SKILLS, GENDER AND PRODUCTIVE ENTREPRENEURSHIP IN AFRICA

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Abstract

While extensive surveys on gender gaps in entrepreneurship in Africa exists, theoretical studies that would underpin the empirical work and inform policymaking have been relatively scarce. This paper contributes to closing this gap with a model linking women entrepreneurship to skills and productivity. The model, which reflects key stylized facts for African countries, shows that differences in skills, together with greater opportunity cost of search for women, can lead to gender gaps in entrepreneurial outcomes. The role of skill shortages and training in performance of women entrepreneurs is tested on data from a recent survey of entrepreneurs in Swaziland.

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1. Introduction

Productive women’s entrepreneurship has been increasingly recognized as a potential source of inclusive growth and societal well-being (World Bank, 2012). Concomitant with this recognition has been the rise of studies on women entrepreneurs (Hallward-Driemier, 2013). Various factors explain this surge but the main ones include the focus on entrepreneurship as an engine of growth (Baliamoune, 2010; Brixiová, 2013). The gender gaps in the levels and performance of entrepreneurship have also been noted (Sabarwal and Terrell, 2008; Minniti, 2010).

This paper examines gender differences in entrepreneurship through a model linking entrepreneurship to skills and productivity in developing countries. The role of productive entrepreneurship for development was already underscored in Baumol (1990). The model reflects the fact that women in Africa face greater challenges than men in starting productive enterprises because of their lack of business skills and lower participation in business networks relative to men (Hallward-Driemier, 2013). Women often also lag behind men in skills that would raise overall productivity of their firms, such as managerial skills and technical skills, such as information and communication technology (ICT) skills. Due to bearing a disproportionate share of family responsibilities, women face more constraints on their time, which can discourage them from entrepreneurship.

Reflecting these facts, the model shows that, in equilibrium, a higher share of men than women will be running productive firms. The model suggests that raising entrepreneurs’ skills and lowering time constraint can facilitate development of productive female entrepreneurship. The role of skills for performance was tested on data from a survey of entrepreneurs in Swaziland. We found that firms ran by women who perceived skill shortages to be a huge barrier to opening or running a firm posted weaker performance than firms ran by women who did not perceive skill shortages as a barrier. However, business training had a positive and statistically significant impact on performance of men entrepreneurs, but not on women, suggesting that narrow business training programs have limited success in closing the skill and performance barrier.

2. The Model

Consider a continuous time economy consisting of infinitely lived entrepreneurs and workers, with population sizes $\mu$ and $1 - \mu$, respectively. All agents have one unit of time at every $t$, and preferences described by $U_0 = E_0 \int_{t=0}^{\infty} e^{-\rho t} c_t dt$, where $c_t$ is consumption at $t$, and $E_0$ are expectations at $t=0$. Workers are working in the formal private or the informal sector. Wages in the private sector, $w$, are equal to workers’ income from the informal sector, $b$.

Entrepreneurs are working in the informal sector and searching for a business opportunity or running a firm in the formal sector. The business opportunity can be of high or low productivity

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2 Firms ran by women also use ICT less than those by men (Annex I).
3 This assumption is consistent with Baumol (1990) and Blanchflower and Oswald (1998).
4 The model builds on Brixiova and Kiyotaki (1997). The current version incorporates skill gaps and higher opportunity cost of search faced by women entrepreneurs.
(\(z^h\) or \(z^l\)). High productivity firms require entrepreneurs with a balanced set of skills, including sectoral expertise, business and soft skills. Only a portion \(p\) of entrepreneurs (men) have such combination of skills. Firms are created through entrepreneurs’ search effort \(x_i\) at a flow cost of \(d(x_i) = x_i^2 / 2\gamma\) units of consumption good, where \(i = s, u\) denotes skilled and unskilled entrepreneurs, respectively. In this paper, women are the less skilled entrepreneurs.

Parameter \(\gamma > 0\) is the search efficiency. The entrepreneurs of type \(i\) choose their effort levels \(x_i\) which then determine the arrival rate of a business opportunity. For the type \(i\) entrepreneur, the arriving business opportunity has high productivity \(z^h\) with probability \(\phi_i\) and low productivity \(z^l\) with probability \(1 - \phi_i\), where \(1 > \phi_i > \phi_u > 0\). Skilled entrepreneurs (men) have higher chances to find a productive opportunity than unskilled entrepreneurs (women).

