DISCUSSION PAPER SERIES

IZA DP No. 9273

Gender and Constraints to Entrepreneurship in Africa: New Evidence from Swaziland

Zuzana Brixiová
Thierry Kangoye

August 2015

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
of Labor

Gender and Constraints to Entrepreneurship in Africa: New Evidence from Swaziland

Zuzana Brixiová
University of Cape Town
and IZA

Thierry Kangoye
African Development Bank

Discussion Paper No. 9273
August 2015

IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

IZA Discussion Paper No. 9273
August 2015

ABSTRACT

Gender and Constraints to Entrepreneurship in Africa: New Evidence from Swaziland[1]

This paper contributes to closing a knowledge gap on gender, entrepreneurship and development by linking the entrepreneurial productivity to start-up capital and skills. The empirical analysis of a survey of entrepreneurs in Swaziland confirmed the importance of start-up capital for sales. Women entrepreneurs have smaller start-up capital and are less likely to fund it from the formal sector than their men counterparts, pointing to a possible room for policy interventions. Further, business training is positively associated with sales performance of men entrepreneurs, but has no effect on women. However, this does not call for abolishing training programs for women entrepreneurs. Instead their design and targeting should be revisited.

JEL Classification: L53, O12

Keywords: gender and entrepreneurship, start-up capital, skills, training, multivariate analysis

Corresponding author:

Zuzana Brixiová
Southern Africa Labour and Development Research Unit (SALDRU)
University of Cape Town
Leslie Social Science Building
Rondebosch, 7701
South Africa
E-mail: zbrixiova@gmail.com

[1] The authors thank Mina Baliamoune, Zoroabel Bicaba, Phindile Dlamini, Nomusa Dlamini-Tibane, Thandy Khumalo, Wenli Li, Zodwa Mabuza, Neil Rankin and Audrey Verdier-Chouchane for discussions and contributions at various stages of this paper. Earlier versions were presented at the 2014 ASSA Meetings (Philadelphia) and at the African Development Bank. The views expressed are those of the authors and do not necessarily reflect views of their respective institutions of affiliation.

1. Introduction

Policy makers in developing countries, including in Africa, have become well aware of the positive impacts that productive entrepreneurship can have on structural transformation and poverty reduction (Acs and Varga, 2005; Brixiová, 2010; Baliamoune, 2011). Interest in entrepreneurship as a source of job creation in Africa, especially for women or youth, has also grown (Amin, 2010; Hallward-Dremier, 2011; Baliamoune et al., 2014, Brixiová et al., 2015). For women globally besides economic benefits productive entrepreneurship presents an opportunity for empowerment and better integration into the society (Blomqvist et al., 2014).

A number of studies have identified performance gaps between men and women entrepreneurs globally (examples are OECD, 2005, for OECD countries and Sabarwal and Terrell, 2008, for countries in Eastern Europe). Bardasi et al. (2009) examined gender gaps in performance in established businesses in several African countries, but have not found major gender differences. In contrast, Hallward-Dremier (2011) found that women operate disproportionally in the smaller firms, the informal sector and low value-added industries. This paper contributes to the understanding of entrepreneurial gender gaps and their drivers in Africa.

Utilizing a recent survey from the urban Swaziland, this paper first identifies performance disparities (in terms of sales levels and growth) between the early stage men and women entrepreneurs. Two reasons motivate our interest in the early-stage entrepreneurship: (i) the definition of entrepreneurship which emphasizes the start-up process, as in the Global Entrepreneurship Monitor and (ii) hypothesis from Bardasi et al. (2009) that gender barriers to entrepreneurship are likely to be more pronounced during the entry stage.

We examine links between performance, start-up capital and skill shortages as well effectiveness of training programs to address them. The findings of the literature on the impact of training on entrepreneurial performance are also mixed. For example, Fairlie et al. (2015) have not found any evidence of longer run effects of training on sales, earning or employees in advanced economies. Giné and Mansuri (2014) found that business training in rural Pakistan improved men's business practices, but not their sales or profits. In contrast, de Mel et al. (2015) showed positive effects of business training on women start-ups in urban Sri Lanka. Similar differences exist in the literature on gender and start-up capital. While most of the literature finds differences between men and women entrepreneurs in terms of both amount and composition of start-up capital, Verheul, I. and Thurik found differences only in the amount.

The paper is organized as follows. Section 2 provides definition of entrepreneurship used in this paper and discusses them as well as methodology. Section 3 presents the results of empirical analysis. Section 4 concludes with policy recommendations.

