ENTREPRENEURSHIP AND INCOME LEVEL IN DEVELOPING COUNTRIES

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Abstract:

This paper analyses the relationship between income per capita and entrepreneurship, defined as the number of limited liability firms per 1000 active persons, registered in a country in one year. Using data on Africa and other regions, the paper finds that the relationship between entrepreneurship and income per capita is U-shaped and identifies an income threshold estimated at $7300 above which income per capita is associated with increasing entrepreneurship. This result is interpreted in the light of Maslow's Hierarchy of Needs Theory. *Ceteris paribus*, at low levels of income per capita, entrepreneurs establish firms as a survival strategy as they do not have access to well-paid employment. As incomes rise up to the $7300 threshold, the need to engage in necessity entrepreneurship declines. Paid employment provides higher risk-adjusted income than survival entrepreneurship. Beyond the threshold, high level of income per capita allows people who would otherwise be in paid employment to become creative, independent, and take more risk by choosing to engage in entrepreneurship. This paper differs from previous studies on the subject as it adopts a different definition of entrepreneurship, uses a large sample of developing countries, and adopts a quantitative approach rarely used in this literature. This analysis is relevant for policymaking in Africa and developing countries in general where countries are at different levels of income and require different policies in order to foster entrepreneurship and job creation.

Key words: Africa, income per capita, entrepreneurship.

1. Introduction

Several studies have analyzed different aspects of entrepreneurship defined as the level self-employment. They include van Stel et al (2005) who analyze the effect of entrepreneurship on economic growth and find that the former's influence on the latter depends on the level of income. Freytag and Thurik (2007) find that non-economic factors such as culture are important determinants of entrepreneurship. Robson (2007) studies the effect of social protection and political culture on entrepreneurship and finds that political culture has a strong incidence on entrepreneurship: the rate of entrepreneurship tends to be low in countries with a history of communist rule. Ilmakunnas and Kanniainen (2001) highlight the importance of risk and labor insurance on entrepreneurship in OECD countries. Klapper et al (2006) find that entry regulations act as a barrier to entrepreneurship while Klapper and Love (2010) find that the 2008 financial crisis had an important negative impact on entrepreneurship.

This paper analyses the relationship between income per capita and entrepreneurship, defined here as the number of limited liability firms per 1000 active persons, registered in a country in one year (Ayyagari et al, 2011).[2] Entrepreneurs in high-income countries are generally considered as people who primarily engage in business as a result of a deliberate personal choice to pursue a perceived business opportunity, be in control of one's life, achieve a feeling of self-esteem or have more independence (Roberts and Robinson, 2010; Hessels et al, 2008). They are called "opportunity entrepreneurs." Influential models of occupational choice (e.g. Banerjee and Newman, 1993) consider these individuals as coming from the high end of the income distribution--given that their activities require collateral-- in opposition to wage earners who are viewed as belonging to the lower end of the income distribution.

This description of entrepreneurship does not fully capture the reality of many low-income countries where two types of entrepreneurship coexist. While people with high incomes may become opportunity entrepreneurs, those with low incomes might be forced to embrace entrepreneurship out of necessity or survival. These "necessity entrepreneurs" (Acs, 2006; van Stel et al, 2007) are more common in economies where employment opportunities are limited and social safety nets catering for the basic needs of people on very low incomes are weak or lacking. These entrepreneurs are "reluctant entrepreneurs" (Charman and Petersen, 2009) given that it is their inability to find paid employment that pushes them into business.[3] The implication is that one would expect to find a large number of "necessity

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[2] In Africa as in most developing countries, the inexistence or poor quality of employment data makes it impossible to use self-employment as a reliable indicator of entrepreneurship.

[3] Several other terms have been used to characterize this dichotomy. They include 'necessity' versus 'opportunity' entrepreneurs, 'real' versus 'quasi' entrepreneurs, 'replicative' or 'routine' entrepreneurs versus 'innovative' or 'high impact' or 'ambitious' entrepreneurs (Wennekers et al, 2010: 173)

entrepreneurs" in poor countries and more "opportunity entrepreneurs" in rich countries. In other words, as incomes increase and people are able to satisfy their basic needs, more people may engage in opportunity entrepreneurship in line with Maslow's Hierarchy of Needs Theory. This process suggests a convex relationship between entrepreneurship and income with high levels of entrepreneurship at both low and high income levels.

Understanding the relationship between income per capita and entrepreneurship is relevant for industrial policy. In Africa for example, it is useful to explore how the steady increase in income per capita observed over the last ten years, if it persists, will likely change the dynamic in the private sector with implications for employment creation.[4] Such analysis could help in crafting development policies that seek to transform developing economies into 'entrepreneurial economies.'

So far, the empirical research on the relationship between income level and entrepreneurship has largely been carried out on OECD economies with inconclusive results.[5] Most studies are historical and explore the evolution of entrepreneurship over a long period of time from as far back as the year 1800. They find some evidence of a U-shape relationship implying a decline followed by a recovery in entrepreneurship, over time. For example, various sources show a long-term decline of entrepreneurship in France, Sweden, USA, Germany, The Netherlands and the UK since the 19th century followed by a revival starting from the early 1970s. The analysis of 23 OECD countries covering the period 1972-2007 reveals that the number of business owners increased by 1.38% per year against an increase of 1.15% for the total labor force. This translated in the creation of 18.5 million owner-managed firms over the 35-year period. Other studies find an L-shape relationship suggesting a decline without recovery of entrepreneurship, over time, within the OECD group of countries (Wennekers, 2010; Carree et al, 2002; 2007).

