ENTREPRENEURIAL ACTIVITY AND ENTREPRENEURIAL ENVIRONMENT? A REEXAMINATION OF THE GEM'S APPROACH

IE Working Paper GE8-102-I 10-01-2005

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Abstract

In this paper we re-examine the measurement of entrepreneurial activity and provide a model-based approach at measure. The Global Entrepreneurship Monitor (GEM) project has been a key addition to our ability to measure and compare rates of entrepreneurial activity. But even though there is consensus about the importance of measuring entrepreneurial activity, researchers differ about the appropriate ways to measure the breadth of entrepreneurial activity.
We analyze the GEM's measure of entrepreneurial activity (TEA), address limitations in its design and development and provide an alternative measure of entrepreneurial activity, which includes entrepreneurial environment. We use a model-based approach to measure entrepreneurship activity and our results indicate that the model provides support for the combined use of entrepreneurial activity and entrepreneurial environment.

Key-Words

Entrepreneurship- Entrepreneurial Activity- Entrepreneurial Environment

Support for this research comes from a Grant from Fundación BBVA, Madrid. Spain

Measuring the amount and impact of new venture creation and entrepreneurial activities within and across different societies has been an important concern within the entrepreneurship literature. The measurement of entrepreneurial activities also has significant implications for our understanding of the nature and breadth of entrepreneurship in society, both from a perspective of research and from the perspective of public policy (Birley, 1984; Haswell & Holmes, 1989; Laitinen, 1992; Williams, 1993; Dennis, 1997; OECD, 1998; Verheul et al., 2002). Many scholars have argued for a link between entrepreneurial activity and economic development of societies, but the measurement of such link needs to be based on adequate measures of new venture creation and entrepreneurial activities.

One such instrument is the Global Entrepreneurship Monitor (GEM), which both attempts to provide measures of entrepreneurial activity and to ascertain the relationship between entrepreneurial activities and economic development. GEM provides a significant addition to researchers' ability to assess the impact and extent of entrepreneurial activity. But even though there is consensus about the importance of measuring entrepreneurial activity, researchers differ about the appropriate ways to measure the breadth of entrepreneurial activity.

In this paper we conceptually analyze the nature and measurement of entrepreneurial activity, re-examine the measurement of entrepreneurial activity in the GEM project, and provide a model based approach at measuring it. In particular, we re-examine the GEM measure of entrepreneurial activity (TEA), address limitations in its design and development and provide an alternative measure of entrepreneurial activity. Finally, we incorporate into our theoretical model entrepreneurial environment, a variable that should be taken into account along with entrepreneurship activity per se, and that should help provide a strong indicator of the pervasive effects of entrepreneurial activity.

THE MEASUREMENT OF ENTREPRENEURIAL ACTIVITY

While there is consensus in the literature about the need to measure new venture creation, entrepreneurial activity, and its impact on the wealth of societies, there is no consensus about how to measure it and of the adequacy of the measures utilized in research. Scholars have indeed proposed a broad array of different definitions and measures (Hébert and Link, 1989; Gartner, 1990; Praag, 1999; Shane and Venkataraman, 2000; Davidsson, 2004).

Of particular importance are the concerns raised by researchers regarding the undercounting of new firms entries and exits in the market, and the effect of this undercounting on the assessment of the impact of entrepreneurial activities (Dennis 1997, 1999; Williams, 1993; Bates 2004; Davidsson, 2004).

Dennis (1997, 1999) attributes the problems of measurement of new entries in particular to the undercounting of small business and the methodological approaches utilized at measuring business entries and exits. His concern about the most common methodological approaches utilized and the opportunities they present for miscounting entries and exits are

consistent with the concerns raised by Williams (1993) and Birley (1984). In particular they contend that government surveys such as census data, and private sector surveys, such as the Dunn and Bradstreet data are prone to miscounting entries and exits because of the methodological approaches utilized for collecting the data.