2. Data and empirical methodology

(a) Data source

The empirical analysis utilizes data from the survey of entrepreneurs in Swaziland, carried out by the UN Swaziland in November 2012 (UN Swaziland, 2013). The sample included 640 small and medium-sized enterprises (SMEs) in the urban areas of Hhoho and Manzini regions. The sampling frame consisted of firms listed in the 2011 SME directory of the Ministry of

Commerce, Industry and Trade.[2] The interviews covered information about the firm's objectives as well as the most common opportunities and constraints they encountered. In addition, the survey explored key characteristics of each enterprise such as location, years of operations, sector, employment and sales, among others.

The empirical part of the paper utilizes the definition of entrepreneurship often used by the Global Entrepreneurship Monitor (GEM), where an entrepreneur is '…an adult engaged in setting up or operating a venture which is less than forty-two months old. . .' (Parker, 2009). Among the 640 SMEs surveyed, the GEM concept of entrepreneurship covered 290 firms (i.e. 42 months old or younger), of which 148 were run by men and 142 by women. Following Baumol (1990), we add profit motive as a criterion for the identification of an entrepreneur.[3]

(b) Empirical approach

In Section 3, we explore the conjecture that women entrepreneurs are generating lower sales on average than men and drivers of sales by estimating different versions of the following equation:[4]

$$\Pr(Sales_i) = \alpha + \begin{pmatrix} \beta.Skills_i + \gamma.InitialCapital + \delta.FirmCharacteristics + ... \\ + \upsilon.EntrepreneurCharacteristics \end{pmatrix} + \varepsilon_i \quad (4)$$

where *i* stands for entrepreneurs. The dependent variable (Sales) takes the value of 1 when the total sales have increased or 0 when they stagnated/decreased relative to sales two years ago. The probit model estimates the probability that the variable 'Sales' takes on value 1. In model specification as in (4), "*Skills"* is a vector of controls including the business training received by entrepreneurs and their perception of the lack of skills as a barrier; "*Initial Capital"* is a vector of controls including the amount of initial capital, the application for a formal source of finance and the use of a formal source of initial capital; "*Firms characteristics"* comprises a vector of controls including the size of the business, whether the firm is an exporter, the support the entrepreneur receives from the government, and the age of the business; "*Entrepreneur characteristics"* capture whether the entrepreneur is 'young' (i.e. is 35 years old or younger).

Further, the same regression model is run using the logarithm of (the level of) sales of the entrepreneur *i* as a dependent variable and doing the regressions separately for men and women entrepreneurs. Two estimations methods have been applied to test the model: Ordinary least square (OLS) regressions and (ii) quantile regression (QR). The OLS measures the effects of the explanatory variables at the mean sales, and assumes a well-shaped distribution around the mean. The QR estimates the effect of the explanatory variables at different quantiles of sales to understand factors that drive sales at various sales ranges.

3. Evidence from Swaziland

This section presents empirical results from the survey of entrepreneurs in Swaziland. It examines gender differences in entrepreneurial performance (proxied by the sales), from the

[2] New firms and those that outgrew the SME size as well as firms in the informal sector are not listed in the directory and hence may be systematically underrepresented. To partly correct for this bias, a large number of enterprises were interviewed relative to the population in selected areas.
[3] This accounts for the lower number of observations in the regression results.
[4] The theoretical underpinnings are in Appendix I.

point of view of entrepreneurs' start-up capital, skills, work experience, and resolve. The sample included both men and women entrepreneurs.

(a) Descriptive statistics and Kernel density estimates of entrepreneurial sales

This part examines differences in means between female and male entrepreneurs along several dimensions. It reveals that on average, women entrepreneurs are a few years younger than men. Moreover, while almost half of male entrepreneurs had higher education, only slightly more than one third of female entrepreneurs possessed one. In contrast, more women than men entrepreneurs received business training. These indicators point out to possible skill shortages among female entrepreneurs and raise question whether training may help close them.

Table 1. Differences between women and men entrepreneurs in Swaziland, 2012

	Men entrepr.	Women entrepr.	SE and stat. sign.
	(percent unless otherwise indicated)		
Background			
Age of entrepreneur (years)	38.6	35.5	1.11***
Higher education	49.3	37.3	5.8**
Outcomes			
Firm stable or growing	69.3	60.4	5.76 *
Sales (monthly, E th)	65.5	26.8	16.5
Sales same or higher than last year	52.9	43.3	3.23 *
Employment (av. 2012)	2.08	1.04	0.48 **
Characteristics			
Skill shortage as barrier	18.5	16.7	2.26
Received business training	24.2	20.4	4.93
Young (35 years or less)	48.6	58.5	2.93 **
Start-up capital (E th)	68.7	22.9	6.0 ***
Personal contribution (Y/N)	63.7	60.1	2.9
Amount of personal contribution (E th)	42.7	18.7	4.76 ***
Applied for informal credit	4.1	9.4	1.5 **

Source: Authors' calculations based on 2012 UN Swaziland survey. 1/ E stands for emalangeni (local currency). *, **, and *** denote 10%, 5% and 1% significance levels.

