Alleviating Poverty Through Innovation and Entrepreneurship (I&E)

Research Paper

Submitted

by

Ludovick Leon Shirima, PhD

for

(International Business and Entrepreneurship)
Department of Management,
Warrington College of Business,
University of Florida, P.O. Box 117165,
Gainesville, FL 32611, USA

Keywords: entrepreneurial activity, innovation, small business, enterprises, foreign aid, economic growth, development, poverty alleviation, entrepreneurship and employment.
# Table of Contents

LIST OF ABBREVIATIONS ....................................................................................................................... iv

Abstract ........................................................................................................................................................... 1

1. Introduction ............................................................................................................................................... 1

2. Literature review ......................................................................................................................................... 2
   Poverty ......................................................................................................................................................... 2
   Innovation and Entrepreneurship .................................................................................................................... 2
   Study’s contribution to knowledge .................................................................................................................. 3

3. Methodological Approach .......................................................................................................................... 3
   Testable Hypotheses ........................................................................................................................................ 3
   Poverty Model Specification .............................................................................................................................. 4
   Econometric Model Specification ...................................................................................................................... 4
   Scatter Plot Analysis ....................................................................................................................................... 5

4. Data Issues ....................................................................................................................................................... 5
   Data Sources ..................................................................................................................................................... 5
   Dataset Development ....................................................................................................................................... 5

5. Regression Results ......................................................................................................................................... 6
   Manipulation of the Variables .......................................................................................................................... 6
   Estimated Results ............................................................................................................................................. 6
   Scatter Plot Schematic Representations ............................................................................................................ 7

6. Conclusions ..................................................................................................................................................... 10

Bibliography ..................................................................................................................................................... 11
### List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Region</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>South America Region</td>
<td>7</td>
</tr>
<tr>
<td>Table 2</td>
<td>Sub-Saharan Africa Region</td>
<td>7</td>
</tr>
<tr>
<td>Table 3</td>
<td>Middle East Region</td>
<td>7</td>
</tr>
<tr>
<td>Table 4</td>
<td>Eastern Europe Region</td>
<td>7</td>
</tr>
<tr>
<td>Table 5</td>
<td>Central America Region</td>
<td>7</td>
</tr>
<tr>
<td>Table 6</td>
<td>Caribbean Region</td>
<td>7</td>
</tr>
<tr>
<td>Table 7</td>
<td>Asia Region</td>
<td>7</td>
</tr>
</tbody>
</table>

### List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Plot</th>
<th>Region</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Scatter Plot</td>
<td>South America Poverty vs Entrepreneurship</td>
<td>8</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Scatter Plot</td>
<td>South America Poverty vs Innovation</td>
<td>8</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Scatter Plot</td>
<td>Sub-Saharan Africa Poverty vs Entrepreneurship</td>
<td>8</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Scatter Plot</td>
<td>Sub-Saharan Africa Poverty vs Innovation</td>
<td>8</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Scatter Plot</td>
<td>Middle East Poverty vs Entrepreneurship</td>
<td>8</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Scatter Plot</td>
<td>Middle East Poverty vs Innovation</td>
<td>8</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Scatter Plot</td>
<td>Eastern Europe Poverty vs Entrepreneurship</td>
<td>9</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Scatter Plot</td>
<td>Eastern Europe Poverty vs Innovation</td>
<td>9</td>
</tr>
<tr>
<td>Figure 9</td>
<td>Scatter Plot</td>
<td>Central American Poverty vs Entrepreneurship</td>
<td>9</td>
</tr>
<tr>
<td>Figure 10</td>
<td>Scatter Plot</td>
<td>Central American Poverty vs Innovation</td>
<td>9</td>
</tr>
<tr>
<td>Figure 11</td>
<td>Scatter Plot</td>
<td>Caribbean Poverty vs Entrepreneurship</td>
<td>9</td>
</tr>
<tr>
<td>Figure 12</td>
<td>Scatter Plot</td>
<td>Caribbean Poverty vs Innovation</td>
<td>9</td>
</tr>
<tr>
<td>Figure 13</td>
<td>Scatter Plot</td>
<td>Asia Region Poverty vs Entrepreneurship</td>
<td>9</td>
</tr>
<tr>
<td>Figure 14</td>
<td>Scatter Plot</td>
<td>Asia Region Poverty vs Innovation</td>
<td>9</td>
</tr>
</tbody>
</table>
LIST OF ABBREVIATIONS

