XX SEMEAD
Seminários em Administração
novembro de 2017
ISSN 2177-3866

DETERMINANTS OF STUDENT ENTREPRENEURSHIP IN BRAZIL: SYSTEMIC PHENOMENON OR STOCHASTIC EVENTS?

ANDRÉ ALVES
UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL (UFRGS)
andre.alves82@gmail.com

BRUNO BRANDÃO FISCHER
UNIVERSIDADE ESTADUAL DE CAMPINAS (UNICAMP)
bruno.fischer@fca.unicamp.br

PAOLA RÜCKER SCHAEFFER
UNIVERSIDADE ESTADUAL DE CAMPINAS (UNICAMP)
paolaschaeffernh@hotmail.com

DETERMINANTS OF STUDENT ENTREPRENEURSHIP IN BRAZIL: SYSTEMIC PHENOMENON OR STOCHASTIC EVENTS?

ABSTRACT

Over the past few decades universities have been receiving an increasing demand to go beyond their general role of producing science, technology and knowledge diffusion to explore its knowledge potential to produce novel commercial applications. Accordingly, these institutions have dedicated efforts to expand their role as research and education entities to become drivers of innovation as 'entrepreneurial universities'. However, while there is an increasing interest in ways to foster scientific academic entrepreneurship (usually done by faculty and graduate students), universities also serve as a positive environment for student entrepreneurship training, knowledge sharing, testing ideas and learning that often incubates new high impact businesses. So far, the importance of student entrepreneurship has received far less attention than it likely deserves. The purpose of this paper is analyze this "hidden side" of academic entrepreneurship and identify its determinants in Brazil. Using a dataset comprehending 2230 college and university students from 70 different institutions across the country we develop 5 Probit models to identify impacts related to individual traits and systemic conditions on five dimensions of interest: entrepreneurial activity, potential entrepreneurs, high-impact entrepreneurship, serial entrepreneurship and innovation content in student' new ventures. The lack of significance in many of the variables used indicates that student entrepreneurship seems to be a rather stochastic phenomenon in Brazil. However, some signs emerge that high-quality, research-oriented universities generate higher levels of innovative entrepreneurs.

KEYWORDS: student entrepreneurship, determinants, innovation, entrepreneurial university.

1. INTRODUCTION

Over the past few decades universities have received increasing demands to go beyond their general role of producing science, technology and knowledge diffusion to actually explore its knowledge potential to produce novel commercial applications. This can be underscored as a function of universities' role as support entities for the evolutionary processes of entrepreneurial ecosystems (Dorfman, 1983). These institutions function as sources of ideas, manpower, and entrepreneurs themselves. Hence, universities have been expanding their role as research and education universities to become drivers of innovation as 'entrepreneurial universities' (Slaughter & Leslie, 1997; Etzkowitz et al, 2000). These universities engage in entrepreneurial activities as they exploit its scientific and technological advances through technology transfer, patenting, licensing and eventually new startups (Mowery and Shane, 2002). These efforts have been referred to and studied under the concept of "academic entrepreneurship" (Rothaermel et al., 2007).

However, while there is an increasing interest in ways to foster (scientific) academic entrepreneurship (usually done by faculty and graduate students), universities also serve as a positive environment for student entrepreneurship training, knowledge sharing, testing ideas and learning that often incubates new high impact businesses (e.g. Apple, Microsoft, Dell, Facebook, Google, Snapchat) (Marchand & Hermens, 2015). All these examples share at least one characteristic: they all started while their founders were experimenting new technologies and business opportunities at the University.

Acknowledging this fact raises some questions: What are the specific features that allow the emergence of student entrepreneurship? What is the influence of the University environment and support institutions over the entrepreneurial propensity of students? What are the individual and systemic factors of the student that influence is entrepreneurial intentions? However, these inquiries, along with the importance of student entrepreneurship, has received far less attention than it likely deserves (Grimaldi, et al. 2016). Following Politis et al. (2011), while there has been significant research on academic entrepreneurship, this is a marginal phenomenon when compared to "the large number of student entrepreneurs who are educated and fostered in the university context, and who often continue to develop their new firm in interaction with the university after graduation" (p.661). In this sense, the purpose of this paper is to analyze this "hidden side" of academic entrepreneurship, the student entrepreneurship, and identify its determinants in Brazil.

To do so, we used a dataset developed by Endeavor[i] Brazil and Sebrae[ii] made available for the purposes of this research. 2230 college and university students from 70 Higher Education Institutions (HEIs) were interviewed between April and May, 2016. Five basic Probit models are developed aiming at identifying impacts related to individual traits and systemic conditions on five dimensions of interest: entrepreneurial activity, potential entrepreneurs, high-impact entrepreneurship, serial entrepreneurship and innovation content in student' new ventures. The lack of significance in many of the variables used indicates that student entrepreneurship seems to be a rather stochastic phenomenon in Brazil. However, some signs emerge that high-quality, research-oriented universities generate higher levels of innovative entrepreneurs.

The remainder of this article is structured as follows: Section 2 presents the concept of student entrepreneurship as an important – but often neglected – aspect inside the idea of academic entrepreneurship. Section 3 dedicates attention to the extant literature on the determinants of knowledge-intensive entrepreneurship in order to offer a consistent background for the examination of the phenomenon under analysis in our research. Section 4 presents the sample, variables of interest and analytical models. Empirical results are provided in Section 5. Section 6 concludes with final remarks, implications and avenues for future research.

2. THE 'HIDDEN SIDE' OF ACADEMIC ENTREPRENEURSHIP: THE STUDENT

Universities have historically played a significant role in education and research. These have been referred to as the first and second missions of Universities (Roper & Hirth, 2005). Over the past four decades (since the Bayh-Dole act of 1980) attention has been directed to the so called universities' "third mission" related to activities carried out by academic institutions to foster innovation, social change and industry competitiveness (Siegel & Wright, 2015). This has given rise to conceptual notions such as Entrepreneurial Science (Etzkowitz, 1998), Entrepreneurial University (Etzkowitz et al. 2000) and "academic entrepreneurship" (Rothaermel et al., 2007). However, and surprisingly, the unit of analysis of the entrepreneurial efforts that come out of the university has consistently been attached to academic research, patenting and technological transfer activities. While important, and often related to radical technological innovations, these contributions can be deemed as marginal when compared to all other new ventures that emerge from entrepreneurial student activity that are not direct outcomes of scientific research and formal technology transfer activities (Politis et al., 2011). Yet, the extant literature seems to take for granted the importance of student entrepreneurship (Grimaldi, et al., 2016; Marchand & Hermens, 2015). We argue that this situation makes student entrepreneurship a sort of 'hidden side' of the traditional approach on academic entrepreneurship. Given its potential impacts and socioeconomic relevance, it is somewhat shocking that it lies in the periphery of dedicated research.