This paper differs from previous studies on entrepreneurship in several respects. Firstly, it adopts a different approach as it explores the relationship between entrepreneurship and income per capita using a large group of African and other countries at different levels of income over the relatively short period 2004-2009. Secondly, the paper uses a different

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[4] African economies grew by 5.1% per year, on average, over the decade 2000-2010. This was twice the performance of the previous decade where average GDP growth was 2.5% per year. While high commodity prices have played a role in Africa's recent growth performance, only one-third of growth in GDP was due to commodities, other sectors accounting for the rest. For example, between 2002 and 2007, hotels and restaurants grew by 8.7%; finance by 8%; transport and communications by 7.8%; and construction by 7.5% (McKinsey Global Institute, 2010). Political and macroeconomic stability as well as microeconomic reforms are identified as the major factors behind Africa's recent growth.

[5] See, for example, the recent review by Wennekers at al. (2010). Most recently, thanks to the World Bank's efforts in collecting comparable data on entrepreneurship across the world, some recent studies of entrepreneurship have integrated developing countries in their samples. For example, Djankov et al (2002) analyze the cost of firm entry while Klapper and Love (2010) have recently analyzed the effect of the global economic and financial crisis on entrepreneurship across the world. They find that the crisis had a significant negative effect on enterprise creation across the world.

definition of entrepreneurship that allows capturing a large cross-section of countries. The availability of data on the creation of limited liability firms made possible the inclusion in the sample of a number of African countries that are not covered by the Global Entrepreneurship Monitor (GEM) database which has provided the data used in most empirical analyses of the subject. Thirdly, it adopts a quantitative approach that has not been pursued in the existing studies we are aware of.[6] Entrepreneurship is modeled both as a static process using random effects models and as a dynamic phenomenon using the Generalized Method of Moments, GMM, approach. This appears to be a novelty relative to past studies. In fact, this paper suggests that the results based on OLS estimation could be misleading even though a number of previous studies have relied on this estimation method. Fourthly, if a convex relationship is established between income per capita and entrepreneurship, its interpretation differs from the results based on historical analyses.

Preliminary results suggest that the relationship between entrepreneurship and income per capita is U-shaped. The analysis identifies an income threshold above which income per capita is associated with increasing entrepreneurship. This result is interpreted in the light of Maslow's Hierarchy of Needs Theory. *Ceteris paribus*, at low levels of income per capita, entrepreneurship may be guided by survival rather than opportunity motives. As income per capita rises up to the threshold the need to engage in necessity entrepreneurship declines. In this income bracket, paid employment is preferred to entrepreneurship as the former offers better risk-adjusted regular income than survival entrepreneurship. Beyond the threshold income, many people who would otherwise be in paid employment choose to become more creative, independent, and take more risk by opting for entrepreneurship.

The rest of the paper is organized as follows. The second section briefly discusses the concept of entrepreneurship in developed and developing country contexts. The third section discusses the relationship between income level and entrepreneurship, as well as other determinants of entrepreneurship such as economic structure and barriers to firm entry. The fourth section establishes a statistical relationship between entrepreneurship and its determinants. Section 5 concludes with some policy suggestions.

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[6] Recent analyses of entrepreneurship have relied on the Global Entrepreneurship Monitor (GEM) database which started collecting systematic data on self-employment in 1999 with 10 developed countries. Only recently have some African countries been covered by GEM (see http://www.gemconsortium.org)

2. Entrepreneurship in developed and developing countries

This section discusses in some detail the concept of entrepreneurship. The specific case of entrepreneurship in Africa is presented in the second part of the section.

2.1. Entrepreneurship in developed countries

Most analyses of entrepreneurship, which are dominated by studies on developed countries, have defined entrepreneurship as the rate of self-employment relative to total employment.[7] Using data from GEM, low-income countries are found to have low ratios of entrepreneurship (less than 2 in Brazil, Uganda, South Africa, Croatia and Poland) while high-income countries have high ratios (10 or more in Sweden, Finland, Denmark, Belgium and Iceland).[8] Risk tolerance is identified as one of the key determinants of the decision to become an entrepreneur in developed economies (Ahn, 2010). It is also suggested that many opportunity entrepreneurs capitalize on ideas and practices they learned through their previous employment to start their own businesses (Braguinsky et al, 2009).

Using self-employment as a measure of entrepreneurship has been largely motivated by the re-emergence of self-employment in developed countries starting from the 1970s, a trend that contradicted previous predictions that small businesses were headed for disappearance in favor of large corporations (Lucas, 1978). The revival of self-employment in the developed world is thought to have resulted from factors including the rapidly growing services sector which has lower entry barriers and requires a smaller scale than agriculture and manufacturing, declining transactions costs, a trend toward more autonomy and self-realization, growth in new technologies that do not require large scale, as well as the information and communication technology (ICT) revolution which has enabled small firms to realize scale economies in the context of loosely organized networks (Wennekers, 2005, 2010).

Highlighting the importance they attach to entrepreneurship, many developed countries have established initiatives aimed at nurturing a culture of entrepreneurship. Some countries have integrated entrepreneurship into their education curricula while others have put in place legislation to encourage risk-taking. Since 2004, through its Enterprise Week, the United Kingdom has been holding national campaigns to encourage entrepreneurship. In the same light, Global Entrepreneurship Week is a worldwide celebration and promotion of youth entrepreneurship, which started in 2008. Also, The

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[7] The self-employed comprise own-account workers whether they work alone or use hired labor (Robson, 2007).

[8] See Acs (2006)

Aldridge Foundation is a charity that sponsors academies specializing in entrepreneurship with a focus on young people.[9]

2.2. Entrepreneurship in Africa

In Africa, the discourse on entrepreneurship is relatively new. For example, it is only in the 1980s that development policy shifted from the 'managed' economy paradigm that was adopted after independences in the 1960s to the 'entrepreneurial' economy (Audretch and Thurik, 2001). As Africa liberalized its economies in the 1980s, the state structures that had constituted a large share of African countries' productive capacity were dismantled (Kiggundu, 1997).[10] Entrepreneurs were expected to seize the opportunity created by the withdrawal of the state in the economy and become key development actors. However, this did not occur mainly because the economic reforms put too much emphasis on macroeconomic stability and economic liberalization with little attention paid to the development of entrepreneurship.

