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ENTREPRENEURSHIP ACROSS COUNTRIES: THE IMPORTANCE OF SUBJECTIVE PERCEPTIONS AND REGIONAL DIFFERENCES

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Entrepreneurship across countries:

The importance of subjective perceptions and regional differences*

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Abstract

Using a panel model with 52 countries and multiple years, we test the influence of perceptual variables over the country-wide entrepreneurship levels. The models introduce macroeconomic and institutional indicators to control for country effects. We also propose a segmentation of the sample into three groups of countries: Latin America, Africa and the rest of the world. As these three "regions" appear to have enough structural or institutional differences to cause a divergence in the entrepreneurship levels.

It is found that institutional factors traditionally regarded as crucial for the promotion of entrepreneurship such as red tape, taxes and credit availability (among others), do not result in significant regressors. In contrast, perceptual variables appear to be highly significant. The results suggest that further research is required to shed light on what are the signs of a good economy to the eyes of potential entrepreneurs. A better understanding of these links is the key to an efficient growth promotion for governments globally.

J.E.L.: L26, O5, O21, O170.

Key words: entrepreneur, panel data, Schumpeter.

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Content

I. Introduction

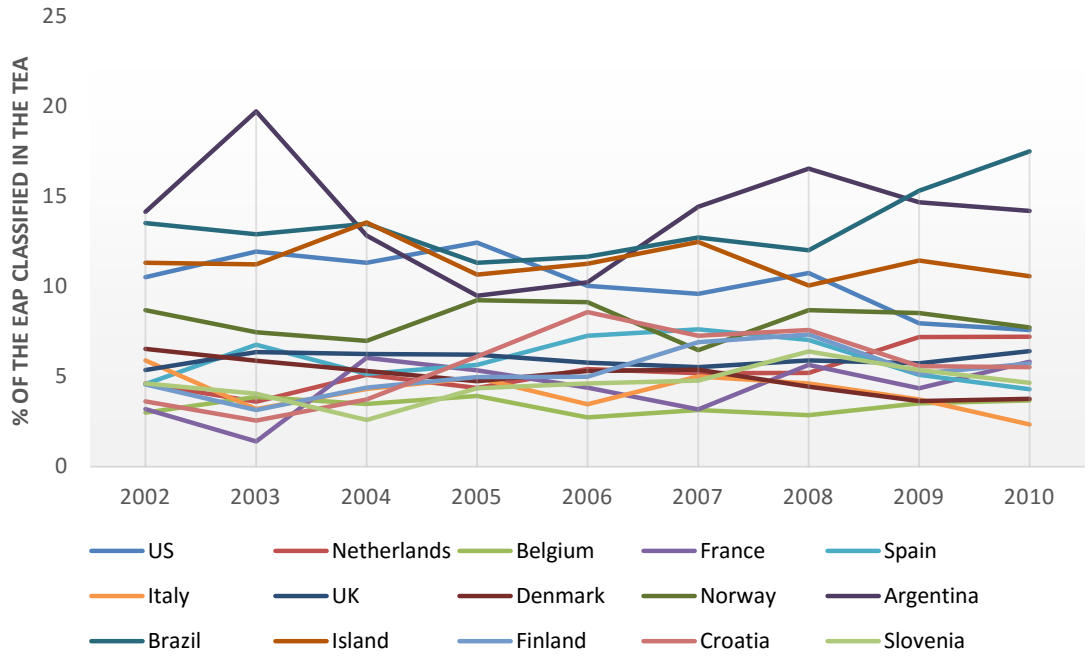
This paper is organized into four sections; the first presents a summary of relevant background in modeling of entrepreneurship and specifically modeling of the TEA. The second details the data selection and a modeling proposal. The third section discusses the results and the fourth section presents the final conclusions.

Over the last decades, entrepreneurship has been the subject of growing research efforts. An important fraction of those efforts have been focused on understanding, both theoretically an empirically, the influence entrepreneurs have on economic activity and economic growth.

The relationship between the results of entrepreneurial activity and economic growth was addressed by Schumpeter (1934) in his economic cycle theory. Later, a number of initiatives focused on the main determinants of this phenomenon have emerged. The GEM Consortium (Global Entrepreneurship Monitor) and its Global Entrepreneurship Report is one of them. The report studies entrepreneurial dynamics of a broad sample of countries. The social and economic importance of entrepreneurial activity have generated a research field with the goal of determining the main characteristics of entrepreneurship, its determining factors and the channels in which they operate.

According to the GEM (2010), Total Entrepreneurial Activity (TEA) variable *"represents the activity of new dynamic firms. Even when an important part of those nascent ventures do not have success as a business, their actions could have a beneficial effect over the entire economy, while the threat of new entries and more competition can put pressure over the established firms enough for them to improve their performance"* (GEM, 2012). Figure 1.1 shows the volatility of the TEA for the period 2002-2010 and a sample of 15 countries.

Figure 1.1. Total Entrepreneurial Activity (TEA) (2002-2010)



Source: developed by the author with data from the GEM

This paper uses a panel regression with 52 countries and the TEA as the dependent variable. Under alternative specifications, we try to determine if entrepreneur's decisions are mainly driven by objectively measurable indicators: taxes, credit availability, years of formal education, number of days required to register and open a new business, number of already established businesses (potential competition) in the area, and other macro-indicators. We will refer to these as "traditional variables". Or if on the other hand, these variables are uncorrelated with the perception of opportunities.

This approach is consistent with more recent streams of thought in entrepreneurship literature stressing this phenomenon cannot be explained only by looking at the differences between individuals within the same economy. Instead researchers should be focused on the process from where opportunities for new ventures originate, the available information about those opportunities, and the interpretation and use of that information individuals can actually make.

For Venkataraman (1997) and Eckhard & Shane (2003) most of the theoretical work on entrepreneurship has defined the activity as a function of entrepreneur's individual characteristics, ignoring the role of opportunities. And there are have compelling arguments to think the perception of opportunities could have nothing to do with these "traditional variables".