While some universities have placed significant attention and energy in third-mission activities, there has been an increasing demand on them to offer entrepreneurship education across all fields and programs (Jansen et al., 2015). In this sense, entrepreneurial initiatives may go beyond the University's own scope of knowledge and technologies mastered by its faculty. Therefore, it seems relevant to explore what are the key determinants for student entrepreneurship in the broader sense (beyond scientific academic entrepreneurship) and the role of the University in this process.

According to Grimaldi et al. (2016, p. 1047), "*one of the least recognized and inadvertent roles of universities in 'encouraging' entrepreneurship is providing a protected environment where students can experiment with new ideas and follow their passions*". Siegel and Wright (2015) argue that the study of academic entrepreneurship should go beyond direct technology and knowledge transfer to encompass indirect aspects such as University education and research that lead indirectly to entrepreneurial activities, start-ups and spin-offs. Examples of the influence of the university environment over the entrepreneurial intentions and efforts of students are innumerous: Michael Dell started his computer retailing business in a dormitory of the University of Texas. Yahoo! and Google started by the initiative of students at Stanford. Mark Zuckerberg launched Facebook as a social network for university students at the Harvard facilities (and only a few years later went global). Bill Gates, Steve Jobs and Steve Wozniak are also classical examples of students that experimented with new technologies and business opportunities while at the University in their undergraduate years. Other examples of companies created by students include: Wordpress, Napster and Reditt (Marchand & Hermens, 2015).

3. DETERMINANTS OF STUDENT ENTREPRENEURSHIP PROPENSITY

According to Venkataraman (1997), entrepreneurial activity is a function of the nexus of two phenomena: the presence of lucrative opportunities and the presence of enterprising individuals. While entrepreneurship studies often place the individual at the center of the analysis, they are often influenced and shaped by the nature of opportunities that emerge or are created by them. The way different individual interact with external factors are seen as crucial in the discovery of technological, market and institutional opportunities for entrepreneurship (Radosevic & Yoruk, 2015). In order to understand how the university environment can

influence the propensity of students to engage in entrepreneurial activities, there is a need to account for both individual and systemic characteristics. These aspects are now explored in further depth.

3.1 Individual Vectors

Our model presents five individual factors for student entrepreneurship propensity: age, family income, family culture, knowledge-intensity, academic degree. As exposed in Glaeser (2007), such demographic traits can be related to the promotion of entrepreneurial behavior. We detail these individual vectors below.

3.1.1 Age

Age is a relevant vector in determining overall entrepreneurial propensity as entrepreneurial decision is not neutral with respect to age. According to Lévesque and Minniti (2011) there are opportunity costs associated with earlier and advanced ages. With fewer resources, younger individuals can reduce the uncertainty that arises with new ventures. Conversely, older individuals have much more to lose by forgoing seniority wages in favor of uncertain returns (Lévesque and Minniti, 2011). In our analysis, age is a relevant vector for student entrepreneurship once the university environment can (to some extent) provide younger students with the necessary resources they lack to initiate their first entrepreneurial trials.

3.1.2 Family Income

Aspects related to income are strongly connected to the dynamics of entrepreneurial activity (Radosevic & Yoruk, 2013; Stel et al., 2007). Accordingly, Cuervo et al. (2005) assert that the family is a source of information, complementary resources, funds, and guarantees for the entrepreneur. Thus, it can be assumed that family income is likely to provide an easier access for initial venture funding for students to experiment with their entrepreneurial initiatives. While evidence on this assumption is disputable (Aldrich et al., 1998), some studies indicate that, within some ethnic communities, families do provide a great deal of financial capital (Aldrich & Waldinger, 1990). Additionally, according to Aldrich and Langton (1998), families play an important role in resource mobilization process during the start-up stage. In addition, family income helps to economize on the transaction costs associated with establishing relationships and obtaining investment (Cuervo et al. (2005).

3.1.3 Family culture

As a general feature, culture is strictly attached to entrepreneurial behavior (Freytag & Thurik, 2007). For instance, non-pecuniary incentives have demonstrated to play a dominant role in determining entrepreneurship propensity (Hamilton, 2000). In the specific case of family culture, it is an element that is expected to exert important effects on entrepreneurship for reasons that can go beyond social relationships. Beyond culture, family members may also share biological characteristics that drive attitudes towards entrepreneurship. According to Shane (2010), studies on adoption provide evidence of the effect of genes on work interests where "biologically related members tend to have similar job preferences, while adopted family members do not" (p.53). This may strongly influence the propensity of family members to take the entrepreneurial professional route. Additionally, businesses are often embedded into family relations (Aldrich & Cliff, 2003). Cuervo et al., (2005) point that family is the key variable for individuals once it may be a source of information, complementary resources, managerial capabilities and networks. Accordingly, family can trigger organizational emergence (Cramton, 1993).

3.1.4 Knowledge-Intensity (Science, Technology, Engineering and Math)

The nature and source of knowledge is a key factor in allowing entrepreneurs to be able to recognize technological and market opportunities. According to Radosevic and Yoruk (2013) knowledge-intensive entrepreneurship (KIE) constitutes not only one of the activities (or functions) of an innovation system but also one of its core properties. A similar perspective is shared by Ács et al. (2014). Knowledge-intensity is a key feature once technological opportunities may not only be identified and responded to, but be shaped by entrepreneurs. According to Gladwel (2008), the amount of hours of programing invested by Bill Gates and its IT youngster partners turned out to be a pre-condition to the exploitation of opportunities that emerged later on.

3.1.5 Graduate Student

While student entrepreneurship is less explored in the academic entrepreneurship literature, student enrolled in graduate programs that are involved in research projects often take on entrepreneurial efforts thorough start-ups that may spin-off from academic research. Hayter et al., (2016), for instance, present the creation of Google as one academic spin-off of this type. Additionally, Hayter (2016) finds that graduate students play a critical role in the early stages of spinoff development.