But researchers also have questioned the definition of what constitutes entrepreneurship. Gartner and Scott (1995) have argued that understanding what is being measured also is an important issue for scholars, and could significantly alter the outcome with respect of the measure of entrepreneurial activity. In particular they address the issue of time frame and the expectation that behavior in a prior time frame is likely to reflect behavior in posterior times. They contend that one of the main problems with measurement of entrepreneurial activity is that is based on data that span relatively short time periods, which is contended to reflect historical as well as future behavior. Moreover, they contend that the determination of who is an entrepreneur is of great importance in terms of measurement, in particular if firm start up for self-employment is to be considered entrepreneurship or if only firms started with the prospect of value creation should be considered entrepreneurial. That difference has significant implications for the measurement of entrepreneurship, since a number of firms created with the purpose of creating self employment would not be considered entrepreneurial activity if the baseline was firm/value creation and the expectation of future growth. Final counts would vary significantly depending on the definition utilized. Finally and more importantly, is the fact that few measures of entrepreneurial activity include and reflect the environmental aspects and effects of entrepreneurship.

This final issue is particularly important for the field and our study. Whereas the measurement of direct entrepreneurial activity is important, we believe that it is incomplete without the examination of the entrepreneurial environment and its impact on entrepreneurial activity and wealth creation. Similar to our argument is Van de Ven's (1993) assertion that a research perspective that considers external environment conditions is appropriate for explaining entrepreneurship. In his article, he points to the fact that the study of entrepreneurship has long been dominated by the analysis of individual characteristics and behaviour of entrepreneurs, and considers that it is deficient without the inclusion of social, economic and political infrastructure for entrepreneurship.

This point has been underlined by Gartner (1985), who proposed a model for the new venture creation process that highlighted the role of environment in the creation of new ventures. Gartner stated, "The existence of highly supportive environments can, from one perspective, be said to actually create entrepreneurs" (1985: p. 700). Variables affecting the entrepreneurial environment, according to Gartner, include venture capital availability, presence of experienced entrepreneurs, government influences, and availability of support services, among others.

Gartner's study originated in an important body of literature that focuses upon the relationship between venture creation and environmental conditions (Aldrich, 1990; Keeble and Walker, 1994; Gnyyawali and Fogel, 1994; Reynolds et al., 1994). Using an evolutionary perspective, Aldrich (1990) suggested that new venture creation could be influenced by intra-population, inter-population and institutional factors.

Jackson and Rodney (1994) have talked about the importance of the adequate attitudinal climate for entrepreneurial activity. Their examination included both individual and environmental level variables such as willingness to accept risk, acceptance of failure, the importance accorded to new venture creation, the socialization children receive from their parents, and measures of the structure and performance of the local economy. The main insight we can derive from their study is the need to consider both individual and societal level variables when examining attitudes toward new venture creation. Dennis (1997) argues that one of the reasons for the numbers of new medium and small firms created in the US is the fact that few American institutions are as popular, drawing empathy from the American public. Moreover, he argues that this popularity, and thus the number of new business creations, is directly linked to most Americans being exposed to business ownership either directly or through someone they know. This familiarity with business ownership is, in his view, an important driver of new venture activity.

Krueger, and Brazeal, (1994) discuss the importance of developing an "entrepreneurial potential" so that potential entrepreneurs can find the suitable conditions to develop their ideas. The authors state that:

> *Despite a focus on the potential entrepreneur, we fully recognize that entrepreneurial activity does not occur in a vacuum… Implicit in this is the notion that the group, organization, or community possesses some potential for entrepreneurial activity. The environment need not be already rich in entrepreneurs, but has the potential for increasing entrepreneurial activity… Regardless of the existing level of entrepreneurial activity, such "seedbeds" establish fertile ground for potential entrepreneurs when and where they perceive a personally viable opportunity. That is, "entrepreneurial potential" requires "potential entrepreneurs*.

This idea of entrepreneurial potential is very akin to the arguments on entrepreneurial environments introduced in this paper.