For Eckhard & Shane the exploitation of available opportunities is directly linked with the quality and homogeneity of information about a given market. And it might be difficult to explain entrepreneurship in a market equilibrium setting, which assumes a perfect flow of information, common to every agent in the market.

They point out two central ideas: 1) perfect information involving signaling through market prices can actually be of little help for deciphering the trends of markets or products that don't yet exist. And 2) information must be asymmetrical or at least different individuals need to have different interpretations or the flowing signals, otherwise there would not people bringing innovations to the market that no other individual had envisioned before.

In this regard, a tax rate for example is known by every relevant agent in the market and is it very unlikely for its fluctuations to stimulate innovation. A tax cut might take a person to start a business because she already had an idea but was not profitable at the previous tax levels. Shane (2000), based on (Kirzner 1973), takes this even further and states that: *"information asymmetry is necessary for entrepreneurial opportunities to exist, everyone in society must not be equally likely to recognize all opportunities. Rather, only a subset of the population is able to recognize any particular opportunity at any particular point in time."* (Shane. 2000, p. 451).

Differences among individuals can still have certain impact on entrepreneurship, but more in terms of determining how opportunities are implemented than in terms of explaining how opportunities arise. This can be inferred from Venkataraman (*Op. Cit*) who refers to authors like Kirzner (1985), Nelson & Winter (1982) and Arrow (1974) to support the notions of these skills and insights as *"acquired through each individual's own circumstances including occupation, on the job routines, social relationships, and daily life"*. He refers in particular to Hayek's (1945) article about the use of knowledge in society and recalls that no two individuals have the same knowledge about the economy.

In the results of this paper, there was no empirical evidence supporting the "traditional variables" as key determinants explaining a country's entrepreneurial level. Rather, higher significance levels are achieved when we estimate the model including the a subjective dummy

variable that takes the value of 1 if an individual perceives there are good opportunities to start a new profitable business, and 0 otherwise. Since this is a country-level regression, the variable is entered as the % of the economically-active population (EAP) that perceives opportunities.

These results could also be supporting Schumpeter's entrepreneur framework, which describes an individual guided by his own risk awareness, expectations and other capabilities (perhaps innate) who is capable of overcoming the market barriers generally confronted by the pioneers of new industries (i.e. credit constraints).

A second finding is that classifying economies according to their geographic region (Latin America, Africa and Rest of World) explains the behavior of the TEA more satisfactorily (in terms of the overall performance of the model and statistical significance of the regressors) than the classification proposed by Porter, Sachs & McArthur (2002) into resource, efficiency and innovation-based economies. We suggest the hypothesis that Africa and Latin America hold opportunity costs associated with starting a venture that are relatively lower than those in developed countries, where there are possibly better job opportunities and wages, which affect the decision of whether or not to start a business. The last is an element that requires further study; in particular it opens the possibility for including opportunity costs and entrepreneurs preferences when examining the impact of public policies stimulating entrepreneurial activity.

It is important to clarify that the main purpose of the models developed in this article is not to explain the process from which opportunities emerge, but test if the individuals' perception of those opportunities is really a determining factor of the TEA.

1.1. Entrepreneurship in the data

Government decision-makers, seeking to actively promote firm formation as a policy against unemployment and in favor of long term economic growth, have always been interested in identifying factors that can (and cannot) explain entrepreneurial activity. Empirical research is abundant but mainly focused on the effect of more traditional variables.

Block & Sandner (2009) use two Probit models, one estimating the probability of being an opportunity entrepreneur and the other measuring the survival rate of a start-up (or new form). Using data from the German Socio-Economic Panel (GSOEP), they find that the probability of belonging to the group of opportunity entrepreneurs increases with the level of financial resources available, like household income. The variables "duration of unemployment" and "educated in this profession" (profession in which the venture operates) seem not to be decisive when classifying an entrepreneur. Age is not subject of a clear interpretation. The test about the joint significance of industry associated variables (type of industry) resulted also in no statistical significance. The authors conclude *"that the mere fact that an entrepreneur has started its business for opportunity or necessity reasons does not have a significant impact on his duration in self-employment"* (Block & Sandner, *Op. Cit.*, p. 7). Also, the region where the venture is started is started does not seem to have any effect on its survival, neither have any effect family variables such as being married or having children, however, sex seems to play a determining role, with men having a high probability of survival in their ventures.

Wong, *et. al.* (2005) recognize the importance and great influence of Schumpeter's conceptual contributions in stablishing a direct relationship between entrepreneurship and economic

growth. However, they affirm that "this theory, although influential, it's largely descriptive and difficult to formalize econometrically. Consequently, entrepreneurship is absent in most econometric models explaining economic growth" (Wong, *et. al. Op. Cit.*, p. 336). For them, most of the research on the effect of entrepreneurship over economic growth has been carried without differencing the effects of technological innovation from new firm formation. They try to make the distinction using an augmented Cobb-Douglas production function and data form the Global Entrepreneurship Monitor (GEM). The absence of statistical significance of three of the entrepreneurship measures employed seems to point out that individuals starting their own business do not necessarily stimulate growth. This could be due to the GEM's entrepreneurship measures that define them as the creators or managers of a relatively young firm. While in congruence with Schumpeter's theory, a simple manager does not represent an entrepreneur nor every firm created born from new technology; therefore the employed variable might not be the most appropriate.

Some of the works have taken entrepreneurship data to a "macro" level. For example, Klapper, Amit & Guillén (2010) try to measure entrepreneurship trough new firm creation, and look for a relation between firm creation and development indicators for a sample of countries, where they include both developed and developing countries.

They define entrepreneurship as *"the activities of an individual or a group of individuals whose aim is to start economic activities in the formal sector under a legal form of business"* (*Op. Cit.* p. 131). In order to compare data from different countries, the specific number of limited liability firms or its legal equivalent is measured in each country, regardless of firm size. For the same reason, the study considers only the private and formal sector of the economy (not meaning that informal activities do not contribute to economic growth). The sample comprehends data from 101 countries for the period 2000-2008.