3.2 Systemic Vectors

Entrepreneurial activity should be regarded as a social phenomenon, being dependent on structural features of the economic system and on social processes and mechanisms (Radosevic & Yoruk, 2013). These factors shape the "entrepreneurial propensity" of innovation systems, i.e., their capacity to generate and exploit innovation-oriented opportunities. As stated by Ács et al. (2014), this systemic nature involves not only individuals, but also socioeconomic and institutional aspects, whereas the productivity of an entrepreneurial system is affected by the performance of any of its components. Some of these features related to the academic environment are analyzed in this section.

3.2.1 Urban Agglomeration

Agglomeration economies provide entrepreneurial systems with larger pools of individuals that can engage in the generation of new ventures, as well as the supply of complementary productive inputs, resources and different sorts of positive externalities (Rosenthal & Strange, 2001; Glaeser & Kerr, 2009). For instance, urban centers foster relationships among individuals and it drives up diversification of consumer demand (Stam, 2009). A related aspect concerns the efficiency gap that exists in peripheral regions in a comparison with "central" regions, indicating the existence of agglomeration economies (Fritsch, 2002).

Accordingly, urban agglomeration represents an important vector to potential student entrepreneurship. As different universities operate in different local and regional, there is a need to explore how they adopt different strategies for academic entrepreneurship consistent with these environments (Fini et al., 2011). In this sense, Fischer et al. (2015) find that highly dense urban agglomerations in the context of developing countries hamper the potential of knowledge-intensive-entrepreneurship, a function of the endemic levels of agglomeration diseconomies.

3.2.2 High-Quality University

University quality usually has a positive influence on the quality and rate of entrepreneurial activity, which can be attributed to the relevance of the technological environment on the performance of young firms (Tischler, 2014). In this regard, institutions that engage in higher quality research show the propensity of offering the socioeconomic context in which they are embedded with more substantial benefits (Cowan & Zinovyeva, 2013), a consequence of the

capabilities concentrated in these particular universities (Laursen et al., 2011). In the same vein, Di Gregorio and Shane (2003) identify that the intellectual eminence of universities as a key predictor of start-up as well as technology transfer offices activities. Analogous findings have been reported for the environment of developing countries by Fischer et al. (2017). In the context of knowledge-intensive-entrepreneurship, university quality plays an important role in gathering a critical mass to think about more complex problems that often lead to new technological or market opportunities.

3.2.3 Mentors

Mentoring is usually understood as an important support activity for student entrepreneurs. According to Blackwell (2007), mentoring is a process by which people of superior rank, special achievements, and prestige instruct, counsel, guide, and facilitate the intellectual and/or career development of protégés. Mentoring is defined as "one-to-one learning relationship between an older person and a younger person that is based on modeling behavior and extended dialogue between them" (Lester & Johnson, 1981, p.50). St-Jean and Audet (2012) find that mentoring benefits include an increase in management knowledge and skills, improved vision for business ventures and ability to identify new opportunities. Moreover, besides knowledge/experience exchange by mentors to mentees, mentoring also has an affective side related to improving self-efficacy, validation of entrepreneurs' self-image, also lowering the sense of solitude, thus influencing entrepreneurial resilience.

3.2.4 University Support

University support involves policy, processes and infrastructure necessary to stimulate and help students to start new business. Henrekson and Rosenberg (2001) find that initiatives aimed at stimulating entrepreneurship contribute to the survival and growth of new ventures. Jansen et al. (2016) identify three major categories: education (for awakening dormant entrepreneurs), stimulation (to support students in starting a business), and incubation (to support young companies to independence). The relevance of incubators and science parks as support mechanisms for start-ups is also highlighted by Fini et al. (2011) and Feldman (2001). Empirical results for the case of developing countries also find evidence in favor of the relevance concerning such sort of academic provisions (Fischer et al., 2017).

3.2.5 Networking

Entrepreneurial ventures are relational by nature, involving the formation of networks by the nascent entrepreneur and depending on existing levels of trust among agents (Stam, 2009). For these reasons, the very location of entrepreneurs is bounded by the availability of social networks that can grant access to a relevant knowledge base (Boschma & Martin, 2010; Feldman, 2001). Consequently, some authors have put strong emphasis on what is called "entrepreneurial support networks", i.e., agents that offer complementary services to the activity of entrepreneurial ventures (e.g. Kenney & Patton, 2005). Ultimately, these linkages among entrepreneurs make for social connections that enhance growth potential of entrepreneurial ventures (Bruederl & Preisendoerfer, 1998).

Different stakeholders play various roles in Universities. Siegel and Wright (2015) provide a full list of stakeholders that can potentially be involved in academic entrepreneurship. These include:

> "[…] students, younger faculty and post-doctoral fellows, university alumni, federal agencies for entrepreneurship programs (i.g. US SBIR/STTR programs), technology managers at universities, economic development officials at the university and in the region, surrogate entrepreneurs, managers of incubators/accelerators and science/research/technology parks, state legislatures and other bodies that govern universities […]" (Siegel and

Wright, 2015, p.6).

Hayter (2016) examines the composition, contributions, and evolution of social networks among faculty entrepreneurs. Networks among early-stage academic entrepreneurs are important for spurring and supporting spinoff establishment. However, if they do not evolve from their initial configuration, these networks can in fact constrain subsequent stages of spinoff development.

Taking into account these insights obtained from dedicated literature, the next section explores the structure of data and other methodological aspects related to the empirical step of our assessment.

4. METHODOLOGICAL APPROACH

This research addresses the issue of student entrepreneurship by using a dataset developed by Endeavor Brazil and Sebrae and made available for the purposes of this research. 2230 college and university students from 70 Higher Education Institutions (HEIs) were interviewed between April and May, 2016. As a result, this information provides an adequate sample for the evaluation of the phenomenon under analysis, allowing a deeper understanding of the entrepreneurial dynamics in the Brazilian academic context from the perspective of students.

Drawing from this dataset, we establish a research agenda aiming at identifying the key factors that put in motion student entrepreneurship. In order to build an exploratory model we adapt propositions contained in Radosevic and Yoruk (2013), Hayter (2016), Grimaldi et al. (2011), and Siegel and Wright (2015) to offer an "entrepreneurial propensity function". The structure of this model relies on the assumptions that entrepreneurial activity, **E**, can be largely attributed to conjoint effects of individual traits, **I**, and systemic vectors, **S**, that shape support and incentives for new ventures. This can be stated formally as:

$$\boldsymbol{E_y = f([\sum y\, I_y]; [\sum z\, S_z])} \qquad \textbf{Equation 1}$$

Where the subscript "y" identifies each individual student and "z" reflects aspects of each system in which the individual is embedded. The summation operators are included to reflect the multidimensional nature of vectors **I** and **S**. To make this model operational, the set of variables to be included in empirical estimations are outlined in Table 1.