Table 1 also shows that women entrepreneurs start their firms with notably lower capital then men, even though sources of financing for this capital in terms of debt and equity are similar. Further, while approximately same share of men and women entrepreneurs contributed to start-up capital from personal sources, the amount of such contribution was much smaller among women. Finally, a larger share of women than men applied for credit from the informal sector.

Table 2 presents mean values of key characteristics of the entrepreneurs and their firms, for the entire samples of men and women by sales quantiles. The quantile approach reveals that in Swaziland, for both genders, entrepreneurs in the higher sale ranges are older, run firms that are more mature, and employ more workers. During a typical week, successful entrepreneurs spend more hours in their firms than entrepreneurs with lower sales. The analysis also points to lower sales and employment among women entrepreneurs with firms in the highest sales

quantile relative to men entrepreneurs. While top performing women tend to spend more hours a week working than men entrepreneurs, they spend a smaller share of the working time in their firms. Factors related to work-life balance and women's household responsibilities thus may also contribute to gender differences in entrepreneurial performance. Women entrepreneurs also have a smaller amount of start-up capital, especially in higher sales ranges.[5]

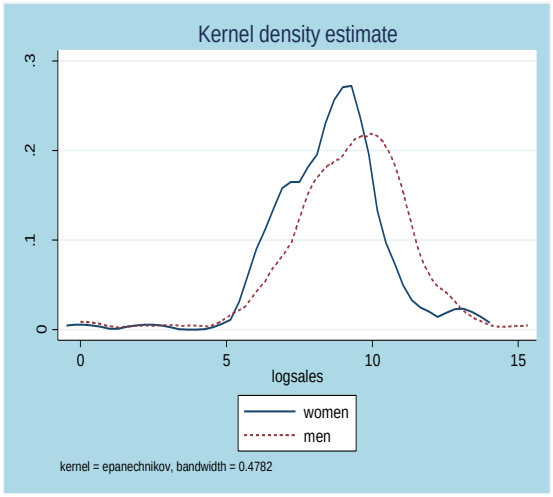
Table 2. Summary statistics

Variable	Sales	Age of an entrepreneur	Age of business	Employment	Hours per week in the firm	Hours per week working	Start up capital
		Women(Mean value)					
By sales quantiles							
Bottom 10%	213	34.50	22.50	0.44	32.75	31.19	7,734
10–25%	1,257	32.73	24.00	0.66	35.87	36.47	7,190
25–50%	4,444	35.39	25.74	0.52	41.06	43.23	15,268
50–75%	12,341	36.88	22.29	1.69	42.31	57.26	30,019
75–90%	29,778	33.89	15.33	1.38	52.44	53.00	47,556
Top 90%	273,300	42.10	26.40	1.90	47.90	58.10	65,200
		Men (Mean value)					
By sales quantiles							
Bottom 10%	133	38.5	25.8	1.1	22.4	24.1	7,822
10–25%	1,481	37	27.3	0.4	45.2	44.5	14,517
25–50%	4,875	37.2	20.6	1.2	42.6	49.3	26,859
50–75%	14,982	36.5	25.3	2.0	36.6	50.9	25,518
75–90%	38,743	41.1	21.7	1.6	46	49.0	94,500
Top 90%	504,133	42	26	8.1	50.4	55.5	238,067

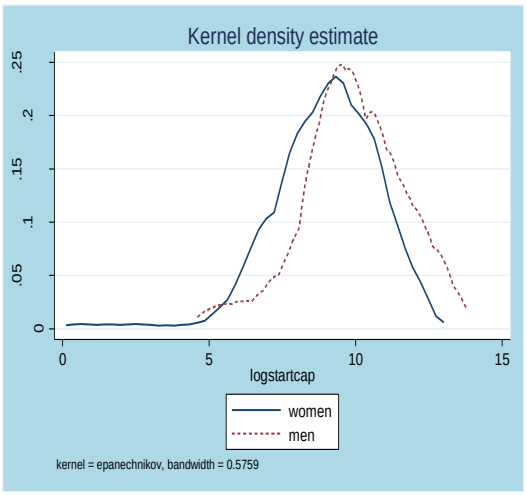
Source: Authors' calculations based on 2012 UN Swaziland survey. Note: *, **, and *** denote 10%, 5% and 1% significance levels. Age of business is measured in months.