They elaborate from the panel data, an econometric model to identify predictors of entrepreneurship at country-level. As dependent variables they use three firm entry and density rates. And as explanatory variables they include the number of processes needed to start a business (as a proxy of entry barriers), and indexes of governance and employment rigidness. As control variables they set the per-capita GDP and the domestic credit/GDP ratio. Two estimation methods where used: random effects generalized least squares (GLS) and generalized estimating equations (GEE), to this last method it was added a tendency control variable.

Klapper, Amit & Guillén (*Op. Cit.*) conclude that new firm's entry and density rates are significantly related with national growth and development indicators (however, they do not determine the causality direction and suggest this as area for further studies). Also, they found that the business environment, including red tape required for starting a firm, credit access and political corruption affect firm creation, independent of the country's level of development.

Bednarzik (2000) uses data about emergence, expansion, contraction and closing of firms in the United States and Europe trying to determine the net effect of this process, which Schumpeter called "creative destruction", over employment generation. They conclude that this process seems to have support in the data at least in the US. Over the period 1995-1996, the born of new firms generated 5,908,300 jobs in the US, while the closing of other firms implied the losing of 4,995,220 jobs; firm expansion contributed with 10,284,770 new jobs, and there was a 9,330,600 job loss due to firm contractions. In net, the process generated more than 1,800,000 jobs. For Europe the net effect is not that significant compared to the

number of jobs implied in the study, suggesting that entrepreneurship can have different effects across regions.

Arenius & Minniti (2005) investigate directly the role of perceptual variables at an induvial level. They test whether the intention of starting a new business is correlated with a person's opinion about his own skills, risk aversion (or fear to failure as defined by the GEM), and opportunities available. These three variables appear to have a significant impact over the potential entrepreneur's intentions, regardless of the gender.

Arenius & Minniti (*Op. Cit.*) suggest that one of the two ways their work could be extended is by investigating the effects of country-specific macroeconomic conditions over entrepreneurship. This includes the level of development and some institutional conditions for example. The present paper explores some of those effects and with a broader sample of countries.

Some of the variables originally postulated by these pioneering authors, like credit access, new firms creation and firm density will also be included in this paper. As well as variables proposed by other authors in the next section that were trying to specifically describe the TEA. In order to contrast them with the GEM's opportunity perception.

1.2. TEA Modeling

Other authors have attempted explanatory models specifically for the TEA. For example Winata (2009) uses a Bayesian Model Average (BMA) on a panel of 33 countries and finds that traditional variables like credit access, taxes, ted tape cost and education are determining factors of the TEA. Kyejjusa & Bazibu (2012) study education as the explanatory variable of the TEA in Uganda, resulting in a model with a poor fit (adjusted R2 of 0.6% in a lineal regression).

Gordon (1998) determines that high personal income taxes can encourage entrepreneurial activity. These taxes can be so high (higher than corporate earnings taxes) that it places an incentive for high-income individuals to reclassify their income as corporate earnings, thus creating new firms. Again, new firm creation does not imply that these engage in new economic activities, in other words, a new firm does not imply innovation.

Pete *et. al.* (2010) use a logit model to estimate the probability of an individual in Romany becoming part of the TEA. The model uses as explanatory variables age, sex, education, income, perception of opportunities, knowledge of other entrepreneurs and the perception of the media coverage that entrepreneurship receives, and the influence of specific skills in the area of the venture over the success of the last. Authors discard education as a significant regressor, while they maintain the perception variables (skills and media promotion), along with the income, age and sex.

Bosma *et. al.* (2005) base their work on a sample constituted by the EuroEAPn Union countries and other "Anglo-countries" outside the Union. They find using a correlation analysis that variables such as the preference for being self-employed, national acceptance of entrepreneurial activities, having met other entrepreneurs in the past 2 years, perceiving good opportunities for starting a business in the next 6 months, and a good perception of their own skills for venture are associated with high levels of TEA, while counting with high indexes of labor protection is associated with lower levels of TEA.

Chepurenko, Gabelko & Obraztzova (2011) argue that per-capita GDP does not seem to successfully resume the environmental conditions for entrepreneurship that an individual can find. Also, that the GEM classification in factor, efficiency and innovation-driven economies is a generalization that excludes important institutional characteristics of the nations, for example how early was the capitalist or free-market system introduced in a given country, authors emphasize this characteristic because while they count with data from a GEM panel, the study is focused in Russia. They find that *"Detailed statistical analysis shows that some early stage entrepreneurial activity determining factors proved by numerous studies over the last decades for 21 developed economies do not* statistically significant influence entrepreneurship in younger market systems like Russia" Chepurenko, Gabelko & Obraztzova (Op. Cit., p. 20-21). They use inflation, per-capita GDP, an index of history as a capitalist nation, the GEM classification of economies, and the Doing Business Report index for grouping the countries in 3 clusters (average TEA, lower-than-average and higher-than-average). They determine that the younger (but with accelerated growth) a given market-based economy is, a higher TEA level can be expected. While countries with old and well-established markets, provide less incentives for ventures amongst their population.

Castro, Maydeu & Justo (2005) discuss the limitations of the TEA and its actual estimation method, two of their critics are the polarization in two groups: entrepreneur or non-entrepreneur (inside or outside the TEA), which ignores the existence of different degrees of entrepreneurship; and the lack of attention that the business environment receives as a determining factor of the TEA that could be a component of a more comprehensive version the index. The authors construct a model including the influence of the business environment as a determinant of entrepreneurial activity, this environment being also determined by the perception of individuals about the opportunities for starting a venture in the next 6 months, and the fact of having known an entrepreneur in the last 2 years. These two variables were significant in defining a measure of the entrepreneurship-environment and that measure or index also resulted significant as a determinant of the TEA. Gómez, Veciana & Urbano (2009) also find that opportunity perception for starting a business results in a significant regressor while modeling the TEA.