This particular set of variables allows assessing five different indicators related to entrepreneurial activity. Besides entrepreneurship *per se*, we can identify the determinants behind prospective entrepreneurs, high-impact new ventures, serial entrepreneurs and innovative activity. Delving more deeply into these aspects is desirable as it offers the possibility of drawing a complete picture of the dynamics under scrutiny. This is of particular relevance for the context of a developing market that presents relatively low levels of innovation-oriented small firms (Lederman et al., 2014). In its turn, predictors follow a long tradition of variables of interest addressed by dedicated research (e.g. Stel et al., 2007; Glaeser, 2007; Radosevic & Yoruk, 2013; Stam, 2009; Di Gregorio & Shane, 2003; Fini et al., 2011; Chatterji et al., 2013).

Taking into account the structure of dependent variables, we used Probit models with quasi-maximum likelihood (QML) standard errors. Some further details of estimations deserve attention. Regressions for the whole sample can only be assessed for "Entrepreneurs" and "Potential Entrepreneurs" as dependent variables, as "High-Impact Entrepreneurs", "Serial Entrepreneurs" and "Innovation" are cohorts of "Entrepreneurs". Likewise, "Mentors", "University Support" and "Networking" correspond to variables collected only for those students involved in entrepreneurial activity. Hence, they cannot be included in the analysis for the complete sample.

Table 1. Variables of Analysis

Dimension	Variable	Description
E	Entrepreneurs	Binary variable. It takes the value of 1 if the student is currently involved or has been involved in the past in an entrepreneurial venture; 0 otherwise.
	Potential Entrepreneurs	Binary variable. It takes the value of 1 if the student foresees the possibility of becoming an entrepreneur in the future; 0 otherwise.
	High-Impact Entrepreneurs	Binary variable. It takes the value of 1 if the entrepreneurial student expects his business to have over 25 employees within the next 5 years; 0 otherwise.
	Serial Entrepreneurs	Binary variable. It takes the value of 1 if the entrepreneurial student foresees the possibility of launching other ventures in the future (besides the current firm); 0 otherwise.
	Innovation	Binary variable. It takes the value of 1 if entrepreneurial students were involved in launching a product that was new to the world, new to the national/regional market or an improvement of an existing product.
I	Age	Age of students.
	Family Income	Family income group of students. Group 1: up to minimum wage; Group 2: between 1 and 2 minimum wage equivalents (MWE); Group 3: between 2 and 3 MWE; Group 4: between 3 and 5 MWE; Group 5: between 5 and 10 MWE; Group 6: between 10 and 20 MWE; Group 7: Above 20 MWE.
	Family Culture	Binary variable. It takes the value of 1 if members of the family have engaged in entrepreneurial activity; 0 otherwise.
	STEM Student	Binary variable. It takes the value of 1 if the student is enrolled in STEM programs (Science, Technology, Engineering or Math); 0 otherwise.
	Graduate Student	Binary variable. It takes the value of 1 if the student is enrolled in a graduate program; 0 otherwise.
S	Urban Agglomeration	Binary variable. It takes the value of 1 if the student is enrolled in a university located in a state capital or metropolitan area; 0 otherwise.
	High-Quality Univ.	Binary variable. It takes the value of 1 if the student is enrolled in a high-quality, research-oriented Higher Education Institution; 0 otherwise. We used the top 100 institutions in Brazil classified in the Scimago ranking[iii] as a benchmark. The following institutions were defined as high-quality: Getúlio Vargas Foundation, Federal University of the ABC, University of Brasília, University of Campinas, Federal University of Ceará, State University of São Paulo, Federal University of Bahia, Federal University of Juiz de Fora, Federal University of Mato Grosso, Federal University of Pernambuco, Federal University of Santa Catarina, Federal University of Rio Grande do Sul and Institute of Military Engineering. Other preeminent institutions in the Brazilian academic scenery were not included in the sample.
	Mentors	Binary variable. It takes the value of 1 if entrepreneurial students had support from a mentor; 0 otherwise.
	University Support	This variable was obtained through factor analysis comprehending categorical variables related to the satisfaction of entrepreneurs with support aspects offered by the university. These support items involved the quality of courses dedicated to entrepreneurship, availability of technological parks and incubators, access to investors and relationships with alumni. Extraction was obtained through Principal Components method with Varimax rotation and Bartlett Scores. The outcome variable explained 69.11% of the variance in original vectors.
	Networking	This variable was obtained through factor analysis comprehending categorical variables related to the importance of networks for the entrepreneurial process. These networks involve relationships with professors, other entrepreneurs, executives and alumni. Extraction was obtained through Principal Components method with Varimax rotation and Bartlett Scores. The outcome variable explained 85.22% of the variance in original vectors.

Additionally, since the variable "University Support" generates a high amount of missing values, estimations for entrepreneurial cohorts ("High-Impact Entrepreneurs", "Serial Entrepreneurs" and "Innovation") are run with and without this variable for robustness checks. As there are no observations for "Graduate Student" within the group of "High-Impact Entrepreneurs", this predictor is excluded from estimations for this dependent variable. Lastly, we include a squared term for "Age", aiming at identifying non-linear patterns for this indicator. Thus, applications of the general model described in Equation 1 can be stated as follows:

$$P(Entrepreneurs = 1 \mid x) = G(\beta_0 + \beta_1 Age + \beta_2 Age^2 + \beta_3 Family\ Income + \beta_4 Family\ Culture + \beta_5 STEM\ Student + \beta_6 Graduate\ Student + \beta_7 Urban\ Agglomeration + \beta_8 High\text{-}Quality\ University + \mu$$