There is no clear evidence that the shrinking of the public sector led to a systematic increase in private sector formal employment as the proponents of economic reforms had expected. On the contrary, some countries experienced a decline in both private and public sector employment during the structural adjustment period. In Kenya, the share of public sector employment declined from 36 per cent of total employment in 1990 to 11.4 per cent in 2000. Over the same period, the share of private sector employment shrank by 50 percent from 36.5 per cent to 17 percent of total employment (UNECA, 2005). Indeed, the privatization of loss making state firms and the retrenchment of the civil service destroyed a substantial number of public jobs in the 1990s (Nkurunziza, 2010). A number of those who lost their jobs in the formal sector might have ended up in the informal sector as 'survival' entrepreneurs. As a result, many countries are still at an early stage of entrepreneurship development so they are unable to use entrepreneurship as an engine of economic development as observed in some previously poor regions of the United States (Stephens and Partridge, 2011).

Entrepreneurs not only create opportunities for themselves but also for society at large (Makura, 2008). Developing countries' entrepreneurs, particularly at the grass root level, contribute to social development, training and skills development, technology diffusion, gender equity, environmental protection, and energy efficiency, among others. They can also be a force for positive change by influencing national policy (SEED Initiative, 2010). There is also evidence that entrepreneurship increases household income while reducing

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[9] Visit http://www.gemconsortium.org/about.aspx?page=ab_what_gem_is for information on the Global Entrepreneurship Monitor (GEM).

[10] About 60 percent of African countries were implementing or had implemented economic liberalization programs by the second half of the 1980s (UNCTAD, 2008).

income inequality, particularly in rural areas (Kimhi, 2009). Moreover, entrepreneurs not only create new ideas, products or markets but also jobs for themselves and others. In fact, employment creation is one of the most important externalities of entrepreneurship. A study of the US economy for example found that it is the young firms that create more jobs than old ones (Haltiwanger et al, 2009). A more general study of the contribution of firms of different sizes and ages to employment creation in 99 countries also finds that young firms have higher job creation rates than large and old firms and higher productivity growth than small and old firms (Ayyagari et al, 2011).

Although the boundaries separating "survivalists" from opportunity entrepreneurs are sometimes blurred, the former are generally unsophisticated, small and rely on family labor. Outside agriculture, they mostly operate in the informal sector particularly in trading thanks to its low cost of entry. They dominate Africa's business landscape. Necessity entrepreneurs create limited, vulnerable and low-paying jobs even though they can evolve into opportunity entrepreneurs heading conglomerates (Makura, 2008). In contrast, opportunity entrepreneurs create more jobs in both the formal informal sectors. In South Africa's informal economy, for example, a survey found that survivalist entrepreneurs create 0.3 jobs excluding their own, on average while opportunity entrepreneurs create 2.2 jobs in addition to their own, on average (Charman and Petersen, 2009). Africa's poor job creation record could be partly due to the failure of the continent to mobilize the right type of entrepreneurship that could create decent jobs in large numbers.

The development of entrepreneurship in Africa will depend on governments policy choices. The current reforms under way across the continent to improve the business environment for SMEs are bearing fruit in terms of increasing entrepreneurship and job creation but the gap with other regions is still large. Table 1 highlights the differences in the indicators of entrepreneurship between Africa and other regions in the 2000s.

Table 1: Indicators of entrepreneurship and firm characteristics (medians)

Variable	Africa	Elsewhere	Sample
Entrepreneurship (# firms per 1000 working-age people)*	0.4	2.2	588
Number of full time permanent workers per firm	24.4	64.8	218
Unskilled workers (in %)	38.7	25.7	194
Firms providing training (in %)	30.3	44.4	217
Years of experience of top manager in firm's sector	12.8	16.2	139

Source: Based on World Bank (2011b)
Notes: Elsewhere is the group of other developing countries
       *: the data on entrepreneurship is based on a global
       sample including developed and developing economies

Table 1 shows that on average, the number of limited liability firms created in Africa is less than one-fifth of the average number in other regions. Even the few firms entering the

business sector are smaller than those created elsewhere. Each new firm entering the formal private sector in Africa generates 24.4 permanent jobs on average, which is less than half of the jobs created by firms in other regions. Africa's failure to create more and larger firms as in other regions reduces the chances of using entrepreneurship to expand employment opportunities. Moreover, more unskilled workers are employed in Africa than elsewhere and the continent's firm managers are relatively less experienced than in other regions. This could explain why Africa specializes in the production of low-skill goods as suggested by the lower quality of their exports relative to other regions (Hausmann et al, 2007). Moreover, the prevalence of unskilled workers limits entrepreneurship development given that many entrepreneurs use the practical skills they have acquired on the job to launch their own businesses (Robson, 2007).

3. Income level, barriers to entry and entrepreneurship

Although some authors have proposed an eclectic theory of entrepreneurship (Verheul et al, 2003) there is no unified model of entrepreneurship and it is impossible to discuss in detail all the potential determinants of entrepreneurship in one study. A review of the literature on entrepreneurship shows that it depends on a large number of economic and non-economic factors linked with demand and supply factors. These include technological development, industrial structure, population dynamics, age structure of the population, women's participation in the labor force, unemployment, social protection, immigration, labor market regulations, the business environment, macroeconomic policy, income level, education, culture and even subjective perceptual variables such as self-confidence (Wennekers, 2006, 2010; Freytag and Thurik, 2007; Robson, 2007; Verheul et al, 2002; Arenius and Minniti, 2005).

This study's interest revolves around the exploration of the relationship between income per capita and entrepreneurship controlling for the effect of barriers to entry and economic structure. Entrepreneurship is understood as 'firm entry'; entrepreneurship in existing firms is not analyzed. For example, this study does not look into entrepreneurship and access to credit given that this issue is more relevant for already existing firms.[11] Some of the demographic aspects of entrepreneurship are captured by the definition used in this study as it is weighted by the number of active people. Regional and year dummy variables are also important controls of regional and time variations in entrepreneurship that are not captured by the other variables.