The great difference in the TEA across groups of countries was addressed by Acs et. al (1994), they argue that after controlling for a group of explanatory variables, a negative relationship between entrepreneurship and economic development persists. A similar relationship will be identified and modeled in the next sections for explaining TEA differences not just between less and more developed countries, but also between specific geographic regions (Latin America, Africa and the rest of the countries in the sample). The specific case of Latin American entrepreneurs was treated by Amoros and Cristi (2008), they argue that those entrepreneurs face institutional restrictions to start a venture that is actually based on innovation; furthermore, they state that innovation in countries from that region is concentrated in the larger companies.
Acs & Amoros (2008) claim that the higher TEAs exhibited by middle and low income countries, in relation to their more developed counterparts, is due to the fact that in these countries a large proportion of the population is unable to find employment in a firm already established.

It is very important to notice that the results obtained by the authors discussed, especially Pete *et. Al* and Bosma *et. al.* are consistent with the findings of this work, but they were constrained in scope to Romany and Europe respectively.

II. Methodology

2.1. Origin of the main variable (TEA)

This section describes the origin of the TEA, and the survey from where the TEA and other relevant variables for the modeling in this work are extracted. The Global Entrepreneurship Monitor (GEM) conducts surveys in a great number of countries to determine both the conditions of the actual ventures and the conditions or opportunities to pursue ventures in the short term.

The GEM applies surveys to a sample of the adult population (these surveys are denominated APS) and to a group of experts (these are called NES) from each country. For the APS the GEM randomly selects a sample of 2000 individuals (as a minimum), and 36 experts, also from each country. These surveys are intended to extract data that permit the quantification the relations between national economic growth and entrepreneurship; entrepreneurship however is quantified according to the GEM model, in which the last depends on the attitudes, activities and entrepreneurial aspirations; these characteristics are measured using the APS through questions about the perception of opportunities for starting a business in the next years, the status of self-employment as a desirable career or the respondent's intentions for stablishing a new business. Questions of this sort are accompanied by other respondent's attributes as his education level, age and income bracket among and others.

The APS seeks to identify the activities, attitudes and aspirations for entrepreneurship in adults of working age. As a part of measuring the attitudes, the perception of the entrepreneurial opportunities that surround them is asked, as well as their own abilities to undertake ventures. Within the aspirations, expectations for growth and innovation are queried. Identification of activities focuses on the collection of information on respondent's concrete efforts to start or help to start ventures, its duration and characteristics, as well as their reasons for quitting them.

Once the data has been compiled, the GEM used them to generate a series of indexes, one of those being our variable of interest, the TEA. This variable, as indicated, consists of the sum of nascent entrepreneurs and new business owners. By nascent entrepreneur, the GEM refers to an individual who commits resources to start a business which has the expectation of owning, while the owner of a new business is the one who runs a business and has been paid wages for more three months but not more than 42 months.

The success of the ventures depends on its competitiveness, the APS is also responsible for measuring competitiveness with questions such as the percentage of clients located abroad (export capacity), the level of innovation of the goods or services provided, the existence of businesses offering the same service and obsolescence of the technology used in the production process (innovation). Conditions at a more macro level as market opening, the physical and legal infrastructure, transfer of R & D, availability of financing and government policies, among others, that help explain the level of entrepreneurship in a country are extracted from the NES.

The economies included in the study are classified by the GEM into three categories, based on the work of Porter, Sachs & McArthur (*Op. Cit.*):

A) Factor-driven economies (FDE), *"These economies are characterized by low institutional, educational and infrastructural development. Consequence of this is the low cost of labor. Its*

exports are mainly based on the exploitation of natural resources and agricultural crops which provide the livelihood for the majority of the population" (GEM. 2013, p. 14).

B) Efficiency-driven economies (EDE) *"are characterized by the existence of investment in infrastructure and a government framework that facilitates doing business. The products and services generated are more elaborated, and although they do not have an important differentiator, are prone to the presence of strategic alliances that allow the assimilation of new technologies and improving the existing"* (Ibid).

C) Innovation-driven economies (EDE), *"These economies have already passed the previous two stages, and have higher institutional, financial, infrastructural, and of course, educational conditions. Thus, their critical entrepreneurial mass is characterized by the ability to produce innovative goods and services using advanced technological means, generating a significant entrepreneurial activity in dynamic sectors"* (Ibid).

However, one must ask whether this classification receives empirical support. This paper addresses this aspect and proposes an alternative approach for clustering.

The 2012 survey is comprised by 69 countries; in the first group are located Egypt, Algeria, Palestine, Iran, Pakistan, Ethiopia, Botswana, Angola, Nigeria, Malawi, Uganda, Ghana and Zambia. The second group includes Russia, Tunisia, Lithuania, Macedonia, Malaysia, South Africa, Bosnia and Herzegovina, Croatia, Hungary, Romania, Poland, Panama, Mexico, Turkey, China, Latvia, Estonia, Uruguay, Trinidad and Tobago, Costa Rica, El Salvador, Brazil, Barbados, Namibia, Argentina, Thailand, Colombia, Peru, Chile and Ecuador. And the third category is comprised of Japan, Italy, France, Belgium, Germany, Denmark, Slovenia, Spain, Switzerland, Finland, Ireland, Sweden, Greece, Israel, Korea, Norway, Taiwan, Portugal, UK, Austria, Slovakia, Netherlands, Singapore and the United States.

2.2. Data selection and processing

To structure a database of national indicators, the starting point was the global GEM APS for the years 2010 and 2012. In order to have a database that allows the development of panel models, both global APS's were consolidated. For the above, only countries featured in both surveys were retained. The resulting database consisted of 52 countries with data for both years.

