a potential driver of economic growth.

Limit Profit Model of Entry: Firm entry in market/industry i is determined by $E_i = \theta(\pi_i - \pi_i^*)$, where E_i is firm entry in market/industry i , π_i is expected post-entry profit, π_i^* is the limit rate of profit, and θ is the entry response parameter. As the limit rate of profit is unobservable, following Bain (1956), assume that there are $J > 0$ existing entry barriers that condition the ability of incumbents to engage in pricing/output that deters new entrants linearly as $\pi_i^* = \alpha_o + \sum_{j=1}^J \alpha_j B_{ij}$, where B_{ij} is entry barrier j in market/industry i , with marginal effects on the limit rate of profit given by α_j , and α_o is a constant. Given $\pi_i^* = \alpha_o + \sum_{j=1}^J \alpha_j B_{ij}$, it follows that in a market where incumbents are at least monopolistically competitive, but not monopoly, $\partial E_i / \partial \pi_i = \theta > 0$, $\partial E_i / \partial B_{ij} < 0$, or new firm entry increases with respect to increases in expected profit, and decreases with respect to increases in entry barriers.

Data and Empirical Methodology

- To estimate the parameters of an empirical Limit profit model of entry for female-owned firms, we use data from the 2010 World Enterprise Survey for Nigeria (WES).
- Administered since 2002 by the World Bank, the WES captures data from respondents on firm characteristics, gender participation, access to finance, annual sales, costs of inputs/labor, workforce composition, bribery, licensing, infrastructure, trade, crime, competition, capacity utilization, land and permits, taxation, informality, business-government relations, innovation and technology, and performance measures.
- Over 90 percent of the questions objectively measure characteristics of a country's business environment. The remaining survey questions capture the respondent's opinion on the obstacles to firm growth and performance—which we exploit to construct inequality based firm entry barriers that can potentially deter the entry of female-owned firms.

Data and Empirical Methodology

- Given that the core variable of interest is the market entry of female-owned firms in Nigeria, we use the reported number of female firm-owners in a particular city-industry cluster as our dependent variable.
- Our observations are measured at the city-industry level to account for the unobserved firm heterogeneity associated with localization and agglomeration associated with firm clustering in cities and industries.
- While this count variable is not necessarily a measure of new firm entry, it is an approximation to new firm entry, as the number of firms in a city-industry cluster will be proportional to the number of new entrants at a point in time—and the data are cross-sectional across city-industry pairings.

- Given that the WES is a cross-section, rendering it impossible to use a measure of lagged incumbent characteristics, we use average profit of firms in each city-industry cluster as a measure of expected profit. We construct four measures of entry barriers.
- The first one is a measure of incumbent firm size, which in a limit profit model captures the ability of an incumbent firm to deter entry as a result of cost advantages. Our measure of incumbent firm size—SCALE—is the percentage of firms in a city-industry cluster with 100 or more employees.
- The remaining three entry barriers are inequality-based barriers and are based on the respondent's provided opinion on particular obstacles to firm growth and performance.

Data and Empirical Methodology

- The inequality-based entry barriers are based on the percentage of incumbents in a city-industry cluster who reported that the most serious obstacle to firm growth/performance is access to finance (FINANCE BARRIER), access to land (LAND BARRIER), and securing business licenses/permits (REGULATORY BARRIER). To the extent that relatives to males, these barriers are higher for females, they constitute inequality-based entry barriers that deter entry as they are a source of relative cost advantages for incumbents.
- Our strategy for estimating the parameters of an empirical Limit profit model of female-owned firm entry recognizes that the number of female-owned firms in a city-industry cluster is discrete, integer-valued, and constitutes count data. As such, we assume that the number of female-owned firms are realizations from either a Poisson, or, if there is unobserved heterogeneity, a Negative Binomial count distribution.

- We specify and estimate the parameters of relevant Poisson and Negative Binomial regression specifications of a Limit profit model of female-owned firm entry, where the estimated parameters measure the effects of exogenous entry barrier variables on λ_i —the expected value of the number of female-owned firms in a city-industry cluster.
- A Poisson regression model (Cameron and Trivedi, 1998) is formulated by specifying for integer-valued measures of female-owned firms E_i in city-industry cluster i , the conditional mean λ_i as :

$$\ln \lambda_i = \beta' \Theta$$

where β is a coefficient vector, and Θ is a vector of exogenous expected profit and entry barrier measures that determine the expected value of the number of female-owned firms E_i in the i th city-industry cluster.