Figure 1. Kernel density estimate sales and start-up capital for men and women entrepreneurs

1a. Sales performance (log)



1b. Start-up capital (log)



Source: Authors' calculations. Note: Sales are for a typical month.

[5] Verheul and Thurik (2001), who examined 2000 Dutch entrepreneurs, found that female entrepreneurs have a smaller amount of start-up capital, but do not differ significantly in the type of capital from men entrepreneurs.

Further, the kernel density estimates of probability function of (log of) monthly sales for men and women entrepreneurs show that in these nearly uni-modal distributions men outperform women almost throughout the entire sales range. Figure 1b indicates that women entrepreneurs have lower start-up capital than men for the entire sales range. In contrast to men who seem to reach some threshold level of capital, some women start their firms with almost no capital.

(b) Regression analysis

Probit estimations

We tested if entrepreneurs' skills and start-up capital matter for firm performance (e.g., sales are stable/growing or declining) for men and women entrepreneurs in a multivariate probit regression (Table 3). Our analysis showed that firms ran by women who did not perceive skills to be a major barrier to opening or running a firm performed better than firms ran by women who viewed skills as a key barrier. Business training had a positive and statistically significant impact on performance of men entrepreneurs, but not on women.[6] In contrast, larger number of employees was associated with better performance of women but not men entrepreneurs.

Table 3. Firm performance, skills and access to finance: probit estimations

	Men	Women
	(1)	(2)
Skills		
Received business training	1.206	0.197
	(0.574)**	(0.364)
Perceives lack of skills as barrier	-0.279	-1.193
	(0.451)	(0.473)**
Capital and access to finance		
Initial capital (log)	0.172	0.12
	(0.109)	(0.107)
Applied for formal source of credit	-0.567	-0.232
	(0.462)	(0.367)
Formal source of initial capital	0.295	0.498
	(0.405)	(0.319)
Business characteristics		
Size	0.071	0.199
	-0.092	(0.117)*
Age of business	-0.006	-0.002
	(0.013)	(0.012)
Entrepreneur's characteristics		
Young entrepreneur	-0.2	-0.314
	(0.378)	(0.324)
Intercept	-1.074	-0.918
	(1.308)	(1.035)
R2 / Pseudo R2	0.2	0.17
Obs	88	87

Source: Authors' estimates based on the UN Survey of entrepreneurs in Swaziland. Note: Only firms 42 months old or younger and profit motivated were considered. "Performance" is equal to "0" if sales two years ago were higher or same as in the year of the survey, and "1" if sales two years ago were lower. Heteroskedastic-robust standard error are in brackets. (*), (**) and (***) denote significance at 10%, 5% and 1% respectively.

[6] Besides training the business environment matters. The findings from the robustness analysis (results are available upon request) showed that for all entrepreneurs, running a licensed company raises performance.

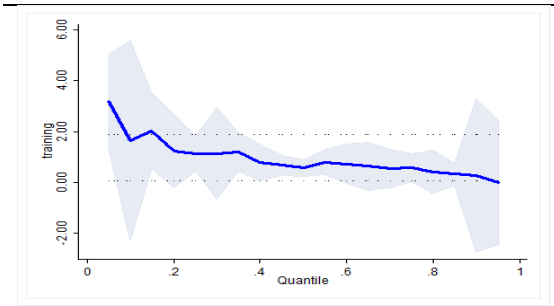
OLS and Quantile regressions

Figure 2 and Table 4 illustrate coefficient estimates in quantile and OLS regressions. Each plot shows the variation in the coefficient of key explanatory variables -- training, amount of start-up capital and formal source of start-up capital – over the sale distribution for both men and women entrepreneurs. The effect of training remains negative (though not significant) over the distribution of sales for women entrepreneurs. In contrast, training has a positive (and significant at lower ranges) but decreasing effect over the sales distribution for men (Table 4).

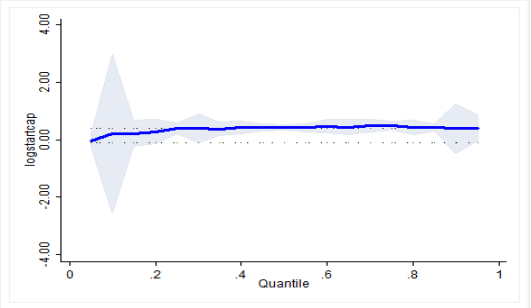
Figure 2. Distribution of OLS and quantile regressions estimates