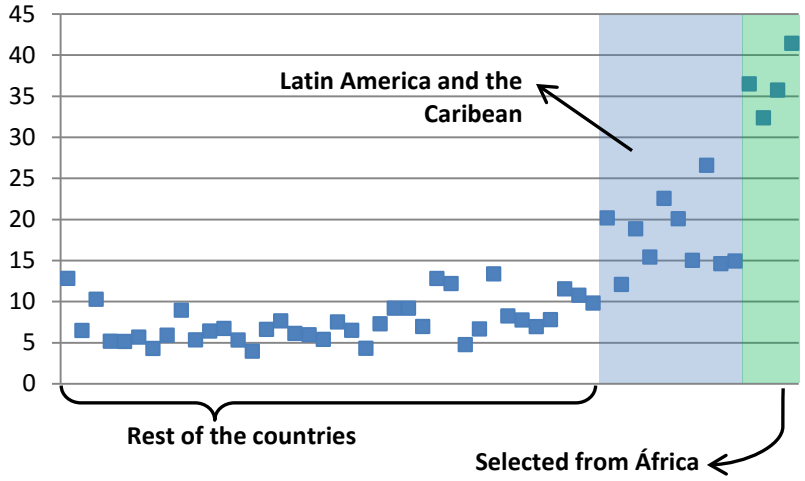
Among the countries with information for only one year, are Australia, Guatemala, El Salvador, Panama, Iceland, Montenegro, Saudi Arabia, Singapore, Thailand, Nigeria and Barbados, among others. One of the reasons for this, is that not all countries can afford to conduct the survey each year under the coordination and standards required by the GEM.

A set of economical and institutional information not covered by the GEM, was added following the line of work of several studies (Klapper, L., el Amit, R., Guillén, M. 2010, Kazuyuki, M. 2011, Block, J. & Sandner, P. 2009). It includes the real GDP adjusted for purchasing power parity, , population, average productivity (measured as the ratio of adjusted per-capita GDP and the number of employees), gross savings as a percentage GDP, the unemployment rate, average wage in USD, net foreign direct investment and domestic credit provided by the banking sector. These first variables come from the World Bank for the years 2010 and 2012 in USD. Information relative to new firm dynamics and associated economic conditions, from the Doing Business Report, was also included. Specifically, the credit access ranking by country, new registered firms, density of the new registered firms, number of procedures required to

start a business, time in days required for the formalities of starting a business, cost of registering a business as % of the per-capita GDP, a scale of law enforcement strength, and the average percentage of income tax. Except for the ranking of credit access, for which there is only the latest ranking, each variable was obtained for the years 2010 and 2012.

Finally, this paper uses dummy variables to identify relevant characteristics of an observation inside the panel, one of them is the year (0 for 2010 and 1 for 2012). Preliminary data analysis suggests that different geographical regions have distinctive characteristics in terms of entrepreneurship. To test this, dummy variables were generated to classify countries into Latin America and the Caribbean, selected countries from Africa and the rest of the countries in the sample. Figure 2.1 shows how countries in this database tend to be configured according to these three clusters.

Figure 2.1. TEA 2012



Source: developed by the author with data from the GEM

Table 2.2 describes the variables to be used in the modeling phase. Also, further detail on how they are used can be found in the modeling section. The list of 52 countries resulting from the overlap of the 2010 and 2012 surveys is detailed in the following paragraphs:

- Latin America and the Caribbean: Peru, Mexico, Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Trinidad and Tobago and Uruguay.
- Selected from Africa: Ghana, Angola, Uganda and Zambia.
- Rest of the countries: United States, Greece, Holland, Belgium, France, Spain, Italy, Switzerland, United Kingdom, Denmark, Sweden, Norway, Germany, Japan, Korea, Portugal, Ireland, Finland, Slovenia, Taiwan, Israel, Russia, South Africa, Hungary, Romania, Malaysia, China, Turkey, Tunisia, Lithuania, Latvia, Croatia, Bosnia and Herzegovina, Macedonia, Egypt, Pakistan, Iran and Palestine.

Table 2.1. Variables employed in econometric modeling

Variable code	Definition	Survey/Data-base origin
NOPROC	Number of procedures required to start a business	Doing Business Report
TDAYS	Time (days) required for the completion of the procedures required to start a business	Doing Business Report
INCOMETAX	Total tax rate (% on income)	Doing Business Report
GCRANK*	Credit access ranking	Doing Business Report
DENS	Number of new firms (limited liability) for every 1000 inhabitants with ages ranging between 15 and 64.	Doing Business Report
NEWDF	Number of new registered firms (limited liability)	Doing Business Report
S	Gross savings as % of GDP	World Bank Data
FUTSUP	% of EAP** expecting to start a business in the next 3 years	APS Global
OPPORT	% of EAP** considering good opport. For starting a business in the area they live	APS Global
ESTBBU	% of EAP** with an income-generating business more than 3.5 years-old	APS Global
TEA	% of EAP** classified in the TEA	APS Global
TEAEDHI	% of EAP** classified in the TEA with a post-secondary degree	APS Global
FDE	Dummy (factor-driven economy)	APS Global
EDE	Dummy (efficiency-driven economy)	APS Global
IDE	Dummy (Innovation-driven economy)	APS Global
RGDP	Real per-capita GDP adjusted by purchasing power partity	World Bank Data
LATAM	Dummy (Lat. Am. or Caribean country)	Author's construct
AFRICA	Dummy (less developed countries in Africa)	Author's construct
REST	Dummy (rest of GEM countries)	Author's construct
HIGH_TEA	Selection of countries with high TEA not belonging to Africa or Lat. Am.	Author's construct
WAGES	Average wage in US$	UNECE
UNEMP	Unemployment rate	World Bank Data

* Only variable not comprised by two points in time (2010 and 2012), corresponds to the last version of the ranking published in March, 2014.

** EAP (economically active population or labor force) defined here has population with ages ranging between 18 and 64.

Source: developed by the author with data from the GEM, Doing Business Report, Europe Economic Commission for the United Nations (UNECE) and World Bank.

2.3. Modeling

The modeling in this paper uses a base model, from which different specifications are derived to test various hypotheses. This base model is a Least Squares Panel Model. Equation (1) describes the model, in which the subscript t indicates the year.

$$TEA_t = C + \beta_1 \cdot X_t + \beta_2 \cdot P_t + \beta_3 \cdot CTRL_t + \mu_t \qquad (1)$$

The TEA represents the dependent variable, C is a constant, $\boldsymbol{\beta_i}$ (i=1,2,3) are coefficient vectors and μ represents the error term, which is assumed as white-noise. **X** is a vector containing the different "traditional" explanatory variables and **P** represents the subjective perceptions proxy from the GEM. Finally **CTRL** contains the control variables (GDP values or dummies used to cluster the countries in the sample).