- The log-likelihood function $L(\beta)$ has a gradient and Hessian given by:

$$\frac{\partial L(\beta)}{\partial \beta} = \sum [\Theta'(E_i - e^{\beta' \Theta})] = 0$$

$$\frac{\partial^2 L(\beta)}{\partial \beta \partial \beta'} = \sum [-(E_i' E_i) e^{\beta' \Theta}] < 0$$

- Given the possibility of unobserved heterogeneity, the Poisson model can be modified as a Negative Binomial where the specification of λ is:

$$\ln \lambda_i = \beta' \Theta + \epsilon_i$$

where ϵ_i reflects unobserved heterogeneity causing the mean and variance of λ to differ.

- Table 1 reports a covariate summary. On average across the 179 city-industry clusters, the average number of female-owned firms is less than one, underscoring a severe underrepresentation of female-owned formal firms in Nigeria. Among the measured entry barriers, the highest average value is for access to Finance, suggesting that securing financing is relatively difficult for all formal firms in Nigeria. Regulatory barriers appear to be low relative to other entry barriers, suggesting that the regulatory burden for formal firms, on average is relatively low in Nigeria.
- Table 2 reports Poisson and Negative parameter estimates, along with Zero-inflated specifications of the Limit profit model of female-owned firm entry in Nigeria.
- All estimates are weighted with the cross-product of the size, region and establishment stratum weights, and the standard errors are clustered on city-industry groupings to control for the unobservables associated with localization and agglomeration.

Table 1
Covariate Summary

Covariate	Definition ^a	\bar{X}	$\hat{\sigma}$	N
Number of Female-owned Firms in City-Industry Cluster	Number of firm owners in cluster who indicated they are female (question = ng_b3f)	.681	1.70	179
Average Year 2008 Cluster Profit In Naira (<i>EXPECTED PROFIT</i>)	Total Revenue - Total Cost: Derived from the residual of firm total revenue(question = 11b) and the cost of land (question = ng_f1a4b), cost of finance (question = ng_f1a122), cost of raw materials and intermediate goods (question = 12a), cost of labor (question = 12b), depreciation (question = 12b), and rental cost of land, buildings, equipment and furniture (question = 12d)	73400000	295000000	179
Percentage of Firms in Cluster With 100 or more employees (<i>SCALE</i>)	Binary variable equal to 1 if the firm has 100 or more 100 or more Employees(question = sampsize)	.058	.167	179
Percentage of Cluster Firm-Owners who report that access to finance is the most serious obstacle (<i>FINANCE BARRIER</i>)	Binary variable equal to 1 if a firm-owner indicates that access to finance is the most serious obstacle (question = flb1)	.188	.269	179
Percentage of Cluster Firm-Owners who report that access to land is the most serious obstacle (<i>LAND BARRIER</i>)	Binary variable equal to 1 if a firm-owner indicates that access to land is the most serious obstacle (question = flb1)	.032	.116	179
Percentage of Cluster Firm-Owners who report that securing licenses and/or business permits is the most serious obstacle (<i>REGULATORY BARRIER</i>)	Binary variable equal to 1 if a firm-owner indicates that securing licenses and/or business permits is the most serious obstacle(question = flb1)	.014	.050	179

Source: 2010 World Enterprise Surveys, (<http://www.enterprisesurveys.org/Data>)

Notes:

^a The question indicator refers to the particular question in the 2010 World Enterprise Surveys from which the covariate is derived.

\bar{X} , $\hat{\sigma}$, and N denote the mean, standard deviation, and number of city-industry cluster observations respectively.

- In a Zero-inflated count specification, the realizations come from two regimes. In one regime the outcome is always zero, while in the other it is not always zero. Let ω_i be the probability that a realization has a zero outcome, then for a Poisson distribution, the mean is $(1 - \omega_i)\beta'\Theta$, where $\omega_i = [\beta'\Theta_d]/[1 + \beta'\Theta_d]$, is a Logit specification, and Θ and Θ_d could be identical.
- The Zero-inflated specifications are potentially informative in their own right. As they account for the process determining zero counts, they can inform how the market entry of female-owned firm is absolutely deterred by gender inequality, as captured in the inequality-based entry barriers.

- As for the adequacy of the specifications reported, Table 2 also reports the value of the Akaike Information Criterion (Akaike, 1998). Explicit hypothesis testing on the implied restrictions of each specification estimated, do not inform on how well the estimated model approximates the true model—which is arguably the ultimate goal of statistical inference.
- The Akaike Information Criterion (AIC) is a measure of the information discrepancy between the estimated model and the true population model. The smaller the AIC for an estimated model, the lower is the discrepancy between it and the true population model.
- Given the AIC values across the estimated specifications of the Limit profit model of female-owned firm entry in Table 2, the minimum value is achieved for the Zero-Inflated Poisson specification, suggesting its adequacy relative to the other specifications.