Model I

$$P(\text{Potential Entrepreneurs} = 1 \mid x) = G(\beta_0 + \beta_1 Age + \beta_2 Age^2 + \beta_3 \text{Family Income} + \beta_4 \text{Family Culture} + \beta_5 \text{STEM Student} + \beta_6 \text{Graduate Student} + \beta_7 \text{Urban Agglomeration} + \beta_8 \text{High-Quality University} + \mu$$ **Model II**

$$P(\text{High-Impact Entrepreneurs} = 1 \mid x) = G(\beta_0 + \beta_1 Age + \beta_2 Age^2 + \beta_3 \text{Family Income} + \beta_4 \text{Family Culture} + \beta_5 \text{STEM Student} + \beta_6 \text{Urban Agglomeration} + \beta_7 \text{High-Quality University} + \beta_8 \text{Mentors} + (\beta_9 \text{University Support}) + \beta_{10} \text{Networking} + \mu$$ **Model III**

$$P(\text{Serial Entrepreneurs} = 1 \mid x) = G(\beta_0 + \beta_1 Age + \beta_2 Age^2 + \beta_3 \text{Family Income} + \beta_4 \text{Family Culture} + \beta_5 \text{STEM Student} + \beta_6 \text{Graduate Student} + \beta_7 \text{Urban Agglomeration} + \beta_8 \text{High-Quality University} + \beta_9 \text{Mentors} + (\beta_{10} \text{University Support}) + \beta_{11} \text{Networking} + \mu$$ **Model IV**

$$P(\text{High-Impact Entrepreneurs} = 1 \mid x) = G(\beta_0 + \beta_1 Age + \beta_2 Age^2 + \beta_3 \text{Family Income} + \beta_4 \text{Family Culture} + \beta_5 \text{STEM Student} + \beta_6 \text{Graduate Student} + \beta_7 \text{Urban Agglomeration} + \beta_8 \text{High-Quality University} + \beta_9 \text{Mentors} + (\beta_{10} \text{University Support}) + \beta_{11} \text{Networking} + \mu$$ **Model V**

Where the probability, **P**, of each entrepreneurial phenomenon is a function of a set of predictors, **G**, ranging between 0 and 1 (Wooldridge, 2000). To each variable is assigned a parameter $\boldsymbol{\beta_k}$ and $\boldsymbol{\mu}$ is an error term. Notice that in Models III, IV and V, "University Support" is in between parentheses because of its exclusion for robustness checks as mentioned above. Next, we analyze the empirical outcomes of models' estimations.

5. RESULTS

Firstly, we address the descriptive statistics of the dataset under analysis (Table 1). The variables related to entrepreneurial activity indicate that these individuals are relatively marginal in the sample – although these shares seem to be compatible with national-level evidence from the Global Entrepreneurship Monitor[iv]. Interestingly, a high proportion of individuals come from families with previous entrepreneurial experience. Graduate students represent a small share of our sample, while STEM students seem to be well represented. Most interviews were conducted with individuals located in state capitals and other metropolitan areas. The age range of the sample is quite broad, but central trends indicate that it mostly comprehends individuals in their 20's.

Table 1. Descriptive Statistics

	N	Mean	Min.	Max.	Std. Dev.	Variance
Age	2230	25.40	17	68	7.197	51.796
Family Income	2179	3.93	1	7	1.409	1.984
University Support	90	-.001	-1.807	1.985	1.000	1.000
Networking	270	1.48	-.204	5.50	2.404	5.780

	N	Frequency (1)	Frequency (1) %	Frequency (0)	Frequency (0) %
Entrepreneurs	2230	270	12.1	1960	87.9
Potential Entrepreneurs	2230	468	21.0	1762	79.0
High-Impact Entrepreneurs	127	12	9.4	115	90.6
Serial Entrepreneurs	270	28	10.4	242	89.6
Innovation	270	17	6.3	253	93.7
Family Culture	2230	1382	62.0	848	38.0
STEM Student	2230	661	29.6	1569	70.4
Graduate Student	2230	67	3.0	2163	97.0
Urban Agglomeration	2230	1389	62.3	841	37.7
High-Quality Univ.	2230	347	15.6	1883	84.4
Mentors	270	73	27.0	197	73.0

Estimations of regressive models are presented in Table 2. An initial assessment of empirical results allows verifying a relatively low level of predictive power across models. R^2

statistics range from 0.008 in Model II up to .284 in Model V.a. This situation can also be attested by the non-significance of several variables included in the model. We now turn to discuss the main findings and possible explanations for these dynamics.

Firstly, "Age" is a significant predictor of overall entrepreneurial activity with a positive sign. Hence, older students are more likely to be involved (or to have been involved in the past) with firm creation. The lack of significance in "Age sq." suggests that this relationship is rather linear in form. Nonetheless, "Age" is not a matter of relevance in the remaining models. A similar situation is identified for "Family Income", although this variable has a weaker statistical significance and it is also somewhat related to "High-Impact Entrepreneurs". This is a surprising result. One would expect that individuals coming from wealthier families would be more strongly associated with entrepreneurial ventures, considering their protection against higher levels of risk (Cuervo et al., 2005).

For the case of "Family Culture", this vector is positively related to entrepreneurial activity and envisaged entrepreneurship (Models I and II), indicating that previous experience with new ventures in the family can have an influential effect on the behavior of students. We can hypothesize that these students may learn from having close ties with entrepreneurs, as well as identifying potential career role models in their respective families as discussed in Shane (2010).

Table 2. Probit Estimations

	Model I	**Model II**	**Model III.a**	**Model III.b**	**Model IV.a**	**Model IV.b**	**Model V.a**	**Model V.b**
	Entrepreneurs	**Potential Entrepreneurs**	**High-Impact Entrepreneurs**		**Serial Entrepreneurs**		**Innovation**	
const.	-3.027*** [.387]	-.639* [.346]	-5.042** [2.180]	-6.378** [2.971]	-3.117** [1.495]	-2.044 [2.105]	-1.011 [1.623]	.953 [2.202]
Age	.065*** [.023]	-.019 [.021]	.131 [.111]	.182 [.161]	.031 [.075]	.006 [.116]	-.049 [.087]	-.096 [.126]
Age sq.	-.001 [.001]	.001 [.001]	-.002 [.001]	-.002 [.002]	-.001 [.001]	-.001 [.001]	.001 [.001]	.001 [.001]
Family Income	.048* [.027]	.012 [.021]	.199* [.108]	.154 [.143]	.069 [.093]	.038 [.127]	.002 [.111]	-.152 [.144]
Family Culture	.337*** [.077]	.220*** [.064]	-.172 [.351]	.180 [.504]	.087 [.256]	.330 [.370]	-.242 [.318]	-.341 [.403]
STEM Student	.064 [.082]	-.099 [.069]	-.313 [.347]	-5.525*** [.296]	.130 [.283]	.356 [.393]	-.344 [.322]	-.693 [.432]
Graduate Student	.135 [.195]	-.304 [.211]	-	-	.179 [.453]	.180 [.689]	.252 [.515]	.887 [.706]
Urban Agglom.	-.144* [.077]	-.065 [.066]	.225 [.342]	.195 [.424]	-.089 [.251]	.196 [.320]	-.344 [.304]	-.631 [.403]
High-Quality Univ.	.153 [.103]	-.017 [.088]	.219 [.470]	.399 [.552]	.988*** [.303]	.726* [.399]	.665* [.342]	.908** [.430]
Mentors	-	-	.090 [.351]	.578 [.525]	.717* [.389]	.478 [.443]	.649 [.447]	.645 [.493]
University Support	-	-	-	-.087 [.211]	-	.163 [.173]	-	-.091 [.156]
Networking	-	-	.228*** [.083]	.235** [.094]	.193*** [.066]	.048 [.083]	.208*** [.072]	.121 [.078]
Valid N	2179	2179	124	89	265	89	265	89
Rsq. (McFadden)	.071	.008	.159	.266	.267	.097	.284	.203