AACSB  Association to Advance Collegiate Schools of Business
APTE  Alleviating Poverty Through Entrepreneurship
CSR  Corporate Social Responsibility
FDI  Foreign Direct Investment
GEM  Global Entrepreneurship Monitoring
HBS  Household Budget Surveys
I&E  Innovation and Entrepreneurship
MNC  Multi-National Corporations
NGO  Non Governmental Organizations
OLS  Ordinary Least Squares
PPP  Private-Public-Partnership
UNDP  United Nations Development Program
VAT  Value Added Tax
WBG_ES  World Bank Global Entrepreneurship Survey
WBSCD  World Business Council for Sustainable Development
Alleviating Poverty through Entrepreneurship and Innovation

By Dr. Ludovick Leon Shirima*

Abstract
The study investigates the role of private sector as a poverty reduction strategy. This objective is attained by using data from 58 different countries, where two proxies capturing innovation and entrepreneurship are used. Findings from the regression estimates and scatter plot indicate that the two reduce poverty significantly as hypothesized. Further, poverty falls by a much larger magnitude when innovation interacts with entrepreneurship.

1. Introduction
Public policy over time has focused on poverty reduction strategies as a way to improve the standards of living of the poor and promote their welfare. It is estimated that, of the world’s 6 billion people, 2.8 billion live on less than $2 a day and 1.2 billion on less than $1 a day (World Bank, 2000/2001). The report narrates further that in 2001:

“In the United States, approximately 32 million people live in poverty, about 30% of the world number. About 25 million people of the Middle East lived with less than one dollar a day. Similarly, together Eastern Europe and Central Asia had about 50 million people living in this condition. East Asia had a more staggering number of 300 million people living in extreme poverty and South Asia tops it with 425 million. Latin America and the Caribbean had a total of 100 million people in poverty while Sub-Saharan Africa had 325 million of its people in poverty.” …end of quote.

However, recent studies show that these numbers have neither increased nor decreased in some regions; in aggregate poverty globally is increasing (Ravallion, Martin and Chen, Shaohua, 2008). The decrease in poverty rates may be due to increased inflow of development aid from the developed countries, growth in exports from these countries especially of the natural resources such as minerals; and individual government efforts to improving social services such as education and health. There is mixed feelings on the outcomes of the foreign direct investment (FDI) and international trade as an engine of economic growth and therefore poverty reduction.

A new poverty reduction strategy paradigm provides a shift towards policies that focus more on private sector initiatives. This led into a growing body of literature that emphasizes on innovation and entrepreneurial (I&E) solutions to global poverty, which argues that there are a number of advantages over the traditional public sector initiatives (Eversole, n.d.). Others went further, into suggesting a policy sandwich that involves the now famous Private-Public-Partnership (PPP) initiative. These private sector initiatives are less centered on philanthropic donations, which have thus far ultimately failed to effectively combat global poverty. Instead, enterprise-based solutions to end poverty are engineered to focus on developing small business or enterprises and innovations, which spur increased total factor productivity (TFP)\(^1\) and overall economic growth (Chu, 2010). In

---

\(^1\)TFP is defined as a variable which accounts for effects in total output not caused by inputs. For instance, in Cobb–Douglas function

\[ Y = A \cdot K^\alpha \cdot L^\beta; \]

\(Y\) represents total output as a function of total-factor productivity \((A)\), capital input \((K)\), labor input \((L)\), where \(\alpha\) and \(\beta\) are the input share contribution for \(K\) and \(L\) respectively.

*This paper is a requirement to fulfill the award of the AACSB certification in the International Business and Entrepreneurship Track of the University of Florida, Warrington College of Business Administration..
doing so, private sector strategies are supplying poorer nations with much more sustainable resources than capital donations; gaining an understanding of new markets that provides these nations with the tools to generate their own wealth on an ongoing basis (Chu, 2009).

The proposed study aims at shading new light on the role that can be played by I&E in mitigating poverty in developing countries. It is intended to show that I&E skills augment the conventional policy framework; they are complementary rather than substitute.

The organization of the paper is as follows. Section 2 provides literature review. Theoretical as well as empirical literature has been consulted on the thesis. In section 3, the study details the methodological approach used where the tested hypotheses are stated and mathematical model applied is laid out. Next, section 4 expounds data issues. The section details the sample constructs and data sources are mentioned. In the penultimate section, result findings are promulgated. Finally, section 6 is more speculative as caveats are drawn and conclusions advanced.