A business opportunity of type \(j, j = h, l\) allows the entrepreneurs to produce output \(y^j = z^jn\) with \(n > 0\) workers, and earn profit \(\pi^j = z^jn - wn\). Firms (and jobs) are destroyed at rate \(\delta\). Denoting \(J_i\) and \(V_i\) to be the discounted value of the income of an entrepreneur of type \(i\) running a firm, and an entrepreneur searching for a business opportunity, respectively, the Bellman equations are:

\[
\begin{align*}
    rV_i &= \max \left[ (b - \sigma_i + \max \left\{ \frac{x_i^2}{2\gamma} + x_i \left[ \phi_i (J_i^h - V_i) + (1 - \phi_i)(J_i^l - V_i) \right] \right\} + V_i); b + V_i \right] \quad (1) \\
    rJ_i^j &= \pi^j + \delta(V_i - J_i^j) + \hat{J}_i^j \quad i = s, u ; \quad j = h, l \quad (2)
\end{align*}
\]

where \(r\) is the discount rate, \(\sigma_i, \sigma_u > \sigma_i > 0\) is the opportunity cost (disutility) of search, with unskilled workers facing greater disutility. The return on search equals the net income from the informal sector and the net expected return on running a firm and the capital gain, \(\hat{V}_i\).

Equation (1) shows that the entrepreneur \(i\) in the informal sector searches for business opportunities when the net payoff from such search exceeds the extra foregone income in the informal sector. Denoting \(\xi_i \in [0,1]\) as the probability that the entrepreneur \(i\) in the informal sector searches for a business opportunity, the decision to search can be described by:

\[
\xi_i = \begin{cases} 
1 & \text{if } \frac{x_i^2}{2\gamma} \geq \sigma_i \\
0 & \text{otherwise} 
\end{cases} \quad i = s, u \quad (3)
\]

The marginal cost of search \(x_i\) equals to the expected marginal payoff:

\[
\frac{x_i}{\gamma} = \phi_i (J_i^h - V_i) + (1 - \phi_i)(J_i^l - V_i) = L_i \quad i = s, u \quad (4)
\]
where $L_i$ is the value of a business opportunity to an entrepreneur with skills $i$. Let $m_i^n$ be the number of searching entrepreneurs with skills $i$, $i = s, u$ and $m_i^l$ the number of entrepreneurs with skills $i$ running a firm of productivity $j$, $j = h, l$. The time paths for entrepreneurs are:

$$m_i^h = x_i \phi_i m_i^n - \delta m_i^h = x_i \phi_i (p_i \mu - m_i^n) - \delta m_i^h$$  \hspace{1cm} i=s, u \hspace{1cm} (5a)$$

$$m_i^l = x_i (1 - \phi_i) m_i^n - \delta m_i^l = x_i (1 - \phi_i)(p_i \mu - m_i^n) - \delta m_i^l$$  \hspace{1cm} i=s, u \hspace{1cm} (5b)$$

where $p_u = 1 - p_s$. The initial condition, $m_i^{n0} = \mu$, implies that $m_i^{h0} = m_i^{l0} = 0$. The labor market clearing condition for entrepreneurs of type $i$ is:

$$p_i \mu = m_i^n + m_i = m_i^n + m_i^h + m_i^l$$  \hspace{1cm} (6a)$$

Defining $m_i$ to be the total number of private firms, the aggregate entrepreneurial market clearing condition becomes:

$$\mu = m_i^n + m_i^n + m_i + m_u = m_i^n + m_i^h + m_i$$  \hspace{1cm} (6b)$$

Workers either work in formal private firms or are self-employed in the informal sector:

$$(1 - \mu) = N_{ut} + N_t = N_{ut} + m_i n .$$  \hspace{1cm} (7)$$

where $N_t$ is the number of workers in the formal sector, $N_{ut}$ is the number of workers self-employed in the informal sector and $n$ is the number of workers employed in each private firm.

The equilibrium of this economy is the allocation of workers $N_{ut}$ and entrepreneurs with skills $i$ $m_i$ such that at every $t$ (i) each entrepreneur $i$ chooses whether to search for business opportunities, $\xi_i$, and if so what effort to put into search, $x_i$; (ii) each worker chooses the allocation of labor, taking wages as given; and (iii) labor and product markets clear. The equilibrium is described by $m_i^{n0}, N_{ut0}$, and by the sequence $\{L_i, \xi_i, m_i, N_{ut}\}_{t=0}^\infty$ such that (7) – (9) and (3) are met. Letting $\pi_{ul}, \pi_{ul} = \gamma L_i^2 / 2$ be the average ‘profit’ from search, the value of a business opportunity to an entrepreneur $i = s, u$, $L_i$, evolves as:

$$\dot{L}_i = (r + \delta)L_i + \pi_{ul} - \left[\phi_i \pi_i^h + (1 - \phi_i)\pi_i^l - (b - \sigma_i)\right]$$  \hspace{1cm} i = s, u \hspace{1cm} (8)$$