- Consistent with a Limit profit model of entry, the statistically significant parameter estimates suggest that in Nigeria, the entry of female-owned firms in Nigeria increases with expected profitability, and decreases with respect to increases in entry barriers associated with securing land and licenses/business permits.
- The parameter estimates of the effects inequality-related entry barriers from Zero-inflated Poisson specification are also of practical significance. With respect to the regulatory barriers associated with securing land, the parameter estimate has an elasticity, evaluated at the means of all regressors of approximately 8 percent.

- This implies that if on average across all 179 city-industry clusters, barriers to securing land fell by 50 percent, approximately 5 new female-owned firms would be induced to enter the market, producing additional net output worth approximately 36.7 million Naira—which is equal to approximately \$227,540 as of June 28, 2012.
- As there are a total of 47 female-owned firms in the sample, the entry of 5 constitutes an approximately 11 percent increase in the number of female-owned firms.
- Similar results follow from considering a reduction in the entry barriers from the Zero-inflated parameter estimates, and underscore how practically significant reductions in the entry barriers faced by female-owned firms are as the majority of city-industry clusters have no female-owned firms at all.

Table 2
Count Data Parameter Estimates:
Entry Barriers and The Number of Female-owned Firms In Nigeria

Specification:	Poisson	Negative Binomial	Zero-Inflated Poisson	Zero-Inflated Negative Binomial
<i>Regressand:</i> Number of Female-owned firms in city-industry cluster				
<i>Regressors:</i>				
<i>CONSTANT</i>	.931 (.097) ^a	.802 (.112) ^a	.959 (.051) ^a	76.64 (37.57) ^b
<i>EXPECTED PROFIT</i>	-5.15e-10 (1.87e-09)	1.79e-09 (4.31e-09)	1.07e-08 (5.16e-09) ^b	3.33e-09 (2.07e-08)
<i>SCALE</i>	-9.66 (3.95) ^b	-9.26 (5.50) ^c	-18.46 (10.0) ^c	21.62 (10.28) ^b
<i>FINANCE BARRIER</i>	-4.91 (2.86) ^c	-3.51 (3.65)	2.09 (1.04) ^b	42.55 (22.37) ^c
<i>LAND BARRIER</i>	-18.01 (10.51) ^c	-16.98 (10.0) ^c	-4.11 (4.87)	5.32 (11.36)
<i>REGULATORY BARRIER</i>	-5.32 (1.74) ^a	-7.65 (2.40) ^a	-3.56 (.831) ^a	-120.53 (59.03) ^b
Zero Inflation parameters:				
<i>Regressand:</i> Binary indicator for Zero Female-owned firms In Cluster				
<i>Regressors:</i>				
<i>CONSTANT</i>			-3.33 (.444) ^a	.597 (.234) ^b
<i>EXPECTED PROFIT</i>			5.25e-08 (6.08e-09) ^a	1.43e-09 (1.70e-09)
<i>SCALE</i>			-64.09 (9.89) ^a	1.50 (1.96)
<i>FINANCE BARRIER</i>			20.37 (3.27) ^a	2.30 (.914) ^b
<i>LAND BARRIER</i>			37.95 (12.40) ^a	.594 (1.52)
<i>REGULATORY BARRIER</i>			6.15 (3.60) ^c	-4.26 (3.11)
Number of Observations	179	179	179	179
Akaike Information Criterion	889471.5	996259.5	723267.1	908065.1

Notes:

Clustered standard errors in parentheses.

^a Significant at the .01 level

^b Significant at the .05 level

^c Significant at the .10 level

Conclusions

- Parameter estimates from count data specifications of the number of female-owned firms across city-clusters revealed that access to financing, land, and licenses/permits absolutely deter the entry of female-owned firms, as these entry barriers are proportional to the the probability of observing no female-owned firms.
- Our results suggest that the market entry and underrepresentation of females among firm-owners and entrepreneurs in Nigeria is, at least in part, caused by gender inequality in general, as the entry barriers capture the access of actual and/or potential female-own firms to finance, land, and licenses/permits required to operate.
- Our results suggest that the pro-growth policy menu for Sub-Saharan Africa should be expanded to include the formation of regional currency arrangements such as CFAZ.

- As firm formation is a potential driver of economic growth in Sub-Saharan Africa, gender inequality in the formation of firms could constrain economic growth, as African economies lose the output that could be produced by female-owned firms due to the entry deterrent effects on inequality-based entry barriers.
- With respect to policies that encourage the growth of the private sector in Sub-Saharan Africa, our results suggest that reducing gender inequality would catalyze the growth of private firms, as it would encourage the formation of new female-owned firms.