2. Literature review

Poverty
Poverty is multidimensional; it affects the society in various ways, robs people of their dignity and limits their ability to improve their lives. It means not having access to basic human needs – such as food and clean water (Shirima 2001). Despite the great amount of economic funding that has been invested in combating the world poverty crisis, global poverty rates remain high; this is evidence of the ineffectiveness of the top-down government funding as a strategy to reduce global poverty. Other solutions to ending international poverty have relied on grassroots and humanitarian efforts, all of which are predominantly aid-based initiatives (Wheeler III, 2010). The inefficiency of these aid-based approaches has engendered a different type of strategy to ending global poverty, one that strays from the traditional structure and governing authority.

Innovation and Entrepreneurship
This strategy relies on enterprise and innovation based solutions to foster social change and bottom-up economic growth (Wheeler III, et al., 2010). The current study recognizes at the heart of entrepreneurship are the entrepreneurs responsible for opportunity spotting and accumulating the factors of production (Robson P J A & Obeng B A 2008) necessary for new ventures to be created.

They are also responsible for decisions concerning strategy and innovation. In Small Medium Enterprises (SMEs), the entrepreneur is likely to have an exaggerated impact on the strategy of the firm; thus, any attempt to investigate the innovation ought to include analysis of the characteristics of the entrepreneur (Donckels R & Fro¨hlich E 1991). Unlike aid-based and/or public sector efforts, which are primarily government funded and supply aid in the form of capital to underdeveloped nations, this study will examine new solution that is private sector based.

In another study (Ans and Tulder 2006) focused on international perspective expounding how Multinational Corporations (MNC), international organizations, Non-Governmental Organizations (NGOs), and business associations can contribute in combating poverty. One such effort used by these organizations is Corporate Social Responsibility (CSR).
The current study will review some of the theory and evidence about the role of entrepreneurial activity in economic development and poverty alleviation. Possible explanations of the role of entrepreneurship in economic development are discussed in (Richardson 2004) study whose findings were indeterminate and were left for further future research. Our main thesis is that, entrepreneurs by setting up enterprises, they enhance economic growth by generating incomes, creating employment opportunities, paying state taxes and making available varieties of goods and services at competitive prices. These views are shared by other studies see for instance, (Bhattacharya M & Bloch H 2004) and (Clark 2002) and (Porter 1990). Entrepreneurs facilitate innovations and therefore improve productivity. This study aims to investigate the role of I&E on poverty reduction.

Study’s contribution to knowledge

The current study is the first of its kind in three main ways. At this juncture there is no other study that has treated or modeled I&E as a policy strategy towards poverty alleviation. Secondly, a world sample dataset construct has been developed covering about 58 countries for the period between 2001 and 2008. Finally, a simple ordinary least squares (OLS) econometric model is specified to establish statistical association between defined proxies of poverty levels, innovation (that is captured by worldwide patent applications submitted for registration); and entrepreneurship depicted by the global business registration database. Both proxies cover our study period of interest.

3. Methodological Approach

The study explores the advancement of I&E as a policy alternative to reduce poverty for the period stretching between 2001 to 2008. It covers a sample of low and middle income countries where data is available for both of the intended proxies. It postulates that higher rates of innovation tend to promote entrepreneurship. We further argue that entrepreneurship increases the production and varieties of goods and services available at any given time at competitive prices, for a complete discussion on this topic see (Porter 1990). This widens individual choices of the consumers’ basket; improving their welfare and hence reducing poverty (Chipika S & Wilson G 2006).

To attain the objectives of the study we use world poverty measures\(^2\) imputed by the World Bank, obtained from PovcalNet web site\(^3\) (Shaohua Chen and Martin Ravallion 2008). Data on innovation comes from World Intellectual Property Organization (WIPO) while data on entrepreneurship comes from the Global Entrepreneurship Monitoring (GEM) and from the World Bank specifically from the World Bank Global Entrepreneurship Survey (WBG_ES). In the next two sub-sections we describe the study hypotheses and the applied mathematical models.

Testable Hypotheses

We test two hypotheses that:

(i) As the rate of entrepreneurship increases; poverty rates declines. This will be shown by the negative association of the variables.