In a similar vein, several scholars stressed the role of government as a major determinant of differing levels of entrepreneurship between countries (Gartner, 1985, Storey, 1999; and Verheul et al., 2002). As expressed by Verheul et al (2002): "The government can exert influence on entrepreneurship in different ways; directly through specific measures and indirectly through generic measures. For example, when stipulating a competition policy, the government can influence the market structure and (indirectly) the number and type of entrepreneurial opportunities" (2002: p.6).

Krueger, and Brazeal, also argue that

> *Few research studies have conceptualized or measured entrepreneurial potential, though interest in pre-emergence entrepreneurial activity has recently grown (...). However, measures of entrepreneurial potential seem to remain wedded to various ad hoc profiles of personality and demographic characteristics with minimal predictive validity…"* (1994: p. 92).

In this article, we contend that research that concentrates only on the measurement of entry and exits understates the impact of entrepreneurial activity in society. In order to adequately measure the impact of entrepreneurship it is important to assess both the direct entrepreneurial activity and the effects that entrepreneurial environment have on fostering entrepreneurship. In this paper we assess not only direct entrepreneurial activity, but also entrepreneurial environment, and provide a measure that relates entrepreneurial activity to entrepreneurial environment.

Entrepreneurial Activity in the GEM Project

The Global Entrepreneurship Monitor (GEM) research program is an annual assessment of the national level of entrepreneurial activity. Initiated in 1999 with 10 countries, has kept steadily growing to reach 31 countries in 2003. The research program, based on a harmonized assessment of the level of national entrepreneurial activity for all participating countries, involves exploration of the role of entrepreneurship in national economic growth. Fundamental to that effort is the ability to measure entrepreneurial activity. The project allows for the measurement of entrepreneurial activity within countries and its comparison across. The results of the study, highlighted in the 2003 annual report indicate that systematic differences continue, with few highly entrepreneurial countries reflecting low economic growth (GEM's 2003 report). There is, further, a wealth of national features and characteristics associated with entrepreneurial activity.

The GEM's annual reports include global comparisons, national reports, and special topic reports based on the annual data collection cycle. Over 120 scholars and researchers are actively participating in the GEM project; thus the measures of entrepreneurial activity present in this project could provide a global research baseline for the examination of entrepreneurial activity in academic research. So it is important to ascertain the quality of the measures and to have the study live up to its potential in terms of the measurement of entrepreneurial activity and the link of it to economic development.

The main outcome of the GEM project is an estimate of a nation's entrepreneurial activity, the Total Entrepreneurship Activity (TEA) index. The GEM study is designed to overcome a number of the concerns raised in prior research about the measurement of entrepreneurship. It is a yearly ongoing continuous measure, so that it is designed to capture entrepreneurial activity and its effects over time, allaying the concerns raised by Gartner and Scott. It is also based on phone interviews with the adult population and the measurement of entrepreneurial activity, addressing the concerns of Dennis, Williams and Birley.

Finally and most importantly, even though the TEA index concentrates on the measurement of entrepreneurial activity, data available in the GEM's datasets allows for the creation and inclusion of a entrepreneurial environment measure, which in combination with the TEA index could provide a richer measure of the impact and strength of entrepreneurial behavior in specific countries. The reexamination of the entrepreneurial activities measure and the creation of a measure of entrepreneurial environment from the GEM's data, constitute the mayor contribution of this paper.

In particular, in this paper we discuss methodological limitations of the way entrepreneurial activity is currently measured in the GEM, and we propose an alternative model-based approach to measuring this construct, while suggesting a way of handling missing data in the GEM survey.

Furthermore, while the current GEM index is built around direct measures of individuals' entrepreneurial activities (independent start-up, current job involves start-up, current owner/manager of business), it does not include other indirect or environmental indicators of activity that also has a direct impact on individuals' entrepreneurial activity (EA). Thus, based on three existing GEM variables (angel activity, knowing an entrepreneur, and whether the individual will start a firm within the next 6 months) we incorporate into our theoretical model individuals' entrepreneurial environment (EE), a variable that should be taken into account along with entrepreneurship activity per se, and that should help provide a strong indicator of the pervasive effects of entrepreneurial activity.