The total number of entrepreneurs changes according to:

$$\dot{m}_i = \gamma L_i (p_i \mu - m_i) - \delta m_i$$  \hspace{1cm} i = s, u \hspace{1cm} (9)$$
In the steady state, variables take on the same values in all time periods, that is 
\[ \dot{L}_i = m_i = 0 \text{ and } m_u = m^*_i, L_{nu} = L^*_u, \xi^*_u = \xi^*_i, \text{ and } N_{uu} = N^* \text{ for } i = s, u \text{ and } \forall t \in [0, \infty]. \] Further, the number of firms in the formal sector rises with expected profits. In contrast, when the value of a business opportunity \( L_i \) is low, entrepreneurs will reduce search or may stop searching altogether, i.e. \( \xi_i = 0 \).

Due to higher search and opportunity cost, unskilled (women) entrepreneurs forego search for business opportunities more easily or put less effort into it than skilled entrepreneurs. Put differently, the cut of value of a business opportunity \( L \) described by (8), which makes search for business opportunities profitable, rises for unskilled entrepreneurs. Reversely, because of their lower opportunity cost of search, skilled (men) entrepreneurs are more likely to search for business opportunities than unskilled (women) entrepreneurs. A larger share of unskilled (women) entrepreneurs is thus in the informal sector. In equilibrium, due to their greater search efforts, a higher share of skilled (men) than unskilled (women) entrepreneurs operate productive firms. The higher search reflects higher pay-off for search of skilled entrepreneurs (Annex II).

### 3. Empirical Evidence from Swaziland

This section presents empirical results from the recent survey of entrepreneurs in Swaziland. First, descriptive statistical analysis of the survey data pointed to differences in educational achievements as well as performance in terms of sales, turnover, and employment between men and women entrepreneurs (Table 1).

| Table 1. Differences between women and men entrepreneurs in Swaziland, 2012 |
|-----------------------------|-----------------------------|-----------------------------|
|                             | Men             | Women            | SE of diff. & stat. sign. |
| (in % of total unless otherwise indicated) | | | |
| **Education and experience** | | | |
| Age of entrepreneur (years) | 38.6            | 35.5             | 1.11*** |
| Higher education            | 49.3            | 37.3             | 5.8**   |
| Received formal business training | 20.4          | 24.2             | 4.93    |
| Worked before               | 47.9            | 51.5             | 5.95    |
| **Outcomes**                | | | |
| Firm stable or growing      | 69.3            | 60.4             | 5.76 *  |
| Sales (monthly, E thousand) | 65.5            | 26.8             | 33.0    |
| Performance same or higher than last year | 69.3          | 60.4             | 5.76 *  |
| Turnover (monthly, E thousand) | 180.1          | 100.6            | 47.5**  |
| Employment (av. 2012)       | 2.08            | 1.04             | 0.48 ** |

**Source:** Authors’ calculations based on 2013 UN Swaziland survey. 1/ E stands for emalangeni (local currency). *, **, and *** denote 10%, 5% and 1% significance levels.

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5 In 2012, UN surveyed 640 small and medium–sized enterprises in the urban areas of Swaziland. Among the 640 firms surveyed, the GEM concept of entrepreneurship focused on firm creation, encompassed 290 new entrepreneurs (that is firms 42 months old or younger). Brixiová et al. (2015) discuss the survey.
Second, the kernel density estimates of probability function of (log of) monthly sales for male and female entrepreneurs are presented. Relative to their male counterparts, female entrepreneurs were putting in fewer hours (Figure 1a). Figure 1b illustrates the sales distributions for men and women entrepreneurs.\(^6\) In both, nearly uni-modal distributions, men outperform women almost throughout the entire sales range. Figure 1c shows that women entrepreneurs who perceive the lack of skills as a huge barrier to starting or running a business perform worse in terms of sales than women entrepreneurs who do not perceive the lack of skills as an obstacle.