(ii) An increased rate of innovation parameter implies that the influence of the entrepreneurship proxy is magnified and therefore poverty rates falls drastically. This shall be depicted by estimating two regressions (model 1 and 2) with and controlling for the impact of innovation. Then the magnitude of the coefficients shall be compared.

\(^2\) These measures are namely head count, poverty gap ratio or incidence, and sum squared poverty measures see for instance (Shirima, et al., 2001).

\(^3\) <http://econ.worldbank.org/povcalnet>
**Poverty Model Specification**

Mathematically, the three poverty measures take the form:

\[
P_{a,i} = \left[ \max\left(1 - \frac{\chi_i}{\upsilon}, 0\right) \right]^\alpha \quad \text{and} \quad \alpha \geq 0 \hspace{2cm} \text{(1)}
\]

where \( \chi_i \) is the per capita consumption expenditure for household \( i \) and \( \upsilon \) stands for poverty line. Hence \( \alpha \) is a non-negative parameter that may take the values of 0, 1 and 2 the implication being, \( P_0 \) gives estimates for headcount index, \( P_1 \) denotes the poverty gap ratio and \( P_2 \) provides for squared poverty gap index (Shirima 2009). Thus equation (1) above gives the individual level poverty measures and aggregate poverty measure is attained by taking the mean across all individuals such that:

\[
P_a = \frac{1}{\eta} \sum_{i=1}^{n} P_{a,i} \hspace{2cm} \text{(2)}
\]

Where \( \eta \) is the population size from the sample.

**Econometric Model Specification**

An OLS econometric model specification given in (3) below is invoked to estimate the degree of association between the various variables. The model functional form shall be linearized by adopting double log to allow the resulting coefficients be interpreted as coefficients of elasticity.

The estimation model specification allows poverty measures to enter the equation as dependent variable while the I&E proxies are treated as explanatory variables. The innovation proxy enters the model exponentially. The implication is that advancement in entrepreneurship relies on the rate of innovation.

Let us denote the entrepreneurship in country \( i \) at time \( t \) and innovation symbolically as \( \epsilon_{it} \) and \( \beta_{it} \) respectively. In addition, we introduce two parameters \( \phi \) and \( \lambda \), which stand for the intercept and coefficients to be estimated accordingly.

Whence, model 1 may be written as:

\[
P_{a,i} = \phi + \lambda [\epsilon_{it}]^\beta_{it} + \epsilon_{it} \hspace{2cm} \text{(3)}
\]

\( \epsilon \) is the error term with all the necessary properties.\(^4\)

Thus, taking the double log of (3) above we can write:

\[
\ln[P_{a,i}] = \phi + \lambda \beta_{it} \ln[\epsilon_{it}] + \epsilon_{it} \hspace{2cm} \text{(4)}
\]

It follows from (4) above that the estimated results can be interpreted as coefficients of elasticity.

Analogously, Model 2 involves controlling for the innovation parameter looks like:

\[
\ln[P_{a,i}] = \phi + \lambda \ln[\epsilon_{it}] + \epsilon_{it} \hspace{2cm} \text{(5)}
\]

\(^4\) That is they are identically independently distributed (i.i.d.).
In the final analysis the size and signs of the coefficients of the two models will be compared to ascertain the significance of how they differ from one another.

**Scatter Plot Analysis**

The study examines the association of the dependent and independent variables to validate the econometric results. The main findings aim to validate our testable hypothesis that with increased rate of entrepreneurship poverty levels decline. Furthermore, poverty falls by more sizeable magnitudes when innovation interacts with entrepreneurship. The scatter plots are implemented between the two explanatory variables to the dependent variable for all the disaggregated seven geographical regions.

**4. Data Issues**

**Data Sources**

The study uses different sources of data as explained elsewhere in this study. Secondary data\(^5\) constitute our main source. To attain the objectives of the study, we ascertain the interaction between the three proxies used herewith:

(i) **Poverty Rates:** Data on poverty rates is borrowed from (Shaohua Chen and Martin Ravallion 2008) report. This dataset is the only comprehensive data source that gives the state of the world poverty to date. It includes the latest estimates drawn from 675 household surveys for 116 developing countries, representing 96% of the population of the developing world.

(ii) **Rate of Innovation:** This is captured by the number of patents application submitted for registration available at World Intellectual Property Organization (WIPO). It is available for the period ranging from 1996 to 2008, which covers about 192 countries world over.