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[11] Cross-country information on access to credit is very sparse. Existing empirical research in industrial organization both in developing and developed countries, shows that a limited number of entrepreneurs use credit in order to start their businesses. Credit is mostly accessed once the business has been established and proved to be viable (Nkurunziza, 2010).

3.1. Economic structure, income level and entrepreneurship

The process of economic development or achieving higher income level is generally correlated with economic transformation from primary-based economies to manufacturing and from manufacturing to the services economy (Chenery and Syrquin, 1989). In turn, the structure of an economy determines how easy it is to start a new business. For example, although there is talent and entrepreneurship in Africa's agricultural sector (SEED Initiative, 2010), it is arguably easier to start a new business in the services sector. Entry costs and the scale required to be successful might not be as high as in the industrial or agricultural sector where large size is an important determinant of efficiency. As a result, the larger is the share of the services sector to GDP in an economy the higher the level of entrepreneurship. This appears to be one of the reasons why there was a reversal in the trend of entrepreneurship in developed economies since the 1970s. Conversely, the share of the agricultural sector to GDP is expected to have a negative relationship with entrepreneurship.

It is also relevant to note that the "opportunity entrepreneurs" and "necessity entrepreneurs" start their businesses from two different income levels. Necessity entrepreneurs are expected to have relatively low incomes as they are drawn into business by necessity. Therefore, their firms are small and operate in the informal sector particularly in countries where the cost associated with starting a business in the formal sector is high.[12] In contrast, even though opportunity entrepreneurs need not be rich, they decide to start a business to pursue an opportunity or become more independent when they have a relatively high level of income to meet the cost of basic needs as well as the cost associated with starting the business (Wennekers, 2010). The need to have a high income to start a business in the formal sector is backed by microeconomic empirical evidence which shows that most entrepreneurs start businesses with their own funds, sometimes with the help of family and friends. Start-up conditions in terms of the amount of financial resources available to start a business have a long-term effect on the evolution of enterprises. Firms starting up with a less binding budget constraint, for example the establishment of new branches of existing businesses, usually have larger start-up size and grow faster than budget-constrained start-ups (Nkurunziza, 2010).

We hypothesize that in the low end of the income distribution, the number of entrepreneurs is high as people start small businesses to earn a survival income. This is particularly the case where employment opportunities are limited and social protection weak or inexistent. In this light, the number of people forced to start small businesses declines as income increases and social protection improves, implying that the rate of entrepreneurship declines with income level up to the point where incomes are high enough that people do not need to engage in survival entrepreneurship. Whether or not the rate of

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[12] In countries where the procedure to register a business is speedy and cheap, even "small entrepreneurs" might choose to register their business and operate in the formal sector.

entrepreneurship increases in the high end of income distribution is an empirical question. In other words, whether the relationship between entrepreneurship and the level of income can be statistically approximated by a U-shaped or an L-shaped curve is an empirical requires empirical testing.

Is there evidence that the level of entrepreneurship is high in countries with low levels of income per capita, low in middle-income countries and high in high-income countries? Table 2 provides some descriptive statistics of entrepreneurship when the income variable is divided into these three groups.

Table 2: Rates of entrepreneurship at different income levels

Income levels	Entrepreneurship
Up to $1000	2.28
$1001 to $4000	1.21
$4001 to $12000	1.07
More than $12000	2.55

We arbitrarily define four income groups which more or less correspond with those used by the World Bank.[13] The first group represents low-income countries which are very poor; the second represents lower middle-income countries, the third is the group of upper middle-income countries while the fourth group captures high-income countries. As hypothesized, table 2 shows that entrepreneurship is higher in very poor and in rich economies than in lower and upper middle-income countries. The data in Table 2 suggests a U-shaped relationship between entrepreneurship and GDP per capita. The statistical analysis of this relationship is the subject of Section 4.

3.2. Barriers to entrepreneurship

Starting a business implies different types of entry costs: financial, time-related, and procedural. The cheaper, faster and simpler it is to register a business, the more entrepreneurs would be willing to register their businesses in the formal sector. Many developing countries, particularly in Africa, still maintain important barriers to firm entry which handicap the development of entrepreneurship. Three such barriers are briefly discussed: the number of procedures required to start a new business, the time it takes to

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[13] The World Bank uses GNI per capita to define the four income groups but we use GDP per capita measured in 2005 purchasing power parities as this is the variable consistently used in the paper. Also, our group boundaries are close to but not exactly the same as those defined by the World Bank (see http://data.worldbank.org/about/country-classifications)

comply with the administrative requirements in order to start a new business, and the cost of registering a new business.[14]

Procedures required for starting a business: Registering a business is associated with some administrative requirements. When limited in number and necessary, these requirements are important as they help to organize the business sector and to protect consumers and other stakeholders. However, when their number is unnecessarily high, they become bureaucratic hurdles and act as a barrier to entry. Too many procedural requirements to register a business are expected to be negatively related to entrepreneurship.

There is a diversity of situations with countries like Canada and New Zealand where registering a business requires just one procedure, to Afghanistan where the same process requires 28 procedures. *Ceteris paribus*, Canada and New Zealand should experience more business registrations than Afghanistan. In Africa in 2011, Equatorial Guinea and Uganda had the highest number of requirements, 20 and 18, respectively. At the other extreme, Madagascar and Rwanda had only 2 procedures each, a remarkable improvement from 15 and 9 procedures just seven years earlier. These contrasting examples show that it is possible to significantly reduce these entry barriers in a relatively short time.

Time to register a business: Another way of estimating the ease with which businesses are registered in a country is the number of days it takes to comply with registration procedures. This measure is highly correlated with the number of procedures required to register a business with a correlation coefficient of 0.70. More procedures imply longer times and longer times discourage entrepreneurs to comply with registration procedures, prompting many to operate in the informal sector.