Men

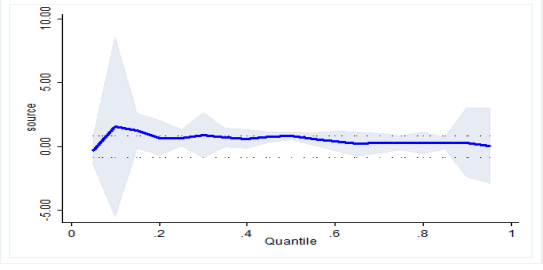
(A) Received business training



(C) Start-up capital (log)

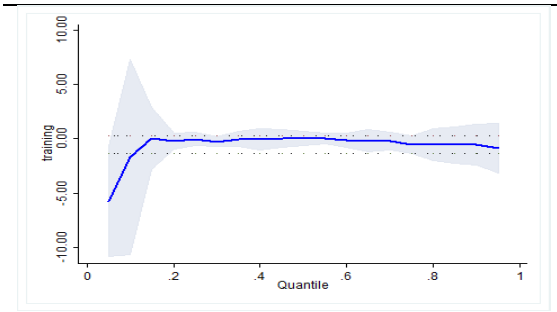


(E) Formal source of start-up capital

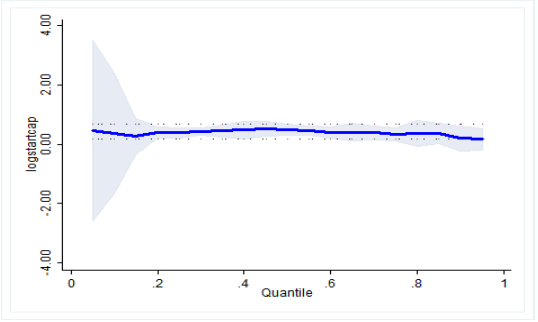


Women

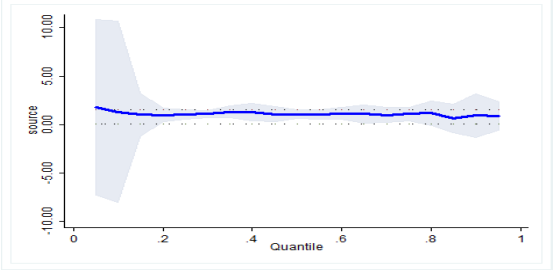
(B) Received business training



(D) Start-up capital (log)



(F) Formal source of start-up capital



Source: Authors' calculations based on the UN 2013 Swaziland survey. **Note**: Horizontal lines represent OLS estimates with 95 percent confidence intervals. The quantiles range from 0 (for firms with the lowest sales) to 1 (for the firms with the highest sales).

Further, for women in the highest sales range (to 25%), better sales performance is associated with factors such as larger size, exports, and age of business. Government support was associated with negative (and significant) impact on sales among the best female performers,

but had a positive impact on sales performance among men in the lowest (bottom 25%) sales range. For these men being young – less than 35 years of age – was associated with negative and statistically significant impact on sales. No such effect was observed for women (Table 4).[7]

Table 4. Firm sales, skills and access to finance: OLS and quantile regressions, full sample

	OLS		Quantile regressions					
Dependent var.:Sales(log)*	*Male*	*Female*	*Male*			*Female*		
			25%	*50%*	*75%*	*25%*	*50%*	*75%*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Skills								
Received business training	**0.968**	-0.551	**1.129**	0.570	0.590	-0.025	0.054	-0.547
	(0.457)**	(0.422)	**(0.538)****	(0.345)	(0.406)	(0.451)	(0.316)	(0.344)
Perceives lack of skills as barrier	**-1.323**	0.276	-1.089	-0.218	-0.636	0.414	0.410	0.049
	(0.605)**	(0.504)	(1.277)	(0.762)	(0.632)	(0.655)	(0.315)	(0.303)
Capital and access to finance								
Initial capital (log)	0.146	**0.429**	**0.388**	**0.424**	**0.504**	**0.383**	**0.496**	**0.337**
	(0.131)	**(0.123)*****	**(0.156)****	**(0.139)*****	**(0.182)*****	**(0.133)*****	**(0.093)*****	**(0.084)*****
Applied for formal source of credit	-0.657	-0.017	-0.684	-0.521	**-1.106**	0.253	-0.033	-0.254
	(0.504)	(0.427)	(0.785)	(0.442)	**(0.459)****	(0.463)	(0.357)	(0.277)
Formal source of initial capital	-0.010	**0.790**	0.677	**0.860**	0.298	**1.024**	**1.070**	**1.108**
	(0.439)	**(0.378)****	(0.651)	**(0.417)****	(0.591)	**(0.359)*****	**(0.299)*****	**(0.316)*****
Business characteristics								
Size	0.123	**0.334**	**0.164**	**0.127**	0.123	0.215	0.222	**0.536**
	(0.079)	**(0.142)****	**(0.077)****	**(0.052)****	(0.163)	(0.442)	(0.254)	**(0.179)*****
Exporting firm	-0.691	-0.550	-0.060	-1.177	**-1.798**	-0.156	-0.564	**-1.149**
	(1.782)	(1.666)	(1.410)	(0.929)	**(0.563)*****	(1.090)	(0.735)	**(0.441)****
Received government support	2.121	-0.443	**3.285**	1.884	1.260	0.022	-0.323	**-0.943**
	(1.927)	(1.193)	**(1.882)***	(1.151)	(1.081)	(0.643)	(0.539)	**(0.394)****
Age of business	-0.011	0.023	0.009	-0.012	-0.014	0.002	**0.018**	**0.015**
	(0.015)	(0.014)	(0.022)	(0.012)	(0.017)	(0.017)	**(0.010)***	**(0.009)***
Entrepreneur characteristics								
Youth (less than 35 years)	**-1.260**	-0.523	-0.609	-0.563	-0.506	-0.482	-0.365	-0.422
	(0.459)***	(0.376)	(0.553)	(0.490)	(0.481)	(0.483)	(0.310)	(0.347)
Intercept	8.111	3.553	3.856	4.829	5.197	3.616	2.919	5.011
	(1.574)***	(1.158)***	(1.717)**	(1.604)***	(2.280)**	(1.321)***	(0.742)***	(0.855)***
R^2 / Pseudo R^2	0.38	0.36	0.33	0.28	0.29	0.31	0.34	0.34
Obs	90	89	90	90	90	89	89	89