Std. Errors in brackets *sig. at 10%; **sig. at 5%; ***sig. at 1%

Unexpectedly, STEM students are not positively related (with statistical significance) to any of the dependent variables included in the analysis. On the contrary: these students are less likely to be involved in high-impact entrepreneurship than individuals from other areas of

knowledge. This situation can be attributed to the shortage of STEM professionals in Brazil, driving up wages in incumbent firms and reducing incentives for this group of students to become entrepreneurs. In its turn, the variable "Graduate Student" has no significance in the proposed models.

Thus far, we have addressed aspects related to individual traits of entrepreneurs. An overall assessment of this dimension suggests that non-observed factors – such as psychological features – may have a deeper connection with entrepreneurial activity than the variables contained in the dataset analyzed. Further research in this realm might consider, for instance, evaluating individuals' risk propensity and market expertise.

The appraisal of results from the systemic side of our models also renders weak results in an overall perspective. From our viewpoint, a possible explanation for this situation can be traced to the hostile regulatory environment for entrepreneurial activity in Brazil. While we understand that the academic ecosystem might exert effects on entrepreneurial propensity, it lies on top of an institutional framework (Ács et al., 2014). If institutions do not set incentives and support for individuals to engage in entrepreneurial endeavors, this might render other parts of systems of entrepreneurship (such as Universities) highly ineffective – despite initiatives to foster student entrepreneurship.

Analyzing each systemic variable independently, "Urban Agglomerations" are negatively related to overall entrepreneurial activity (Model I). While this is in contrast with evidence from developed nations (e.g. Glaeser, 2007), it is in accordance with findings for the Brazilian economy (Fischer et al., 2015). A possible explanation resides on the strong agglomeration diseconomies found in large cities located in this country. "High-Quality Universities" do not seem to generate more entrepreneurial students, but these centers of excellence are significantly connected to the emergence of "Serial Entrepreneurs" and "Innovation". This outcome is in line with recent results obtained for the Brazilian context (Fischer et al., 2017), suggesting that these institutions have a key role to play in promoting socioeconomic changes in the economic structure and its respective evolutionary trends.

The role of "Mentors" is of marginal relevance and it is statistically significant only for the case of "Serial Entrepreneurs", although even this outcome is not robust across the two specifications for this dependent variable. A striking result concerns the lack of relevance identified for the variable "University Support", although this outcome finds some support in the appraisal offered by Di Gregorio and Shane (2003). This vector is not associated with any of the entrepreneurial propensity functions to which it is assigned. This seems to be evidence of a lack of coordination and establishment of correct initiatives aiming at fostering entrepreneurial behavior in Brazilian academia. Lastly, the role of "Networking", a key aspect of successful academic entrepreneurship (Hayter, 2016) presents positive impacts for all the three instances in which it is evaluated ("High-Impact Entrepreneurship", "Serial Entrepreneurs" and "Innovation"), although its significance is not robust for models IV and V.

6. CONCLUDING REMARKS

This research has addressed the issue of determinants of student entrepreneurship in the context of Brazilian universities. A rather complete picture of the dynamics behind entrepreneurial activity, potential entrepreneurship, high-impact entrepreneurship, serial entrepreneurship and innovation in small ventures has been drawn. Several dimensions of interest concerning students' individual traits and systemic aspects were evaluated. As postulated by Ács et al. (2014), systemic effects related to the generation of entrepreneurial activity involve a series of connections among different dimensions of the socioeconomic environment. Flaws or inefficiencies in key components of these systems of entrepreneurship may hinder the overall production of new ventures. Our research has addressed in-depth the dynamics of one of these components: academic institutions. In this regard, what our findings

strongly suggest, as per the structure of our econometric models, student entrepreneurship seems to be a rather stochastic phenomenon in Brazil.

A direct implication of this perspective concerns the incipient nature of the idea of entrepreneurial systems in this particular country. The expected connections among systemic vectors (Isenberg, 2010) are weak and the "pieces of the puzzle" do not seem to fit together. Ultimately, this can have important detrimental effects on student entrepreneurship, depriving the National System of Innovation from the strategic benefits that these new firms could provide.

The role of high-quality universities has also been underscored as a key ingredient in the generation of innovation-driven new companies arising from the academic context. Nonetheless, these institutions are mostly public, thus subject to organizational rigidities that hinder a further exploration of its full potential. As a result, the interconnectedness of these schools with other elements of entrepreneurial ecosystems is often shaky. Although institutional advancements in fostering the implementation of technology transfer offices in Brazilian universities seem to have positive impacts on traditional, science-based academic entrepreneurship (Fischer et al., 2017), its effects on student entrepreneurship seem to have provided insignificant outcomes.

Additionally, a structural challenge that the Brazilian economy suffers in terms of entrepreneurial activity are those related to an inefficient regulatory environment. For instance, Lederman et al. (2014) reach the conclusion that building an institutional environment that fosters competition and improves the contractual environment ranks amongst the main challenges for innovation-driven entrepreneurial activity in Latin America. Audretsch et al. (2006) make reference to "entrepreneurship capital", understood as local-level institutions that foster entrepreneurial activity. For the Brazilian case, as per our evaluation, these conditions seem be operating at suboptimal levels.