Our model is based on the assumption that individuals' entrepreneurial activity and environment are latent continuous variables that are related to the observed survey questions through a threshold relationship. We provide an assessment of the goodness of fit of our proposed model, and we propose linear combinations of the GEM indicators that can be used as valid proxies of the latent variables in our model.

METHODS AND ANALYSIS

For this study we utilized a sample of 7000 Spanish respondents of the 2003 Gem survey. The sample was obtained through phone interviews by a survey firm, specialized in phone surveys. Consistent with GEM's specification of TEA, we utilized three indicators of direct entrepreneurial activity[i]:

q1a: whether the individual is currently involved in a startup
q1b: whether the current job involves a start-up
q1c: whether the individual is the owner/manager of a business,

and included 3 indicators from the GEM survey of EE:
q1d: business angel activity,
q1g: know entrepreneur, and
q1h: good start-up opportunities within the next 6 months.

We provide in Table 1 a table of frequencies for GEM variables used in this study. Five individuals refuse to respond to one or more of these variables and were deleted for further analysis. Thus, the effective sample size is 6995.

Insert Table 1 here

It is interesting to point out that from our point of view being a business angel is also a form of EA, although is not taken into account in the TEA index. However, in order to be consistent with the TEA measure and to be able to provide an adequate comparison, we included angel investing in our EE measure. However, we believe GEM should reconsider and recalibrate the TEA measure, even if that entails reanalyzing the data from previous years so that year-to-year comparisons are adequate and valid.

GEM's current approach at measuring entrepreneurship: The TEA index

The TEA national index is computed as the proportion of respondents classified as entrepreneurs in a representative national sample. Each individual in the sample is classified as either entrepreneur or non-entrepreneur based on his or her responses to the questions *q1a* to *q1c* in the GEM survey through some complex procedure.

One mayor concern with the approach GEM utilizes to measure entrepreneurship results from their classifications of individuals as entrepreneurs or not, to later group them to determine a percentage of entrepreneurs. We argue that this measure poses two problems; First, the use of a classification in which individuals are either considered as entrepreneurs or non-entrepreneurs overlooks an essential dimension of the entrepreneurship phenomenon, that is, the existence of "degrees of entrepreneurship" (Davidsson, 1989; Schafer, 1990; Tay, 1998). This point is underlined by Davidsson (2004) who, building on Shane and Venkataraman's (2000) delimitation of the field of entrepreneurship, stresses the importance of studying "Why, when and how do individuals, organizations, regions, industries, culture, nations (or other units of analysis) differ in their propensity for the discovery and exploitation of new venture ideas" (2004: p. 29). Following this reasoning, we claim that rather than treating entrepreneurship as a dichotomous variable, it is more legitimate to consider that some economic actors show a greater propensity to entrepreneurship than others.

Second, we believe that what is important is not to determine a percentage of entrepreneurs in a country, a percentage which given the GEM methodology is suspect, but the ability to determine an index which allows us to compare across countries and within countries over time. Such an index should be transparent, easy to calculate and should allow for the determination of confidence intervals. One of the main problems with the TEA as calculated by GEM is that because it is obtained based on individual classifications, each of which has their own error, the determination of a confidence interval is almost impossible in the current GEM approach, considering the complexity of the TEA formula. To overcome these limitations of the TEA index we take a model-based approach, which we now present.

A DIMENSIONAL MODEL OF ENTREPRENEURSHIP

We hypothesize that a two-factor model underlies the individuals' responses to these survey questions as depicted in Figure 1. The first latent variable (factor) corresponds to the individuals' propensity to engage in entrepreneurial activities (EA). This factor has four indicators (*q1a* to *q1d*). The second latent variable corresponds to the individuals' entrepreneurial environment (EE) with three indicators (*q1d*, *q1g*, *q1h*). We also hypothesize

that individuals' entrepreneurial activities are determined by their entrepreneurial environment, which is unique for each individual (i.e. it changes from individual to individual).