The times to register a business also differ across countries. In Africa, the shortest time to register a business in 2011 was 3 days in Rwanda followed by 6 days in Mauritius. The longest time was 216 days in Guinea Bissau. Rwanda's performance is the result of years of efforts undertaken to improve the country's business environment. As recently as 2008, the time it took to register a business in Rwanda was 16 days illustrating once more that improvements to the business environment can be made in a short time period.

Cost of business registration: In addition to the number of bureaucratic procedures and the time it takes to register a business, there are also financial costs involved. Unlike the first two barriers to entry discussed above which are highly correlated, the financial cost is not as highly correlated with the first two measures. A country could impose a high cost for business registration even when there are few procedures to comply with or even when registration is done relatively fast once the cost has been paid. The coefficient of correlation

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[14] Data on these variables is from The World Bank's Doing Business online database accessed on 11 September 2011 (http://www.doingbusiness.org/custom-query)

is 0.54 with respect to the number of procedures and 0.55 with the time to register property.

The cost of registering a firm in a country is measured in percentage of per capita income of the country. In 2011, the cost was 2.2% of per capita income in Botswana and 3.8% of per capita income in Mauritius. The highest cost to register a business is in the Democratic Republic of Congo where entrepreneurs are required to pay 735% of per capita income. Similar to the other two measures discussed above, most countries have been reducing the cost to register a business. Across the board, the costs in 2011 are much lower than their level 5 years ago. Progress has been so impressive in some regions that the International Finance Corporation and the World Bank, the two institutions compiling information on the ease of doing business across the world, declared on 17 August 2011 that East Africa could match Japan in the ease of doing business if each of the 5 countries forming the community adopted the best of the Community's regulations and procedures.[15]

4. Econometric analysis

This section first discusses the descriptive statistics of the variables used in the econometric model then presents the modeling strategy and the empirical results.

4.1. Descriptive data

The data are divided into three groups (see Table 3). The global sample shows information on all countries included in the dataset. The second and third groups represent the African and non-African sub-samples in order to shed some light on possible differences between entrepreneurship in Africa and non-Africa regions. The data covers the period from 2004 to 2009 but the panel is unbalanced due to missing observations.

Table 3: Descriptive statistics (2004-2009)

	Full sample			Africa			Elsewhere		
Variables	Mean	Median	Obs.	Mean	Median	Obs.	Mean	Median	Obs.
Entrepreneurship	3.32	1.73	588	1.11	0.38	89	3.72	2.22	499
Log procedures to register	2.11	2.20	1047	2.29	2.30	272	2.04	2.08	775
Log time to register	3.36	3.43	1047	3.73	3.66	272	3.22	3.29	775
Log cost to register	3.06	3.06	1040	4.51	4.68	272	2.54	2.58	768
Log GDP per capita	8.66	8.75	1074	8.16	8.14	257	8.82	8.89	817
Square log GDP per cap	76.75	76.49	1074	68.15	66.29	257	79.45	79.01	817
Log agri value-ad. to GDP	2.12	2.27	955	2.81	3.15	242	1.89	2.01	713
Log serv. value-ad. to GDP	3.97	4.06	965	3.73	3.84	237	4.05	4.10	728

Source: Based on World Bank (2011a)

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[15] http://www.doingbusiness.org/press

The descriptive statistics in Table 3 show that the African sub-sample is limited as it relates to only 16 countries and 89 observations available for the entrepreneurship variable.[16] Despite the relatively limited data, it is possible to gain some interesting insights into the economic determinants of entrepreneurship.

The data in Table 3 show that the potential determinants of entrepreneurship in Africa are more constraining than in other regions, on average. Africa's median rate of entrepreneurship is almost one-sixth of its value in other regions. The income variable is the Gross Domestic Product (GDP) per capita in 2005 Purchasing Power Parities (PPP). It is also lower in Africa although the difference is not as large as for entrepreneurship. The data also show that on average it is costlier to register a business in Africa than elsewhere, the relative cost in Africa being almost twice the relative cost in other regions. The size of agriculture in GDP is also about 50% higher in Africa than elsewhere.

It is relevant to note that most of the variables display limited variation. This is the case with the log of the number of procedures required to create a business. With a mean of 2.11 and a standard deviation of 0.44, the coefficient of variation is close to zero. The same obtains for other variables including the following: log time to register, log GDP per capita, and log services value-added. Part of this is due to in-country low variation. For example, GDP composition does not change substantially from one year to the next. Similarly, the business climate does not vary substantially across countries over one-year periods. This has implications for econometric modeling.

4.2. Modeling strategy and empirical results

Entrepreneurship is modeled first by estimating an OLS model as the baseline (Table 4) given that several previous econometric studies of entrepreneurship have used this technique (e. g. Carree et al, 2008; Robson, 2007; Parker and Robson, 2004; Noorderhaven et al, 2004; Blanchflower and Oswald, 1998). Entrepreneurship is regressed on five variables: a variable indicating the difficulty of registering a business which is expected to have a negative sign; the log of GDP per capita (negative sign), the square of the log of GDP per capita (positive sign), and two variables capturing the structure of the economy, namely the log of the share of agriculture value-added in GDP (negative sign) and the log of the share of the services sector value-added in GDP (positive sign). Regional and year dummy variables are included to control for regional and year effects that are not captured by the other variables. The omitted categories are Europe and 2004 for regional and year dummies, respectively.

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[16] The African countries included are Burkina Faso, Ethiopia, Gabon, Ghana, Kenya, Madagascar, Malawi, Mauritius, Niger, Nigeria, Rwanda, Senegal, South Africa, Togo, Uganda and Zambia.