There are 11 models reported, simply called from "M1" for Model 1 to "M11" for Model 11. In order to provide an initial overview of the models, its focus of analysis, as an explanation of the TEA's behavior is indicated below. And the relationships being tested are summarized. The results of each of the estimates are discussed in the next section.

- **M1:** This model tests structural changes occurred between 2010 and 2012 affecting all countries. It makes use of a dummy variable that takes a value of 1 if the observation comes from a 2012 survey and 0 if proceeds from a 2010 survey. Additionally it includes a constant and the real per-capita GDP (adjusted for purchasing power parity) as a control variable. A negative coefficient associated with GDP is expected, this because in developed countries possibly the opportunity cost of starting a new business is higher due to better working conditions (higher wages, insurance and many others).

- **M2:** This model discards the year associated effect, and focuses on testing the role or influence of credit availability, taxes and red tape on entrepreneurial activity. It includes as explanatory variables the domestic savings rate, the average income tax, the number of procedures required to register a new firm and the time in days required for these procedures (maintains the constant and the control variable from M1). A positive coefficient associated with savings is expected (high gross savings could translate into greater financing availability for entrepreneurs), a negative coefficient associated with the tax rate (as a disincentive to the generation of profits) and negative coefficients associated with the number of procedures and time in days are expected (excessive red tape could drive people to start or register a firm).

- **M3:** It analyzes the extent to which factors associated with business demographics or dynamics affect entrepreneurship. It uses the number of new limited liability companies registered during the year as well as the density of these firms (number of new firms per 1000 inhabitants). Maintains constant and control variables of M1 and M2. In this case, there is not any particular sign expected for the coefficients associated with these variables. On one hand, while a larger number of firms could serve as an indicator of a success "wave" in some industry (or industries), like the ones described in Schumpeter's (1934) work, generating an incentive start a business. On the other hand it could also mean more intense competition and less space for success for a new business.

- **M4:** Focuses on the topic of credit, more than its availability, is tests the influence of the degree of access to credit, measured by the access to credit ranking of "Doing Business Report" (DBR). This variable was not incorporated into M2 as the degree of access to credit depends not only on the tape; but the effectiveness of the mechanisms of identification,

dissemination and effective transfer of resources to the target market of the supply of credit (end entrepreneurs). In different financial systems that mechanism is divided and different levels of banking have various roles (for example development banks assign a particular portfolio which can be channeled through various institutions of a secondary or tertiary level). This ranking places at the top nations with greater access to credit, therefore it is expected for the coefficient associated to this variable to be negative, as entrepreneurs from economies located in the last positions of the ranking face more credit constraints and therefore fewer possibilities for funding their start-ups.

- **M5:** Model 5 seeks to establish whether there is indeed a relationship between the number of people who report being interested in starting a venture, and the actual number of entrepreneurs. To test this, the FUTSUP variable (percentage of EAP planning to start a business over the next 3 years) is used. A positive coefficient associated with this regressor is expected, also expecting for an economy with a higher percentage of its population developing plans and expectations for future endeavors, to be more prone to the materialization of start-ups.

- **M6:** The FUTSUP variable used in M5 can be seen as an indicator of the intensity of the incentives that exist in every country for starting a business, but it cannot be considered *per se* as a determinant factor. For this reason, M6 tests other variables detached from GEM surveys as determinants; that have been discussed by various authors and might affect (or not) the decision of starting a venture. Specifically, the model evaluates education levels (% of individuals in the labor force who are also ranked within the TEA and with higher education), recent past success experiences of ventures competing in the open market (% of that population who owns a business that has been generating any income for the last over 3.5 years) and the perception of opportunities to start a business (measured as the % of the labor force considering that there are good opportunities for starting a business during the next 6 months in the area they live). Regarding opportunities and the past success, a positive coefficient is expected for both variables (both are incentives to start a business). With regard to education, however, the effect can be considered ambiguous. First, a higher educational level might suggest individuals more prepared to understand the socioeconomic dynamics and mainly to develop a product or service in their area of specialization; moreover, higher skills involve more and better employment opportunities, which could drive these people away from starting their own business.

- **M7:** Is based on M6, and focuses on the factors that proved to be significant regressors explaining a relevant fraction of the TEA's variability across countries (opportunities and success of past ventures). In this case, the GDP is replaced as a control to attempting to verify whether the categorization GEM in factor (FDE), efficiency (EDE) and innovation-driven economies (IDE) actually represents a good control on the subject of entrepreneurship. Since this classification should be tested through categorical variables, only the dummies for EDE and FDE are included.

- **M8:** Focuses on our proposal to organize economies by region. This would be consistent with a structural hypothesis: Economies of the same region share some structural characteristics specific to that region (factors that affect, as a whole, entrepreneurship: necessity, institutions, political environment, opportunity costs, and others) that differentially affect start-ups: Latin America, Africa and the rest. For this purpose, M8 makes use of the categorical variables AFRICA and LATAM described in Table 2.1. Egypt and South Africa are not classified within the variable Africa since they have characteristics more consistent with those of the "rest" of the countries, and do not allow the proper isolation of the African "outliers" effect. Due to a lower

opportunity cost for starting a venture and other idiosyncratic factors, positive coefficients are expected for AFRICA and LATAM, it is also expected for the AFRICA coefficient to be larger than LATAM one, reflecting the situation shown in Figure 2.1.

- **M9:** Designed to test the hypothesis that higher TEAs in Latin America and Africa are due to major difficulties to find employment in existing firms in those regions, so looking for an option of self-employment (a form of entrepreneurship) is the only alternative for the subsistence of many people. To verify this, the unemployment rate in each country is included as a determining factor. A positive sign associated with unemployment is expected.