(iii) **Entrepreneurship Development:** Finally, data on entrepreneurship is sourced partly from the World Bank Global Entrepreneurship Survey (WBG_ES) and Global Entrepreneurship Monitoring (GEM). The data file contains over 72 different variables in including proxy on annual business registration from about 108 countries covering the period of our study interest.

**Dataset Development**

Using the above data sources we merged the three files to create a single file containing the above named variables. The data properties were corrected for stationarity, heteroskedasticity and outliers. Then to capture the impact of enterpreneurship and innovation on poverty across the globe the data was disaggregated regionally to cover a total of 58 countries:

(i) **Sub-Saharan Africa** - Burkina Faso, Central African Republic, Ghana, Kenya, Madagascar, Malawi, Morocco, Senegal, South Africa, Tanzania, Tunisia, Uganda and Zambia,

(ii) **South America** - Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador and Peru,

(iii) **Caribbean** - Dominican Republic, Haiti, Jamaica,

(iv) **Central America** - Costa Rica, Mexico and Nicaragua,

(v) **Asian Countries** - Azerbaijan, Bangladesh, India, Indonesia, Kazakhstan, Kyrgyz Republic, Malaysia, Pakistan, Philippines, Sri Lanka, Tajikistan, Thailand and Uzbekistan,

---

\(^5\) This refers to data that has already been collected by someone else for a different purpose.
(vi) **Eastern Europe** - Armenia, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Latvia, Moldova, Poland, Romania, Russian Federation, Slovenia and Ukraine and
(vii) **Middle East** - Jordan, Turkey and Yemen.

Using different data sources econometrically serves as instrumental variables. The three files are merged into a single dataset file ready for analysis. Nonetheless, like any other larger dataset of this magnitude and from various sources, missing observation cases are ubiquitous. The said anomaly is corrected by inputting mean values of the neighboring observations. This is likely with the poverty data which is imputed from the country’s Household Budget Surveys (HBS) that are implemented after three-year intervals. Similarly, inspection on the patent application shows that in most countries there are several missing values not uncommon for the developing countries. It is mainly due to the fact that not in every country each year an invention occurs and patent application is submitted.

5. Regression Results

**Manipulation of the Variables**

We developed the following variables for estimation:

(i) Log of Headcount poverty measure denoted by L_P,
(ii) Entrepreneurship denoted by E,
(iii) Log of Entrepreneurship denoted by L_E,
(iv) Innovation advancement captured by number of annual patents applied for registration as β,
and
(v) Finally we combined L_E and β multiplicatively written as βL_E.

**Estimated Results**

Results from OLS for both models capturing the impact of increased innovation and entrepreneurship activities confirmed our hypothesis that they reduce poverty. This is depicted in tables 1 through 7 below. Specifically, promoting entrepreneurship lowers poverty significantly. Nevertheless, when we controlled for innovation the estimated coefficients carry the expected signs and all are significant but with a lower influence on the poverty rates. Furthermore, results of the full model that accounts for the cumulative impact of innovation on entrepreneurship indicates that poverty declines substantially with a much larger magnitude.
### Table 1 South America Region

<table>
<thead>
<tr>
<th>Variables Names</th>
<th>Dependent</th>
<th>Independent</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>βL_E</td>
<td>-0.208</td>
<td>-0.208</td>
<td>(0.093)</td>
<td>(0.093)*</td>
</tr>
<tr>
<td>L_E</td>
<td>-0.026</td>
<td>-0.026</td>
<td>(0.000)</td>
<td>(0.000)*</td>
</tr>
<tr>
<td>CONST</td>
<td>3.376</td>
<td>1.932</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R_SQUARED</td>
<td>0.043</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. OBS</td>
<td>55</td>
<td>55</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2 Sub-Saharan Africa Region

<table>
<thead>
<tr>
<th>Variables Names</th>
<th>Dependent</th>
<th>Independent</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>βL_E</td>
<td>-0.295</td>
<td>-0.295</td>
<td>(0.046)</td>
<td>(0.046)*</td>
</tr>
<tr>
<td>L_E</td>
<td>-0.223</td>
<td>-0.223</td>
<td>(0.000)</td>
<td>(0.000)*</td>
</tr>
<tr>
<td>CONST</td>
<td>4.725</td>
<td>3.637</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R_SQUARED</td>
<td>0.087</td>
<td>0.050</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. OBS</td>
<td>103</td>
<td>103</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 3 Middle East Region