Table 4: Empirical results of the OLS estimation

	Model 1	Model 2	Model 3
Log GDP per capita	-4.09***	-4.30***	-4.79***
	(0.98)	(1.04)	0.96
Square of log GDP per capita	0.23***	0.24***	0.27***
	(0.05)	(0.06)	(0.05)
Log agriculture value-added/GDP	-0.50***	-0.68***	-0.14
	(0.13)	(0.13)	(0.14)
Log services value-added/GDP	2.13***	2.23***	3.00***
	(0.38)	(0.39)	(0.39)
Log number of procedures	-1.49***		
	(0.21)		
Log time to register a business		-0.47***	
		(0.12)	
Log cost to register a business			-0.77***
			(0.08)
Dummy variables			
year 2005	0.02	-0.04	0.01
	(0.29)	(0.30)	(0.28)
year 2006	0.20	0.10	0.09
	(0.28)	(0.30)	(0.28)
year 2007	0.24	0.13	0.13
	(0.29)	(0.30)	(0.29)
year 2008	-0.03	-0.10	-0.20
	(0.29)	(0.30)	(0.28)
year 2009	-0.50*	-0.49	-0.69***
	(0.30)	(0.31)	(0.29)
Africa	-0.61	-0.33	0.43
	(0.40)	0.39	(0.38)
East Asia	-0.36	-0.25	0.24
	(0.24)	0.29	(0.30)
South Asia	-0.99***	-0.70**	-0.63*
	(0.32)	0.32	(0.34)
America	0.02	-0.04	0.40
	(0.29)	0.31	(0.31)
Middle East	-1.19***	-1.57***	-0.69***
	(0.24)	0.24	(0.22)
R-squared	0.45	0.42	0.48
Observations	448	448	442

Note: Standard errors in parentheses are White (1980) heteroskedasticity-consistent. ***, **, and * correspond to 1%, 5% and 10% significance level, respectively. The reference groups are Europe for region and 2004 for year dummies.

All the variables of interest have the expected signs and they are statistically significant with the exception of the share of agriculture to GDP in Model 3. Year effects seem to be only statistically significant in 2009 in Model 3. With respect to regional effects only South Asia and the Middle East display lower rates of entrepreneurship relative to Europe, once other determinants have been accounted for.

Given its econometric limitations including its failure to account for heterogeneity, the OLS model produces results that could be misleading. Moreover, given that some of the variables in the equation have very low within-country variation (e.g. barriers to entry variables) the random effects estimator is used (see Table 5) to --at least partially--account for heterogeneity. The interest of the random effects estimator is that it is not based on first-differences but is quasi-time demeaning. It removes a fraction of the time average of each variable rather than the full time average as is the case with fixed effects models (Wooldridge, 2002).

In order to establish that random effects estimation is indeed valid, Hausman (1978) test is used to compare the random effects and fixed effects estimators. If the Hausman test validates the use of the random effects estimation, the model is re-estimated with robust standard errors to control for heteroskedasticity. The results are reported in Table 5.[17]

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[17] The Hausman (1978) test comparing random and fixed effects models cannot be performed with robust standard errors.

Table 5: Empirical results of the random effects estimation

	Model 1	Model 2	Model 3
Log GDP per capita	-3.38*	-3.15	-3.60*
	(1.89)	(2.02)	(1.98)
Square of log GDP per capita	0.19*	0.18	0.20*
	(0.11)	(0.11)	(0.11)
Ln agriculture value-added/GDP	-0.67***	-0.69***	-0.58***
	(0.21)	(0.21)	(0.22)
Ln services value-added/GDP	0.28	0.24	0.43
	(0.56)	(0.63)	(0.59)
Ln number of procedures	-0.82***		
	(0.17)		
Ln time to register a business		-0.31***	
		(0.10)	
Ln cost to register a business			-0.28***
			(0.10)
Dummy variables			
year 2005	0.09*	0.06	0.07
	(0.05)	(0.05)	(0.05)
year 2006	0.32***	0.27***	0.26***
	(0.09)	(0.09)	(0.09)
year 2007	0.44***	0.38***	0.38***
	(0.11)	(0.11)	(0.11)
year 2008	0.24**	0.21**	0.21*
	(0.11)	(0.11)	(0.11)
year 2009	-0.26*	-0.26*	-0.23*
	(0.15)	(0.15)	(0.13)
Africa	-0.61	-0.59	-0.38
	(0.43)	(0.42)	(0.43)
East Asia	-0.51	-0.45	-0.31
	(0.67)	(0.71)	(0.75)
South Asia	-1.18	-1.12	-1.06
	(0.76)	(0.76)	(0.82)
America	0.18	0.17	0.27
	(0.71)	(0.72)	(0.72)
Middle East	-1.82***	-2.09***	-1.75***
	(0.44)	(0.46)	(0.45)
R-squared (overall)	0.41	0.38	0.40
Observations	448	448	442
Hausman test (Prob>Chi-square)	0.11	0.11	0.00

Note: Standard errors in parentheses are White (1980) heteroskedasticity-consistent. ***, **, and * correspond to 1%, 5% and 10% significance level, respectively. The reference groups are Europe for region and 2004 for year dummies.

There are three models each using a different measure of the difficulty of starting a business. According to the result of the Hausman (1978) test, we cannot reject the null hypothesis that the random effects estimator is more efficient than the fixed effects estimator for models 1 and 2 (but this is not the case with Model 3), implying that the random effects model is more appropriate in the estimation of the determinants of entrepreneurship than the fixed effects model. Given that Model 1 has a better fit than model 2, the discussion below is based on Model 1 where the difficulty of registering a business is measured by the log of the number of procedures required.