- **M10:** is designed to test the alternative hypothesis that wages are on average higher in developed economies, so the opportunity cost of rejecting a remunerated job in order to pursue a personal business is higher, leading to lower TEAs for the countries in this group. M10 has a great limitation in relation to other models proposed in this work that is not having a database of comparable average wages for the 52 countries in the original panel sample. Therefore, the estimate should be conducted with a smaller sample, thus having 104 observations in M1-M9 but only 53 in M10. Beyond the smaller size of this sub-sample, it also does not include countries in Africa or Latin America; and so it is not possible to include variables the LATAM and AFRICA. This however does not limit the feasibility of proving a negative relationship between the opportunity cost (linked to development) and the TEA, as even within the group of countries labeled as "other" variability in their levels of TEA and salaries is presented. The sign associated with wages is expected to be negative.

- **M11:** This model seeks to generalize results making use of a panel broader in terms of time horizon. To achieve this all the global GEM databases are compared to identify countries with a continuous data series (for the variables of interest) throughout the 2002-2010 period. This data panel covers a larger period of time, but African countries are not included since none of them had continuous data for the 2002-2010 period TEA; therefore a variant of the proposed classification, now divided in developed countries with unusually high TEAs (HIGH_TEA), Latin America (LATAM) and other countries was used. The countries in the HIGH-TEA group are the United States, Norway and Iceland. As with LATAM, a positive coefficient associated with HIGH_TEA expected. Bednarzik (2000) had already found that the U.S. TEA, for example, was much higher than that of European countries.

III. Results

Table 3.1 shows the results for the first 8 studied models. The table reports both the coefficient associated with each regressor, and its significance, as well as the overall fit of the model (using the adjusted R^2 as a measure of fit).

In general, only the perceptions proxy and the control variables resulted in significant regressors (and the perceptions appear not to be correlated with the traditional variables). The only objectively measurable variable with a considerable explanatory power is the success/survival of past ventures indicator (ESTBBU). And in terms of the control variables, differentiating between Latin America, Africa and the rest of the countries increases considerably the fit of the model with respect to the case were economies are classified in factors, efficiency or innovation driven ones.

If we analyze each individual model, **M1** discards a relevant general change in entrepreneurship levels from 2010 to 2012. It also presents the GDP as a significant control variable (and with the expected sign).

Table 3.1. Alternative modeling's explaining the TEA value among the panel

	Models							
Variables	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
C	18.6400 (* , **)	16.9547 (* , **)	16.6968 (* , **)	21.1201 (* , **)	-2.1732	0.9367	-4.3710 (* , **)	3.1500 (* , **)
ANODUMMY	1.3924							
RGDP	-0.0004 (* , **)	-0.0003 (* , **)	-0.0004 (* , **)	-0.0004 (* , **)	0.0001 (* , **)	-0.0002 (* , **)		
S		0.0380						
INCOMETAX		-0.0554						
NOPROC		-0.0065						
TDAYS		0.0727 (*)						
NEWF			0.0000					
DENS			0.2418					
GCRANK				-0.0274				
FUTSUP					0.4894 (* , **)			
OPPORT						0.2513 (* , **)	0.2234 (* , **)	0.0898 (* , **)
ESTBBU						0.4515 (* , **)	0.4656 (* , **)	0.1590 (* , **)
TEAEDHI						2.7441		
EDE							3.7043 (* , **)	
FDE							6.9612 (* , **)	
LATAM								7.8265 (* , **)
AFRICA								21.2622 (* , **)
R^2 (Adjusted)	33.23%	31.55%	31.23%	33.79%	83.82%	76.56%	74.49%	87.49%

* indicates 10% significance, ** indicates 5% significance.

Source: developed by the author.

Table 3.2. Proposed models for explaining the difference in the general TEA levels across regions (panel comprising the period 2002-2010)

Model 9 (M9), variant including unemployment			**Model 10 (M10), variant including wages**			**Model 11 (M11), M8 variant applied to a 9 year panel**		
Dep. variable: TEA			Dep. variable: TEA			Dep. variable: TEA		
Method: Panel Least Squares			Method: Panel Least Squares			Method: Panel Least Squares		
Obs.: 104			Obs.: 53			Obs.: 135		
Variable	**Coef.**	**Prob.**	**Variable**	**Coef.**	**Prob.**	**Variable**	**Coef.**	**Prob.**
OPPORT	0.115	0.000	C	3.465	0.002	C	2.296	0.000
ESTBBU	0.225	0.000	ESTBBU	0.382	0.001	OPPORT	0.027	0.021
UNEMP	0.154	0.000	OPPORT	0.083	0.001	ESTBBU	0.263	0.000
LATAM	7.948	0.000	WAGES	-0.001	0.001	LATAM	7.404	0.000
AFRICA	20.061	0.000				HIGH_TEA	3.607	0.000
R^2	88.68%		R^2	33.82%		R^2	82.71%	
R^2 (Ajust.)	88.22%		R^2 (Ajust.)	29.77%		R^2 (Ajust.)	82.18%	

Source: developed by the author

According to **M2**, tax and savings rates, as well as the number of procedures required to legally open a business all have the expected sign, but show no significance. Only the number of days required to register the business showed significance (at the 10% level), but it has a contradictory sign: the longer it takes to set up shop, the higher the TEA. None any of the firm demographics indicators tested in **M3**, nor the credit access from **M4** resulted in significant regressors either.

As taxes and bureaucratic procedures required to conduct a business tend to remain unchanged for several years, the output of **M2** could be consistent with the theoretical works of Eckhardt & Shane (2003) and Gartner (1990), who consider that factors that affect the individuals in the same way all the time cannot be source of sudden waves of entrepreneurial activity. Figure 1.1 shows the volatility of the TEA for the period 2002-2010 and a sample of 15 countries.

It was found in M5, which explores long-term entrepreneurship expectations, using the variable FUTSUP (explained in the previous section), that in countries in which higher proportion of the respondents claim to have in their plans to start a venture, higher levels of TEA are also observed (the sign is expected). This may suggest as indicated that individuals who have made plans and have expectations of future ventures are associated with economies that have a great number of already consolidated start-ups. The coefficient associated with this intention can be interpreted as follows: for every percentage point increase in the fraction of people intending to start a business, the TEA increases by half a percentage point. It is important to note other features of M5, for example, the constant has changed sign, but this is not relevant as this coefficient is no longer significant. The coefficient associated with GDP has also changed sign, although this has remained relevant; however, the coefficient is reduced in size to about a quarter of that value achieved in M1-M4, indicating that GDP is used in this model to explain a smaller portion of the variation in the TEA.