**Figure 1.** Kernel density estimate of weekly hours and (log of) sales for entrepreneurs

1a. Men vs. women, weekly hours

![Kernel density estimate](image1)

1b. Men vs. women, sales of new firms

1c. Women, new firms, sales by skill barrier

Source: Authors’ calculations. Note: Sales are for a typical month. ‘Skill barrier’ refers to a situation where the entrepreneurs considered the lack of education, skills, and training a ‘huge barrier’ to starting or running a business.

We tested if entrepreneurs’ skills are significant for firm performance (e.g., if business is stable, growing or declining) in a multivariate probit regression (Table 2). We found that firms ran by women who did not perceive skills to be a huge barrier to opening or running a firm posted better

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\(^6\) Entrepreneurs are again defined as individuals or teams running a firm that is 42 months old or less, as in Bosma et al. (2012).
performance than those ran by women who perceived skills to be a major obstacle. For all entrepreneurs, running a licensed company raises performance. Business training had a positive and statistically significant impact on performance of men entrepreneurs, but not on women.7

Table 2. Firm performance and skills: probit estimations, new firms

<table>
<thead>
<tr>
<th></th>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>manager</td>
<td>-0.4095176</td>
<td>0.0460806</td>
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<tr>
<td></td>
<td>(0.3200824)</td>
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<tr>
<td></td>
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<td><strong>1.392164</strong>*</td>
</tr>
<tr>
<td></td>
<td>(0.3041317)</td>
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<tr>
<td>applied for credit</td>
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<tr>
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<td>0.4800517</td>
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</tbody>
</table>

Source: Authors’ calculations.

4. Conclusions

The main contribution of this paper is in reducing a gap in the literature on women entrepreneurship. We developed a model where differences in skills and greater opportunity costs for women help account for gender differences in entrepreneurial outcomes, including why, relative to men, women are less likely to run productive firms in the formal sector. Stylized facts and empirical analysis of survey of entrepreneurs from Swaziland confirmed the impact of skill gaps on performance of women entrepreneurs. Given the large share of household responsibilities born by African women and unique characteristics, including specific skills, that women entrepreneurs have, the approaches aiming to incentivize them need to differ from those aimed at their men counterparts.8 Further, empirical evidence showed that narrow business training programs for women have had a limited success. Training for women entrepreneurs that encompasses business skills, technical skills, networking, and confidence building, together with lifting women’s time constraints, could be more effective.

7 The tables with regression results are available upon request.
8 This point is also underscored in (Ahl, 2006).
References


ANNEX I – Stylized Facts

African women entrepreneurs operate more often than men in the informal sector…

Figure 1. Firms formally registered when starting operations (%)

... and a lower share of women-owned firms uses ICT. Women also run firms with lower average share of foreign ownership and technology transfer.

2a. Share of entrepreneurs using e-mail for work (% of total, selected countries) 2b. Technology transfer (% of all firms)

Source: Authors’ calculations based on the Enterprise Surveys online database (World Bank).
ANNEX II – The Model Results

**Proposition 1.** The ‘cut-off’ value of a business opportunity at which an entrepreneur $i = s, u$ chooses to search for business opportunities, $\hat{L}_i$, is higher for unskilled entrepreneurs: $\hat{L}_u > \hat{L}_s > 0$

**Proof.** From (3) the ‘cut-off’ value of a business opportunity for an entrepreneur $i$, $\hat{L}_i$, becomes $\hat{L}_i = \sqrt{2\sigma_i / \gamma}$. Since $\sigma_u > \sigma_s > 0$, $\hat{L}_u > \hat{L}_s > 0$.

**Proposition 2.** If the difference in expected profits of skilled and unskilled entrepreneurs exceeds the difference in their opportunity cost, that is if $(\phi_s - \phi_u)\pi^h - (\phi_s - \phi_u)\pi^I > \sigma_u - \sigma_s$, then a larger share of skilled than unskilled entrepreneurs run high productivity firms: $k^h_s = m^h_s / p\mu > m^h_u / (1 - p)\mu = k^h_u$.

**Proof.** Condition $(\phi_s - \phi_u)\pi^h - (\phi_s - \phi_u)\pi^I > \sigma_u - \sigma_s$ and (9) imply that $L^*_h > L^*_u$. From (3) $x^*_s > x^*_u$, that is skilled entrepreneurs put more effort into search than unskilled entrepreneurs. From (9) and (4) it follows that $k^h_i = \frac{\phi_i x^*_i}{x^*_i + \delta}$ is the steady state share of entrepreneurs of type $i$, $i = s, u$ that run productive firms. Since $x^*_s > x^*_u$ and $\phi_s > \phi_u$, then $k^h_s > k^h_u$. 