Insert Figure 1 about here

Since the model's random errors and latent variables are likely induced by a large set of specific causes, we assume that the random errors and latent variables are normally distributed. Now, to link this theoretical model to the observed individual responses, we assume a threshold relationship such that for each observed variable

$$q_{1i} = \begin{cases} \text{No} & \textit{if} \quad q_{1i}^{*} < \tau_{1i,1} \\ \text{Don't know} & \textit{if} \quad \tau_{1i,1} \le q_{1i}^{*} \le \tau_{1i,2} \\ \text{Yes} & \textit{if} \quad q_{1i}^{*} > \tau_{1i,2} \end{cases} \tag{1}$$

where the τ's are thresholds that change from variable to variable, and the q_{1i}^{*}'s are propensity scores assumed to underlie each of the observed categorical responses.

Note that we assume that 'Don't know' responses provide information about the individuals' entrepreneurial activities and environment[ii]. Furthermore, the incorporation of 'Don't know' responses into the model leads to a substantial reduction of missing patterns. Should we have discarded 'Don't know' responses, the effective sample size would be 5313 (a 24% data loss).

We fitted this structural equation model using Mplus (Muthén & Muthén, 2001). The model fits well given the large sample size employed: $\chi^2 = 15.1$ on 7 df ($p = 0.03$), RMSEA = 0.01. We provide in Table 2 the slope parameter estimates for the model in Figure 1 along with their standard errors. Also, we provide in Table 3 the R^2 for each of the 6 variables used.

As can be seen in these tables, the variable worst accounted for by the model is whether a there will be good start-up opportunities within the next 6 months ($R^2 = 6\%$). On the other hand, the variable best accounted for by the model is whether the current job involves a start up (R2 = 90%). The latter is the best indicator of the individuals' propensity to engage in entrepreneurial activities (see Table 2). On the other hand, the best indicator of the individuals' business environment is whether they have known an entrepreneur in the last two years. Finally, as we had hypothesized being a business angel is weakly (although significantly) related to individuals' propensity to entrepreneurial activities.

Insert Tables 2 and 3 about here

Of particular interest is the effect of entrepreneurship environment on the individuals' propensity to engage in entrepreneurial activities. This effect is significant and strong, R^2 = 18%[iii].

In closing, we have verified that our complex model for GEM's entrepreneurship is supported by our data. This model assumes two continuous latent variables as opposed to the TEA's current classification of respondents as entrepreneurs or non-entrepreneurs. Our model enables researchers to draw powerful statistical inferences on the entrepreneurship phenomenon. In our model, the main quantities of interest are the means of the latent variables individuals' propensity to engage in entrepreneurial activities and individuals' entrepreneurial environment. Interest lies in investigating how these means change over time within a country and across countries. Furthermore, the model allows for the comparison of thresholds and latent variable slopes over time within a country, and for comparisons across different countries. Finally and most interestingly, by incorporating additional exogenous variables into our model, such as individuals' background information, countries' economic variables, and countries' cultural environment, it is possible to investigate the effects of these background variables on the model's latent means, thresholds, and latent variable slopes, very much as in multivariate probit analysis (see Muthén, 1979; Browne & Arminger, 1995).

However, although statistically optimal, the approach advocated here requires considerable statistical expertise. We therefore consider in the next section constructing linear combinations of the indicators than can be used as an approximation to our model's latent variables.

Proxies of the latent variables

Point estimates and standard errors of each individual's standing on the two latent variables of our model level of entrepreneurship can be obtained by integrating the posterior distribution of the latent variables, given their responses to the six indicators considered in this study. We investigate in this section whether suitable proxies for these estimates can be alternatively be obtained by the following procedure. We code the responses to the indicators q1a to q1h as 'No' = 0, 'Don't know' = 1, and 'Yes = 2'. Then we compute

$$\begin{aligned} EA &= (q1a + q1b + q1c + q1d)/8 \\ EE &= (q1d + q1g + q1h)/6 \end{aligned} \qquad (2)$$

Here, EA and EE are normalized indices (i.e., they range between 0 and 1) of the individuals' propensity to engage in entrepreneurial activities and of the individuals' economic environment, respectively. We provide the Table 4 the correlations among these proxies and the point estimates of these latent variables.