Source: Authors' calculations based on 2012 UN Swaziland survey. Note: *, **, and *** denote 10%, 5% and 1% significance levels. Age of business is in months. Only entrepreneurs motivated by profit were considered.

Regarding the role of start-up capital, a larger amount is associated with better sale performance in firms run by men or women. For men entrepreneurs, this effect is rising along the sales distribution. Drawing on the formal source of financing for start-up capital has a positive, significant and increasing impact on sale of firms run by women entrepreneurs in all sales ranges, pointing to the importance of access to formal finance for this group.

[7] The potential endogeneity of main variables (business training and start-up capital) is ruled out for several reasons. We expect limited measurement errors on the business training variable, which is binary. The fact that comprehensive interviews were implemented with a high rate of response should also minimize such errors on the start-up capital variable. We also rule out the reverse causation between the sales performance and the start-up capital as the latter is measured at the very initial stage of the firm. Finally, specification tests (available upon request) indicate that the model is properly specified and does not suffer for bias due to the omission of variables.

To account for industry differences, we have also examined separately entrepreneurs operating in low-skilled sectors, such as agriculture, cleaning, tailor services, and hairdressing (Appendix II). In these sectors, business training has a positive and significant impact on sales posted by men entrepreneurs, but no or negative effect on sales of women entrepreneurs. The amount of the start-up capital and access to its formal financing had a positive and significant relation with sale performance of both men and women entrepreneurs throughout the sale distribution.

4. Conclusions

The main contribution of this paper consists of reducing a knowledge gap in the literature on constraints to women's entrepreneurship in Africa. Specifically, to the extent that women have fewer entrepreneurial skills and lower access to start-up capital than men, they are likely to face greater challenges turning their ideas into businesses and to be less motivated to engage in productive entrepreneurship. These findings would support government for women entrepreneurs, especially in societies where equity factors are considered.

We tested these hypotheses on data from a survey of entrepreneurs in Swaziland. The empirical analysis confirmed the critical role of start-up capital for sales performance of both men and women, under various model specification and throughout the sale distribution. In Swaziland, women entrepreneurs have lower start-up capital and more limited access to finance it from the formal sector than men entrepreneurs, even when sectoral differences are taken into account. The results suggest that policy interventions aiming to promote entrepreneurship in general and female one in particular, should go beyond strengthening the overall business environment and include pro-active measures such as subsidies or loan guarantees for start-up capital.

Empirical analysis showed that narrow business training for women has a limited success, even though it is associated with better sales among men. Broader training for women entrepreneurs encompassing business and technical skills as well as soft skills could be more effective.

References

Acs, Z. J. and Varga, A. (2005), Entrepreneurship, Agglomeration and Technological Change, *Small Business Economics*, Vol. 24 (3), 323–334.

Amin, M. (2010), 'Gender and firm size: Evidence from Africa', *Economics Bulletin*, 30 (1), 663-668.

Baliamoune-Lutz, M. (2011), 'Policy reform and entrepreneurship in developing countries', in Naudé, W.A. ed., *Entrepreneurship in Economic Development*, Palgrave Macmillan, 187-202.