Perhaps more important than the previous two observations, is the fact that despite the good fit achieved by the variable used to reflect the intention of pursuing a venture (which can be

seen as an indicator of incentives for entrepreneurship within a country), it only serves as a confirmation for the link between an economy with highly motivated individuals (in terms of intentions of starting a venture), and individuals actually involved in a start-up. The model cannot explain which are the actual factors motivating those individuals. However confirms the importance of signal recognition amongst the market agents.

In M6 higher education is discarded as a relevant explanatory variable, while both the potential entrepreneur's perceptions and the success of past ventures do result in highly significant regressors (and with the expected sign). The fact that the success of past ventures resulted in a relevant regressor is consistent with the work of Bednarzik (2000). The fit of this model is relatively good, achieving an adjusted R^2 close to 77%. This result is consistent with the works of Pete *et. al.* (*Op. Cit.*) and Kyejjusa & Bazibu (*Op. Cit.*) who also discarded education as a statistically significant regressor.

In M7, both dummy variables evaluating Porter's thesis (EBR and EBE) are significant. It can be interpreted that belonging to the group of EBE increases on average about 3.7 percentage points the value of a country's TEA (relative to the average TEA in the EBIs); similarly, belonging to the group of EBR increases in average about 7 percentage points the value of a country's TEA (also relative to the average TEA in the EBIs). Despite its relevance as a control variable, the GEM categorization does not significantly improve the model fit achieved by M6, so this classification does not seem to help any more than GDP in explaining the TEA.

The hypothesis of structural and idiosyncratic factors considered in M8, with dummy variables associated to Latin American and African outlier economies holding its significance even at the 5% level (with sign and magnitude characteristics as expected). This model tells us that the TEA in Latin American economies is on average almost 8 percentage points higher than that of the most developed economies classified in the "rest" of economies. Also, African nations have exceptionally high average TEAs, more than 21 percentage points higher (on average) relative to the TEAs of developed countries.

Beyond the above data, the advantage of this classification over the GEM classification, is the improvement that it can achieve over the GDP in terms of goodness of fit, moving from an adjusted R^2 of about 76.56 % on M6 to about 90% in M8. Furthermore, the interpretation of the constant is more intuitive than the one using Porter's classification, since in this case the sign is positive and can be seen as the average TEA of the most developed countries if the effects of opportunity perception and the success past businesses are discarded.

The specification of M8 is used as the basis for the 3 subsequent models, which seek to verify whether the results obtained in this 2-year panel can be verified in a different panel covering more years. It also attempts to explain the large differences in the levels of TEA between three categories of countries proposed here.

The results of M9 are shown in Table 3.2. While it is true that the coefficient associated with unemployment is significant and of expected sign, our measure of fit improves only slightly more than one percentage point. Moreover, the value of the coefficients associated with categorical variables AFRICA and AMLAT remain virtually unchanged, which indicates that the unemployment rate alone does not capture the structural differences in these economies that cause so dissimilar average TEAs.

Table 3.2 also presents the regression output for M10. The fit measure undergoes a drastic penalty and decreases to a 33.82%; however, it is important to note that the coefficient associated with wages is highly significant and with the expected sign.

Finally, the result of M11 (Table 3.2) validates the significance of perceived opportunities, success of past ventures, and an average more than 7 percentage points higher than that of developed countries for the Latin America TEA. Like M8, with a relatively good fit (82%).

The fact that unemployment and wages (as measures of necessity and opportunity costs) cannot account for all the divergence between regions showed by the dummies AMLAT and AFRICA, may indicate that more important factors related to the quality, quantity and interpretation of information. In this sense, in developed countries, asymmetries in the information may be less frequent or obvious, making it more difficult to extract a profit from those: *"because entrepreneurial opportunities depend on asymmetries of information and beliefs, eventually, entrepreneurial opportunities become cost inefficient to pursue."* (Shane & Venkataraman. 2000, p. 221).

IV. Conclusion

The data suggests that the income tax rate, the number of procedures and time required to register a new business, the savings rate of the economy, credit accessibility, higher education rates and new firm demographics have no significant explanatory power over the differences in entrepreneurship levels across countries. Moreover, these seem to be uncorrelated with the perception of an economy with good opportunities to start a new business. While perceptions are in fact a significant regressor of the TEA levels.

It was also shown that economies that have a higher number of successful startups, defining success as survival in the market for more than 3.5 years, are also more likely to have a higher TEA in the present.

GEM's classification into factor-driven economies (EBR), efficiency-driven economies (EBE) and innovation-driven economies (EBI) proposed by the GEM does not represent a better choice for control variable when explaining the TEA than an index as simple as de GDP. However, the classification proposed in this work, separating Africa and Latin America from the rest of the countries is capable of obtaining a much better fit in the models. This is consistent also with the criticism of Chepurenko, Gabelko & Obraztzova (2011).

While it is true that unemployment and the average wage level showed to be highly-significant regressors of the TEA and with the expected signs, these did not reduce the preponderance of the control variables associated with the regional separation. In relation to the work of Acs & Amoros (*Op. Cit.*), this confirms the validity of their beliefs in the access to employment as a determinant of the TEA, however, it also shows that such factor is not the only one explaining the differences between the regions studied. Further research should be conducted about quantifiable relations between the TEA and factors such as relative market imperfections, information asymmetries and other idiosyncratic elements.

Finally, governments seeking to promote entrepreneurship should reconsider efforts based solely on the improvement of the macro-economic indicators tested in this paper, like granting more credit options or just promoting a higher savings rate hoping it will translate into seed capital for startups. More research is required about the construction of perceptions by potential entrepreneurs. Further findings in this field will allow a more efficient allocation of governments' budget for the help of small and medium businesses.

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