Insert Table 4 about here

As can be seen in this table, our proposed proxies correlate .90 with the point estimates of our model's latent variables. Hence, they can be used as valid proxies of the latent variables. However, note that the use of proxies underestimates the correlation between entrepreneurial activity and entrepreneurial environment because it does not take into account the unreliability of the proxies. This correlation between the proxies is only 0.22 (see Table 4) whereas the correlation among the latent variables is 0.47 (see Table 2).

Most interestingly, the TEA index correlates 0.70 but only 0.10 with our proxies of economic activity and economic environment. Thus, although based on rather different principles, our measure of economic activity correlates quite highly with the TEA index.

DISCUSSION

Our results indicate the benefits of including entrepreneurial environments in the measurement of entrepreneurial activity. Consistent with the theoretical arguments of Gartner and others, the results indicate a significant influence of entrepreneurial environments on direct entrepreneurial activity, and indicate that failing to consider that effect significantly understates the effects and extent of entrepreneurial activity.

One important addition of this study is that it provides a model-based approach at measuring entrepreneurial activity, one that incorporates an individual's entrepreneurial environment into the measure. The metrics in this study are an improvement over previous approaches because they are both transparent, and provide for the ability to calculate confidence intervals for the variables. Our metric results in a propensity score for entrepreneurial activity, one that is normalized and continuous. This point is a significant departure from prior research and in particular from the GEM's TEA measure. The use of a classification, as in the TEA in which individuals are determined to be or not entrepreneurs reflects a static approach at the phenomena, whereas the use of propensity, calculated as a variable ranging from 0 to 1, allows researchers to take a dynamic view of the process and to incorporate the notion of the likelihood of entrepreneurship over time. This, we believe is a significant contribution of this study, and one that merits rethinking the traditional approaches at examining entrepreneurial activity.

One caveat is important to discuss at this point. It is important to realize that both the TEA and ours are simply indices. They are not the % of entrepreneurs. While it is tempting to think about the TEA as percentage of entrepreneurs, and there is evidence that it is sometimes misused as such, the value of these indices lies in the power to compare across time and across countries and regions.