Baliamoune, M.; Brixiová, Z. and Ncube, M. (2014), Skills, Gender and Entrepreneurship in Africa', Paper presented at the 1st Africa Search and Matching Workshop (Marrakesh, May).

Bardasi, E.; Blackden, S. M.; Guzman, J. C. (2009), 'GBender, Entrepreneurship, and Competitiveness in Africa', in *Africa Competitiveness Report 2009*, World Economic Forum: Geneva, World Bank: Washington DC, and African Development Bank: Tunis.

Blomqvist, M.; Chastain, E.; Thickett, B.; Unnikrishnan, S. and Woods, W. (2014), *Bridging the Entrepreneurship Gender Gap: The Power of Networks*, The Boston Consulting Group.

Brixiová, Z. (2010), 'Unlocking Productive Entrepreneurship in Africa's Least Developed Countries', *African Development Review*, Vol. 22 (3), 440-451.

Brixiová, Z.; Ncube, M. and Bicaba, Z. (2015), 'Skills and Youth Entrepreneurship in Africa: Analysis with Evidence from Swaziland', *World Development*, Vol. 67(C), 11— 26.

de Mel, S.; McKenzie, D. and Woodruff, C. (2015), 'Business Training and Female Enterprise Start-up, Growth, and Dynamics: Experimental Evidence from Sri Lanka', *Journal of Development Economics*, Vol. 106, 199 – 210.

Fairlie, R. W.; Karlan, D. and Zinman, J. (2015), 'Behind the GATE Experiment: Evidence on Effects of and Rationales for Subsidized Entrepreneurship Training', *American Economic Journal: Economic Policy*.

Giné, X. and Mansuri, G. (2014), 'Money or Ideas? A Field Experiment on Constraints to Entrepreneurship in Rural Pakistan', World Bank Policy Research Working Paper # 6959.

Hallward-Dremier, M. (2011), 'Strengthening Women's Entrepreneurship', in *Africa Competitiveness Report 2011*, World Economic Forum: Geneva, World Bank: Washington DC, and African Development Bank: Tunis.

Naudé, W. (2010), Promoting Entrepreneurship in Developing Countries: Policy Challenges', UNU-WIDER Policy Brief, No. 4.

Sabarwal, S. and Terrell, K. (2008), 'Does Gender Matter for Firm Performance? Evidence from Eastern Europe and Central Asia', IZA Discussion Papers No. 3758.

UN Swaziland (2013), *Constraints and opportunities for youth entrepreneurship in Africa: Perspectives of young entrepreneurs from Swaziland*, Mbabane: UN Swaziland.

Verheul, I. and Thurik, R. (2001), 'Start-up Capital: Does Gender Matter?', *Small Business Economics*, Vol. 16, 320–345.

APPENDIX I. THEORETICAL UNDERPINNINGS

The continuous time economy consists of infinitely lived entrepreneurs with population normalized to 1, of which ϕ share are women.[8] Each entrepreneur has one unit of time at every *t*, and preferences described by $E_0 \int_{t=0}^{\infty} e^{-\rho t} c_t dt$, where c_t is consumption at *t*, and E_0 are expectations at *t=0*. The entrepreneur are working in the informal sector earning subsistence income *b* while searching for a business opportunity or running a productive firm, which yields income y, with $y > b > 0$. Firms are created through entrepreneurs' search effort *x* at a flow cost of $d(x) = x^2 / 2\gamma$ units of the consumption good, where $\gamma > 0$ is search efficiency, and destroyed at rate δ. The entrepreneurs choose their effort *x*, which determines the arrival rate of a business opportunity.

For an entrepreneur, *V* denotes the discounted value of the income of from searching for a business opportunity, and J the value of running a firm. The value functions become:

$$rV = b + \max_x \left(-\frac{x^2}{2\gamma} + x(J - V - (\bar{c} - c_e)) \right) + \dot{V} \quad (1)$$

$$rJ = y + \delta(V - J) + \dot{J} \quad (2)$$

where *r* is the discount rate, *b* is the income from the informal sector, $\bar{c}$ is the value of start-up capital and c_e the initial endowment of the start-up capital. The return on search equals the informal sector income, the net expected return on running a firm, and the capital gain, $\dot{V}$. The return on running a firm equals the profit, the net loss from bankruptcy and the capital gain $\dot{J}$. Defining $d = J - V$ to be net value from opening a private firm and solving (1) w.r.t. *x* yields:

$$x = \gamma(d - (\hat{c} - c_e)) \quad (3)$$

Equation (3) shows that the entrepreneur's search effort for productive business opportunity is positively related to (i) search efficiency, (ii) the initial endowment of start-up capital and (iii) net value from opening a private firm. In turn, if the entrepreneur exhorts effort $\bar{x}$'s on average, typical sales/profits profit at time *t* will be $\Pi = \bar{x}\pi + (1 - \bar{x})b$, that is it is increasing in the effort, and thus search efficiency and start-up capital.