All the variables of interest have the expected signs. The results confirm the hypothesis of a U-shaped relationship between entrepreneurship and GDP per capita. This result lends support to the idea that at low levels of income, countries display high levels of entrepreneurship but not necessarily the preferred type of entrepreneurship. The result could be interpreted as meaning that people start small businesses for lack of better alternatives, particularly limited opportunities in formal sector employment. In developing countries where productive employment is limited and unemployment benefits inexistent, family heads or adult children are forced to start small businesses to earn some income to provide for their families. In countries where real wages and social protection are relatively high, employment is preferred to entrepreneurship as it offers a stable flow of income relative to income from business which is uncertain. Indeed, some studies have found a robust negative relationship between employment benefits and entrepreneurship (Robson, 2007). Over some income threshold, as people's basic needs are satisfied, entrepreneurship becomes more attractive than paid employment. People are more willing to take more risk in order to be more autonomous and achieve self-fulfillment (Wennekers, 2010), conforming to Maslow's Hierarchy of Needs Theory.

The results of the econometric analysis point to two conclusions. Overall, increasing GDP per capita by 10% would reduce entrepreneurship by 20%, which suggests that globally, the negative effect of income per capita on entrepreneurship dominates the positive effect. In other words, increasing income reduces the number of "survivalist" entrepreneurs while eventually increasing the number of opportunity entrepreneurs.[18] The second conclusion is that the turning point where increases in income start having a positive effect on entrepreneurship seems to be around an income level of $7,293. This falls within the World Bank's upper middle income group.

Entrepreneurship is also handicapped by unnecessary measures that prevent potential entrepreneurs from registering their businesses. The higher the number of procedures to register a business, the lower the number of firms registered, which limits entrepreneurship and hence its positive effect on employment creation. The estimate in Model 1 shows that reducing by 10% the number of procedures needed to register a

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[18] This could reflect the fact that the sample used is dominated by developing countries.

business would globally increase entrepreneurship by 2.5% to 4.7%.[19] The effect could be even three times stronger if we consider the African sub-sample. Assuming that the elasticity derived from Table 7 is stable across regions, reducing the number of registration procedures in Africa by 10% would increase entrepreneurship by 7.4%. For example, if Uganda could reduce its procedures from 18 to 16, which would be about 10%, it would increase the number of firm registrations by 7.4% or 825 additional limited liability firms, using the data for 2009. Considering the average number of permanent employees per firm, these results suggest that between 17,330 and 28,884 additional jobs could be created as a result.[20]

This simple simulation illustrates that by reducing the bureaucratic hurdles to registering a business, some countries can substantially increase their employment. This could be one of the first policies countries attempt to adopt in their drive to create more decent jobs. Many of the measures to simplify business registration are administrative by nature so they are relatively easy to implement as they do not require large financial and human resources. This is relatively easy in countries which still have a high number of procedures, including Uganda, Kenya and Malawi. Reducing the number of procedures by 10% would imply an absolute reduction of 1 to 2 procedures for those countries.

Rwanda, for example, made remarkable progress in terms of simplifying its business registration procedure—in addition to other measures-- in just one year. Between 2009 and 2010, the number of procedures to start a business was reduced from 8 to 2; the number of days from 14 to 3 and the cost from 108.9% of GDP per capita to 10.1% of GDP per capita.[21] As a result, the country was hailed as the best reformer in 2010. Largely thanks to these efforts, Rwanda mobilized $414 million in new investments that created about 12736 jobs (The Whitaker Group, 2011). Data for 2008 and 2009 shows that the number of firms registered in 2009 was almost three times that of 2008 as a result of these reforms.

Table 5 also confirms that a country's economic structure has an important impact on its capacity to generate entrepreneurs. As expected, a large share of agriculture in an economy results in smaller rates of entrepreneurship. In the model above, the negative association between agriculture activity and entrepreneurship and its strong statistical significance is the most consistent econometric result across the different models and estimation procedures. A reduction of the share of agriculture value-added to GDP by 10 percent would increase entrepreneurship by 2 percent. This does not imply that agriculture should be abandoned. Instead, the result could be interpreted as meaning that more investments

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[19] Given that we have estimated a semi-logarithmic model, the elasticity is derived as: coefficient times the inverse of the mean of entrepreneurship. This is -0.82/3.32. Using the median instead of the mean as the denominator returns an elasticity of 0.47.

[20] The lower figure is calculated by assuming that on average limited liability firms have the country's overall average number of permanent employees per firm (small, medium and large) of 21.14. The higher bound assumes an average medium size for all limited liability firms, which is 34.82 permanent employees (figure for 2006, the latest year for which this information is available).

[21] Data from http://www.doingbusiness.org/Custom-Query/rwanda

should be directed to the rural sector in order to increase non-agriculture activities which complement agriculture in the process of rural economic development (Nkurunziza, 2007). Although the share of the services sector value-added to GDP is positively related to entrepreneurship, the relationship is not statistically significant. This is surprising given the discussions in the literature purporting the existence of a strong relationship.

The time dummy variables show that relative to 2004, entrepreneurship was stronger in 2006 and 2007, just before the world economic and financial crisis, with the strongest result recorded in 2007. Relative to 2004, entrepreneurship declined in 2009, most probably as a result of the crisis affecting developed economies and spreading to other parts of the world. The decline in entrepreneurship after 2007 has been well documented (Klapper and Love, 2010). This finding illustrates that entrepreneurship in a specific environment may be affected by internal as well as external factors.

The regional dummies show that after controlling for other economic factors, entrepreneurship in Africa is not statistically different from entrepreneurship in Europe. However, in the Middle East, entrepreneurship is much lower than in Europe, suggesting that there could be specific regional factors, probably non-economic, explaining this difference.

Modeling entrepreneurship as a dynamic phenomenon

Entrepreneurship could be considered as a dynamic phenomenon. Due to localization economies, entrepreneurs establishing businesses create opportunities that attract other businesses either as suppliers or clients or even competitors. This increases the density of business activity in a specific area which in turn attracts even more firms. These relationships are empirically investigated by modeling entrepreneurship in a dynamic equation and estimating it using the Generalized Method of Moments (GMM) econometric procedure. Note, however, that in the context of slow-changing variables, GMM estimators could be imprecise due to information loss associated with first-differencing. With this caveat in mind, exploring the dynamic behaviour of entrepreneurship could provide interesting insights that the methods used so far cannot provide. The results of the estimation are presented in Table 6.