<table>
<thead>
<tr>
<th>Variables Names</th>
<th>Dependent</th>
<th>Independent</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>βL_E</td>
<td>-0.592</td>
<td>-0.592</td>
<td>(0.074)</td>
<td>(0.074)*</td>
</tr>
<tr>
<td>L_E</td>
<td>-0.111</td>
<td>-0.111</td>
<td>(0.000)</td>
<td>(0.000)*</td>
</tr>
<tr>
<td>CONST</td>
<td>3.021</td>
<td>1.234</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R_SQUARED</td>
<td>0.350</td>
<td>0.012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. OBS</td>
<td>23</td>
<td>23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 4 Eastern Europe Region

<table>
<thead>
<tr>
<th>Variables Names</th>
<th>Dependent</th>
<th>Independent</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>βL_E</td>
<td>-0.243*</td>
<td>-0.243</td>
<td>(0.098)</td>
<td>(0.098)*</td>
</tr>
<tr>
<td>L_E</td>
<td>-0.205</td>
<td>-0.205</td>
<td>(0.000)</td>
<td>(0.000)*</td>
</tr>
<tr>
<td>CONST</td>
<td>2.089</td>
<td>-0.197</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R_SQUARED</td>
<td>0.59</td>
<td>0.042</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. OBS</td>
<td>113</td>
<td>113</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 5 Central America Region

<table>
<thead>
<tr>
<th>Variables Names</th>
<th>Dependent</th>
<th>Independent</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>βL_E</td>
<td>-0.754</td>
<td>-0.754</td>
<td>(0.069)</td>
<td>(0.069)*</td>
</tr>
<tr>
<td>L_E</td>
<td>-0.077</td>
<td>-0.077</td>
<td>(0.000)</td>
<td>(0.000)*</td>
</tr>
<tr>
<td>CONST</td>
<td>5.058</td>
<td>1.638</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R_SQUARED</td>
<td>0.568</td>
<td>0.006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. OBS</td>
<td>23</td>
<td>23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 6 Caribbean Region

<table>
<thead>
<tr>
<th>Variables Names</th>
<th>Dependent</th>
<th>Independent</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>βL_E</td>
<td>-0.866</td>
<td>-0.866</td>
<td>(0.096)</td>
<td>(0.096)*</td>
</tr>
<tr>
<td>L_E</td>
<td>-0.697</td>
<td>-0.697</td>
<td>(0.007)</td>
<td>(0.007)*</td>
</tr>
<tr>
<td>CONST</td>
<td>5.209</td>
<td>2.709</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R_SQUARED</td>
<td>0.75</td>
<td>0.486</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. OBS</td>
<td>19</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 7 Asia Region

<table>
<thead>
<tr>
<th>Variables Names</th>
<th>Dependent</th>
<th>Independent</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>βL_E</td>
<td>-0.268*</td>
<td>-0.268</td>
<td>(0.144)</td>
<td>(0.144)*</td>
</tr>
<tr>
<td>L_E</td>
<td>-0.137</td>
<td>-0.137</td>
<td>(0.000)</td>
<td>(0.000)*</td>
</tr>
<tr>
<td>CONST</td>
<td>6.465</td>
<td>2.357</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R_SQUARED</td>
<td>0.072</td>
<td>0.019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. OBS</td>
<td>126</td>
<td>126</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Standard errors are given in the parentheses
*Significant at 10% levels

### Scatter Plot Schematic Representations

The scatter plot analysis is implemented in two type analysis to capture first the association between poverty rates and patent registration, which is our proxy for innovation. Secondly, we explored the relationship between poverty and entrepreneurship. In both cases, results are very intuitive and confirm our hypothesis and the regression results provided above. That is, countries with higher poverty rates are associated with lower patents applications submitted.

Similarly, countries with higher levels of business registration, our proxy for entrepreneurship represent lower levels of poverty rates. The reason as stated earlier in this paper is due to the fact that innovation and entrepreneurship generates incomes to the poor, expands their choices of goods and services at competitive prices and their tax payments allow governments to spend more on social service delivery.
6. Conclusions
The study concludes by ascertaining that pro poor strategies by engaging the private sector may reduce poverty substantially. Policy efforts directed towards promoting innovation and entrepreneurship may stimulate economic activity and generate incomes for the poor. This has been shown using data from seven regional areas covering all the continents.
Bibliography