As a matter of fact, if not tackled properly by dedicated policies, this building block of systems of entrepreneurship may actually hinder systemic dimensions to function effectively. Data from the Doing Business Report from the World Bank underscore these barriers. Even compared to other Latin American countries, Brazil performs poorly in terms of starting a business (28th position among 32 nations), tax compliance (30th) and international trade (30th). Such fundamental aspects of the entrepreneurial activity can render initiatives targeted at fostering systemic connections highly unfruitful. For instance, building specific university programs to develop a stronger entrepreneurial orientation in students is unlikely to shift the overall propensity of students to engage in establishing new ventures, provided the institutional settings do not favor such endeavors.

Lastly, the assessment contained in our research deals with a very sensitive and strategic issue for the long term, evolutionary patterns that developing countries' innovation systems can reach. Entrepreneurial human capital can be regarded as somewhat more relevant in low and middle-income countries, since these nations face a relative scarcity of skilled professionals (Iyigun & Owen, 1998). Understanding the systemic dynamics in which entrepreneurial activity takes place, particularly the often neglected case of student entrepreneurship, represents a fundamental step forward in generating knowledge that can guide future policymaking processes in these environments. We expect our endeavor may stimulate other researchers to delve into this 'hidden' phenomenon.

ACKNOWLEDGEMENTS

Authors acknowledge the database provided by Endeavor Brazil and Brazilian Micro and Small Business Support Service (Sebrae) and the financial support from the São Paulo Research Foundation (Fapesp). The usual disclaimer applies.

REFERENCES

Ács, Z., Autio, E., & Szerb, L. (2014). National systems of entrepreneurship: measurement issues and policy implications. *Research Policy*, 43(3), 47-494.

Aldrich, H.E., & Waldinger, R. (1990). Ethnicity and entrepreneurship. *Annual Review of Sociology*, 16(1), 111–135.

Aldrich, H.E., Renzulli, L., & Langton, N. (1998). Passing on privilege: resources provided by self-employed parents to their self-employed children. In: Leicht, K. (Ed.). *Research in Social Stratification and Mobility*. Greenwich: JAI Press.

Aldrich, H.E., & Langton, N. (1998). Human resource management and organizational life cycles. In: Reynolds, P.D. et al. (eds). *Frontiers of Entrepreneurship Research*. Babson Park, MA: Babson College, Center for Entrepreneurial Studies.

Audretsch, D., Keilbach, M., & Lehmann, E. (2006). *Entrepreneurship and Economic Growth*. New York: Oxford University Press.

Blackwell, J. E. (1989). Mentoring: An action strategy for increasing minority faculty. *Academe,* 75(5), 8–14

Boschma, R., & Martin, R. (2010). The aims and scope of evolutionary economic geography. [Papers in Evolutionary Economic Geography #10.01]. *Utrecht University - Urban & Regional Research Centre.*

Bruederl, J., & Preisendoerfer, P. (1998). Network support and success of newly founded business. *Small Business Economics*, 10(4), 213-225.

Aldrich, H. E., & Cliff, J. E. (2003). The pervasive effects of family on entrepreneurship: Toward a family embeddedness perspective. *Journal of Business Venturing*, 18(5), 573-596.

Bergmann, H., Hundt, C., & Sternberg, R. (2016). What makes student entrepreneurs? On the relevance (and irrelevance) of the university and the regional context for student start-ups. *Small Business Economics*, 47(1), 53-76.

Chatterji, A., Glaeser, E., & Kerr, W. (2013). Clusters of entrepreneurship and innovation. [Working Paper 19013]. *National Bureau of Economic Research Working Paper Series*.

Cowan, R., & Zinovyeva, N. (2013). University effects on regional innovation. *Research Policy*, 42(3), 788-800.

Cuervo, A. (2005). Individual and environmental determinants of entrepreneurship. *International Entrepreneurship and Management Journal*, 1(3), 293-311.

Cramton, C.D. (1993). Is rugged individualism the whole story? Public and private accounts of a firm's founding. *Family Business Review*, 6(3), 233–261.

Di Gregorio, D. & Shane, S. (2003). Why do some universities generate more start-ups than others? *Research Policy*, 32(2), 209-227.

Dorfman, N. (1983). Route 128: the development of a regional high technology economy. *Research Policy*, 12(6), 299-316.

Etzkowitz, H. (1998). The norms of entrepreneurial science: cognitive effects of the new university–industry linkages. *Research Policy*, 27(8), 823-833

Etzkowitz, H., Webster, A., Gebhardt, C., & Terra, B. R. C. (2000). The future of the university and the university of the future: Evolution of ivory tower to entrepreneurial paradigm. *Research Policy*, 29(2), 313–330.

Feldman, M. (2001). The entrepreneurial event revisited: firm formation in a regional context. *Industrial and Corporate Change*, 10(4), 861-881.

Fini, R., Grimaldi, R., Santoni S., & Sobrero, M. (2011). Complements or substitutes? The role of universities and local context in supporting the creation of academic spin-offs. *Research Policy*, 40(8), 1113-1127.

Fischer, B., Queiroz, S., & Vonortas, N. (2015). On the geographic distribution of knowledge-intensive entrepreneurship: an evaluation of the State of São Paulo, Brazil. *Annals of the XVI Latin-Iberoamerican Technology Management Conference*, Porto Alegre, Brazil, October 19th–22nd.

Fischer, B., Schaeffer, P., Vonortas, N., & Queiroz, S. (2017). Quality Comes First: University-Industry Collaboration as a Source of Academic Entrepreneurship in a Developing Country. *Journal of Technology Transfer*, forthcoming (Pre-print: https://link.springer.com/article/10.1007/s10961-017-9568-x).

Freytag, A., & Thurik, R. (2007). Entrepreneurship and its determinants in a cross-country setting. *Journal of Evolutionary Economics*, 17(2), 117-131.

Fritsch, M. (2002). Measuring the quality of regional innovation systems: a knowledge production function approach. *International Regional Science Review*, 25(1), 86-101.

Glaeser, E. (2007). Entrepreneurship and the city. [Working Paper 13551]. *National Bureau of Economic Research Working Paper Series*.

Glaeser, E., & Kerr, W. (2009). Local industrial conditions and entrepreneurship: how much of the spatial distribution can we explain? *Journal of Economics and Management Strategy*, 18(3), 623-663.

Gladwel, M. (2008). *Outliers: The Story of Success*. Penguin Books, London.

Grimaldi, R., Kenney, M., Siegel, D., & Wright, M. (2011). 30 years after Bayh–Dole: Reassessing academic entrepreneurship. *Research Policy*, 40(8), 1045-1057.