Table 6: Empirical results of the dynamic model

	Model 1	**Model 2**	**Model 3**
Entrepreneurship lagged	0.43*	0.44**	0.42
	(0.24)	(0.23)	(0.29)
Log GDP per capita	-19.90***	-17.65*	-17.17**
	(8.43)	(9.49)	(8.43)
Log GDP per capita lagged	16.58**	14.99*	14.09
	(8.69)	(9.25)	(9.18)
Log square of GDP per capita	1.12**	1.00*	0.94**
	(0.49)	(0.53)	(0.48)
Log square of GDP per capita lagged	-0.96**	-0.87*	-0.80
	(0.49)	(0.52)	(0.52)
Log agriculture value-added/GDP	-0.13	-0.01	-0.23
	(0.43)	(0.46)	(0.45)
Log services value-added/GDP	0.03	0.15	0.03
	(0.72)	(0.70)	(0.67)
Log number of procedures	-0.49		
	(0.30)		
Log time to register a business		-0.28**	
		(0.13)	
Log cost to register a business			-0.17
			(0.15)
Time dummy variables			
year 2005	0.27	0.31	0.27
	(0.24)	(0.24)	(0.22)
year 2006	0.53***	0.55***	0.50***
	(0.21)	(0.20)	(0.19)
year 2007	0.59***	0.59***	0.57***
	(0.18)	(0.17)	(0.15)
year 2008	0.37***	0.37***	0.36***
	(0.11)	(0.10)	(0.10)
Wald Chi2 (12)	153.03***	135.87***	149.67***
Observations	281	281	277
Autocorrelation of order 1 (Probability)	0.18	0.18	0.27
Autocorrelation of order 2 (Probability)	0.10	0.12	0.12

Note: Standard errors in parentheses are White (1980) heteroskedasticity-consistent. ***, **, and * correspond to 1%, 5% and 10% significance level, respectively. The reference groups are Europe for region and 2004 for year dummies.

Comparing Tables 5 and 6, some variables lose their explanatory power when the GMM estimation is used. This is expected given the slow variation of several variables. For example, a country does not experience important changes in its GDP composition in a one-year interval. Similarly, in many countries, the three variables used to capture the ease of doing business are usually fixed with one-off changes, if any, every few years.

Despite these data limitations, the positive sign and significance of the lagged dependent variable suggest that past values of entrepreneurship influence current flows implying a cumulative process. According to the results in Table 6, past rates of entrepreneurship account for about 40% of the current rate, giving some credence to the hypothesis of network effects. Income per capita and its squared value have the expected signs and both variables are significant. The threshold income per capita where entrepreneurship starts increasing with income is $7,250, which is almost equal to the value of $7,300 determined on the basis of random effect models.

5. Conclusion and Policy Recommendations

This study has focused on the relationship between entrepreneurship and income per capita. According to the econometric results, the increase of income per capita could lead to the reduction of survival entrepreneurship but this effect takes place when income reaches a threshold of $7,300, which falls within the World Bank's upper middle income group. Economic transformation particularly the modernization of the agriculture sector should also help in the process of fostering entrepreneurship. It is surprising that the econometric results failed to establish a strong relationship between the services sector and entrepreneurship even though the two variables are positively related, as expected. There is evidence that for example, the development of the mobile telephone industry in Africa has created a large network of enterprises in the services sector. In 1999, by the time the Kenyan telecommunication sector was liberalized, the country had 15,000 mobile telephone subscribers. By the mid-2006, this number had jumped to 5.6 million subscribers. According to the Kenyan government's Economic Survey for 2005, the expanding small business sector created 437,900 new jobs just in 2004, mainly thanks to the spectacular development of the mobile telephone sector.[22] Most African countries are experiencing a mobile telephone revolution that should be harnessed to increase entrepreneurship.

Improving the business climate provides another avenue for fostering entrepreneurship development. For example, conservative estimates show that just removing two of the 18 procedures needed to register a business could result in the creation of close to 1,000 additional limited liability firms in Uganda in just one year. Given how relatively simple it is to take such action, this is a strong message. Even though Uganda cannot be expected to move from 18 procedures to just one as in Canada and New Zealand in a short period of time, the example of neighboring Rwanda shows that it is possible to substantially reduce this hurdle.

In terms of policy, the convex relationship between income per capita and entrepreneurship suggests that the number of opportunity entrepreneurs would start to increase when income per capita reaches a threshold level estimated at $7,300. The implication for African

[22] See http://media.mit.edu/ventures/EPROM/whyafrica.html

countries is that it may take several years of sustained economic growth to reach this average level of income. Hence, African countries where necessity entrepreneurs dominate the business landscape should accept to live with them instead of attempting to transform them into opportunity entrepreneurs. Instead, policymakers should devise specific policies that address the most pressing needs of necessity entrepreneurs such as their access to credit and infrastructure services. Furthermore, in order to foster entrepreneurship, the education system should be reformed to respond better to the needs of the economy. Encouraging vocational training and apprenticeship is one of the aspects of educational reforms that could have a long-lasting effect on entrepreneurship in Africa. According to empirical research on developed countries, most entrepreneurs use their practical skills previously acquired through apprenticeship rather than their academic training, to establish their own enterprises (Robson, 2007). The generalized practice of apprenticeship in Germany, for example, is credited to be at the basis of the country's economic success; the rate of youth unemployment in the country is half of the rates in the UK, France and USA.[23] African countries should also take advantage of the opportunity created by the information technology revolution taking place throughout the continent. Mobile telephony is revolutionizing communication and business practices in Africa and this new development has the potential to create millions of businesses across the continent. A success story such as Kenya's should be replicated in other countries.

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[23] http://www.bbc.co.uk/news/14185334

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