In summary, in the model shortages of entrepreneurial skills and start-up capital slow down the rate of productive start-ups. To the extent that women entrepreneurs possess lower start-up capital and are less efficient in searching for opportunities, they find fewer productive business opportunities and record lower sales or profits on average than men. Below, we test these results on data from a recent survey of entrepreneurs in Swaziland.

[8] In the model, entrepreneurship is defined as in Naudé (2010) to be '…the resource and process where individuals utilize opportunities in the market through the creation of new business firms.' The economy is of continuous time.

APPENDIX II. RESULTS OF OLS AND QUANTILE REGRESSIONS

Table 1, Appendix II: Sales, skills and access to finance: OLS and quantile regressions, Low-skill sectors[9]

Dependent var.:Sales(log)*	OLS		Quantile regressions					
	Male	*Female*	*Male*			*Female*		
			25%	*50%*	*75%*	*25%*	*50%*	*75%*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Skills								
Received business training	**0.932**	**-1.235**	**1.34**	**0.646**	0.057	-.433	-0.065	-0.520
	(0.420)**	**(0.582)****	**(0.609)*****	**(0.339)***	(0.357)	(1.036)	(0.672)	(0.638)
Perceives lack of skills as barrier	-0.563	-0.317	0.061	-0.292	**-1.404**	.023	0.344	-0.348
	(0.653)	(0.767)	(1.52)	(0.571)	**(0.593)****	(.894)	(0.498)	(0.734)
Capital and access to finance								
Initial capital (log)	**0.439**	**0.356**	**0.53**	**0.511**	**0.548**	**.391**	**0.555**	**0.480**
	(0.143)***	**(0.160)****	**(0.173)*****	**(0.090)*****	**(0.101)*****	**(.168)*****	**(0.123)*****	**(0.189)****
Applied for formal source of credit	-0.623	0.279	-0.69	-0.635	**-0.845**	**.665**	-0.442	**-0.992**
	(0.460)	(0.583)	(0.895)	(0.392)	**(0.489)***	**(.919)***	(0.456)	**(0.581)***
Formal source of initial capital	0.557	0.857	0.788	**0.801**	0.385	1.327	**1.027**	0.914
	(0.447)	(0.574)	(0.762)	**(0.329)****	(0.360)	(.820)	**(0.456)****	(1.087)
Business characteristics								
Size	**0.133**	**0.294**	**0.177**	**0.129**	**0.062**	.163	0.151	0.384
	(0.075)*	**(0.162)***	**(0.080)*****	**(0.043)*****	**(0.028)****	(.153)	(0.106)	(0.384)
Exporting firm	-0.877	-1.090	-0.074	-1.102	**-2.008**	-.589	-0.131	-0.659
	(1.538)	(1.754)	(1.347)	(0.761)	**(0.466)*****	(1.244)	(0.757)	(0.570)
Received government support	2.101	-0.726	1.984	**1.711**	**2.050**	**.348**	0.287	-0.851
	(1.707)	(1.293)	(1.854)	**(0.881)***	**(0.602)*****	**(1.194)*****	(1.120)	(0.783)
Age of business	-0.012	0.013	-0.010	-0.019	**-0.025**	**.005**	0.003	0.017
	(0.014)	(0.019)	(0.026)	(0.011)	**(0.010)****	**(.024)****	(0.015)	(0.022)
Entrepreneur characteristics								
Young entrepreneur	**-0.764**	-0.520	-0.412	-0.206	-0.064	-.417	**-0.842**	-0.916
	(0.443)*	(0.505)	(0.775)	(0.396)	(0.436)	(.576)	**(0.397)****	(1.083)
Intercept	4.671	4.575	2.61	4.014	5.118	3.177	2.963	4.304
	(1.678)***	(1.498)***	(1.924)***	(1.035)***	(1.089)***	(2.199)***	(1.226)**	(1.684)**
R^2 / Pseudo R^2	0.46	0.39	0.43	0.43	0.39	0.33	0.30	0.33
Obs	76	54	76	76	76	54	54	54

Source: Authors' calculations based on 2012 UN Swaziland survey. Note: *, **, and *** denote 10%, 5% and 1% significance levels. Age of business is in months. Only entrepreneurs motivated by profit were considered.

[9] Low-skill sectors include agriculture and agro-processing, personal and household goods, baking, cleaning services, farming, laundry, salons and hairdressing, tailors.