Guerrero, M., Urbano, D., Fayolle, A., Klofsten, M., & Mian, S. (2016). Entrepreneurial universities: emerging models in the new social and economic landscape. *Small Business Economics*, *47*(3), 551-563.

Hamilton, B. (2000). Does entrepreneurship pay? An empirical analysis of the returns to self-employment. *Journal of Political Economy*, 108(3), 604-631.

Hayter, C. (2016). Constraining entrepreneurial development: A knowledge-based view of social networks among academic entrepreneurs. *Research Policy*, 45(2), 475-490.

Hayter, C. S., Lubynsky, R., & Maroulis, S. (2016). Who is the academic entrepreneur? The role of graduate students in the development of university spinoffs. *Journal of Technology Transfer*, 1-18.

Henrekson, M., & Rosenberg, N. (2001). Designing efficient institutions for science-based entrepreneurship: Lesson from the US and Sweden. *Journal of Technology Transfer*, 26(3), 207-231.

Isenberg, D (2010). How to start an entrepreneurial revolution. *Harvard Business Review*, 88(6), 40-51.

Iyigun, M., & Owen, A. (1998). Risk, entrepreneurship, and human-capital accumulation. *The American Economic Review*, 88(2), 454-457.

Jansen, S., van de Zande, T., Brinkkemper, S., Stam, E., & Varma, V. (2015). How education, stimulation, and incubation encourage student entrepreneurship: Observations from MIT, IIIT, and Utrecht University. *The International Journal of Management Education*, 13(2), 170-181.

Kenney, M., & Patton, D. (2005). Entrepreneurial geographies: support networks in three high-technology industries. *Economic Geography*, 81(2), 201-228.

Laredo, P. (2007). Revisiting the third mission of universities: Toward a renewed categorization of university activities? *Higher Education Policy*, 20(4), 441-456.

Laursen, K., Reichstein, T. & Salter, A. (2011). Exploring the effect of geographical proximity and university quality on university–industry collaboration in the United Kingdom. *Regional Studies*, 45(4), 507–523.

Lederman, D., Messina, J., Pienknagura, S., & Rigolini, J. (2014). *Latin American entrepreneurs: many firms but little innovation*. Washington, DC: The World Bank.

Marchand, J., & Hermens, A. (2015). Student Entrepreneurship: A Research Agenda. *International Journal of Organizational Innovation*, 8(2), 266-281.

Lester, V., & Johnson, C. (1981). The learning dialogue: Mentoring. *New Directions for Student Services*, 15, 49-56.

Lévesque, M., & Minniti, M. (2011). Age matters: how demographics influence aggregate entrepreneurship. *Strategic Entrepreneurship Journal*, 5(3), 269-284.

Mowery, D. C. Shane, S. (2002) Introduction to the Special Issue on University Entrepreneurship and Technology Transfer. *Management Science*, 48(1), 5-9.

Politis, D., Winborg, J., & Dahlstrand, Å. L. (2010). Exploring the resource logic of student entrepreneurs. *International Small Business Journal*, 30(6), 659-683.

Radosevic, S., & Yoruk, E. (2013). Entrepreneurial propensity of innovation systems: theory, methodology and evidence. *Research Policy*, 42(5), 1015-1038.

Rasmussen, E., Mosey, S., & Wright, M. (2011). The evolution of entrepreneurial competencies: A longitudinal study of university spin-off venture emergence. *Journal of Management Studies*, 48(6), 1314-1345.

Roper, C. D., & Hirth, M. A. (2005). A History of Change in the Third Mission of Higher Education: The Evolution of One-Way Service to Interactive Engagement. *Journal of Higher Education Outreach and Engagement*, 10(3), 3-21.

Rosenthal, S., & Strange, W. (2001). The determinants of agglomeration. *Journal of Urban Economics*, 50(2), 191-229.

Rothaermel, F.T., Agung, S., & Jiang, L. (2007). University entrepreneurship: a taxonomy of the literature. *Industrial and Corporate Change*, 16(4), 691–791.

Siegel, D., & Wright, M. (2015). Academic Entrepreneurship: Time for a Rethink? *British Journal of Management*, 26(4), 582-595.

Slaughter, S., & Leslie, L. L. (1997). *Academic capitalism: Politics, policies, and the entrepreneurial university*. Baltimore: Johns Hopkins University Press.

Shane, S. (2003). *A general theory of entrepreneurship: the individual-opportunity nexus*. Cheltenham: Edward Elgar.

Shane, S. (2010). Born entrepreneurs, born leaders: How your genes affect your work life. Oxford: Oxford University Press.

Stam, E. (2009). Entrepreneurship, Evolution and Geography. [Papers in Evolutionary Economic Geography]. *Utrecht University - Urban & Regional Research Centre*.

Stel, A., Storey, D., & Thurik, R. (2007). The effect of business regulations on nascent and young business entrepreneurship. *Small Business Economics*, 28(2-3), 171-186.

St-Jean, E., & Audet, J. (2012). The role of mentoring in the learning development of the novice entrepreneur. *International Entrepreneurship and Management Journal*, 8(1), 119-140.

Tischler, J. (2014). Characteristics of technological base, pace of technological development, and growth of young technology-based firms. [Paper n. 96156]. *German National Library of Economics*.

Venkataraman, S. 1997. The distinctive domain of entrepreneurship research: An editor's perspective. In J. Katz & R. Brockhaus (Eds.), *Advances in entrepreneurship, firm emergence, and growth*. Greenwich, CT: JAI Press.

Wright, M., Clarysse, B., Lockett, A., & Knockert, M. (2008). Mid-range universities' in Europe linkages with industry: knowledge types and the role of intermediaries. *Research Policy*, 37(8), 1205–1223.

Wooldridge, J. (2000). *Econometric analysis of cross section and panel data*. Cambridge: The MIT Press.

ENDNOTES

[i] Endeavor is a non-profit organization that aims to catalyze long-term economic growth by selecting, mentoring, and accelerating the best high-impact entrepreneurs worldwide.

[ii] SEBRAE is a Brazilian Micro and Small Business Support Service. Sebrae is a non-profit private entity with the mission of promoting the sustainable and competitive development of small businesses.

[iii] This ranking corresponds to a classification of academic and research-related institutions according to a composite indicator based on research performance, innovation outputs and societal impact (http://www.scimagoir.com/methodology.php).

[iv] Data from GEM can be downloaded at < http://www.gemconsortium.org/data>.