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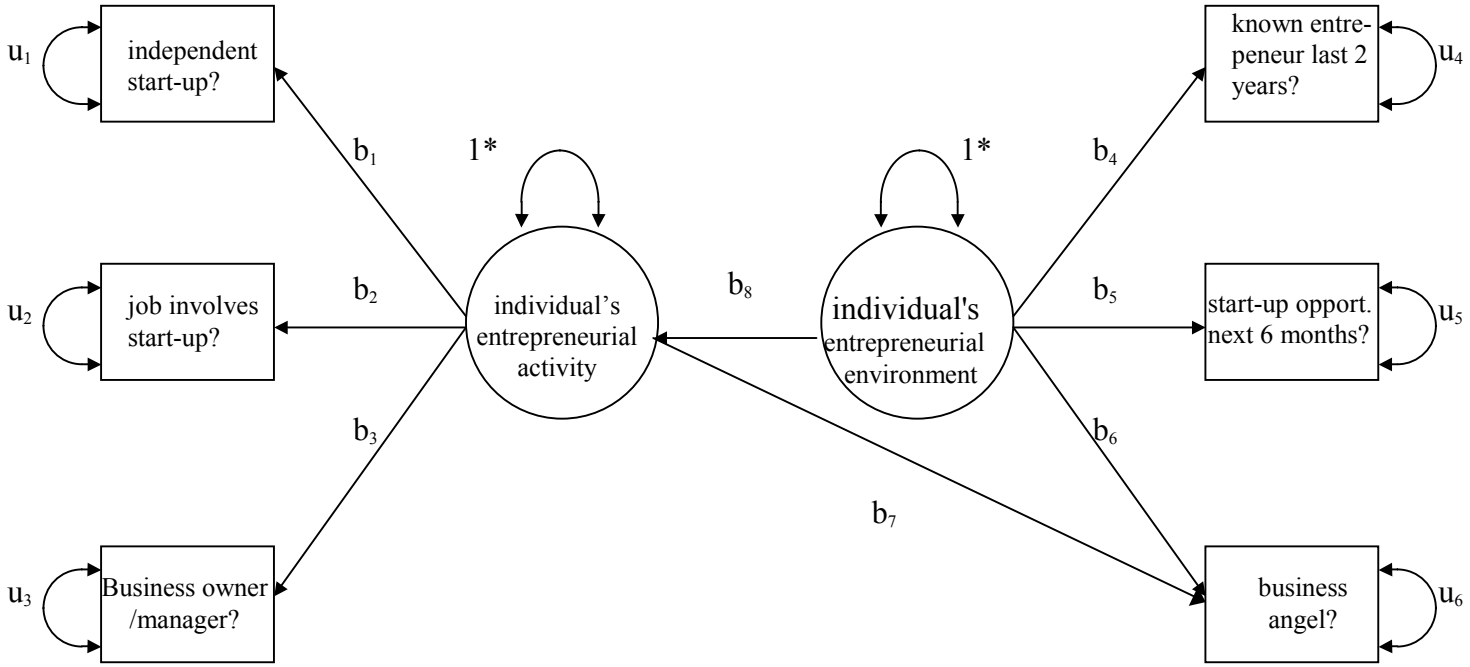
Figure 1
A TWO DIMENSIONAL MODEL OF ENTREPRENEURSHIP



Note: * parameter fixed for identification purposes

Table 1

Frequencies of selected GEM variables

code	variable	no	don't know	yes
q1a	independent startup?	6708	0	297
q1b	current job involves a start-up?	6877	4	114
q1c	owner/manager of a business?	6333	1	661
q1d	business angel in past 3 years?	6766	0	229
q1g	know entrepreneur in last 2 years?	4769	144	2082
q1h	start-up opportunities within next 6 months?	3097	1580	2318

Table 2

Parameter estimates and standard errors for the slope parameters

Parameter	Value	SE
b1	0.51	0.04
b2	0.86	0.06
b3	0.45	0.04
b4	0.65	0.08
b5	0.24	0.03
b6	0.30	0.08
b7	0.18	0.07
b8	0.47	0.09

Note: N = 6995, WLS estimation

Table 3

Proportion of variance accounted for

code	variable	R^2
q1a	independent startup?	0.32
q1b	current job involves a start-up?	0.90
q1c	owner/manager of a business?	0.25
q1d	business angel in past 3 years?	0.18
q1g	know entrepreneur in last 2 years?	0.42
q1h	start-up opportunities within next 6 months?	0.06

Table 4

Correlations among the TEA, point estimates of the latent variables, and latent variables proxies

	TEA	EA	EE
entrepreneurship activity	.73	.89	.47
entrepreneurship environment	.29	.41	.90
TEA	1	.70	.10
EA	.70	1	.22
EE	.10	.22	1

Notes: All correlations are significant (α = .01); entrepreneurship activity and environment are the point estimates of the latent variables, EA and EE are our proxies of those latent variables

i We provide in this paper only summaries of GEM questions rather than the actual questions used in the survey.

ii Our model is based on the assumption that data in GEM is not missing randomly. Following the idea of "degrees of entrepreneurship" stated before, we assume that the pattern observed by missing data is the following: when the respondent answers "Don't know", he is in fact choosing an intermediate answer between the YES and the NO.

iii Although this effect should be R^2= 22% (that is, 0,47*0,47), the result is in reality slightly inferior due to the indirect effect of the b7 parameter.

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Depósito Legal: M-20073 I.S.S.N.: 1579-4873