Seed Capital and the Equation of Investment in Entrepreneurship

Mauricio Vladimir Umaña Ramírez

Ph.D. in Business Competitiveness and Economic Development
Professor & Researcher, Faculty of Business and Management
Catholic University of El Salvador, El Salvador
mauricio.umana@catolica.edu.sv; mvumanar@gmail.com

Abstract

The investments in seed capital of incubators in a country in a specific time horizon is a topic without scientific studies in developing economies. The same issue happens with the relation that these investments have with the increase of entrepreneurial projects that have been administered by the same funding.

Traditionally, the topic of entrepreneurship in El Salvador has been in the spotlight of various international and national funds, a database of some of the most common funds of ventures has been built. In recent years, the increase in projects is hypothesized to be due to the increase of funds annually in projects of entrepreneurship, and, therefore, we would be discouraging entrepreneurship at the country level if we left some incubators currently operating without funds.

The study is exploratory and descriptive, using econometric regressions. The results of the research are presented and an Investment Function in Entrepreneurship, which models the increasing behavior of projects in the seed capital funds is proposed, and an attempt is made to propose an equation model of the incubators of the sample based on the capital invested in the time horizon; this is called in this research The Equation of Investment in Entrepreneurship.

Finally, this research offers a discussion about investments in the future of entrepreneurship, which can contribute to the understanding of the creation of firms.

Keywords: Seed Capital, Entrepreneurship, Creation of firms, Companies.

Introduction

Nowadays, one of the biggest problems for the development of incubators in Europe is the lack of entrepreneurship and the low development of seed capital and networks of business angels (Aernoudt, 2004). In addition, this author proposes that business incubator concepts are much better developed in America than in Europe, although the etymological roots of the concept of incubation are linked to Europe.

Klofsten & Jones-Evans (2000) propose that one of the greatest challenges that European economies face is the comparatively limited capacity to turn technological achievements into business successes. For this reason, academic institutions are taking a proactive approach, adopting a direct business approach in contributing with the industry. As an example: In Berkeley Extension Programs in California, USA, the University is working with Berkeley

Chamber of Commerce and Silicon Valley, adopting a direct business approach in contributing to the industry from the University.

To Aernoudt (2004), the principle of the incubator is that premature infants receive care in controlled conditions, in our case, these premature are the start-up companies. A true business incubator is more than an office space with a shared assistant; it offers management services, access to financing, legal counseling, operational "know-how" among other services that the company carries out. That is why incubator concepts are much better developed in America than Europe, because in America, the incubator is trying to guide the process in controlled conditions, but in Europe, as an old culture, they are trying that the invisible hand rules the game of start-ups.

Conceptualization

Based on the work of Klofsten & Jones-Evans (2000), there are eight types of Academic Entrepreneurship Activities that can be carried out and promoted by the University, as presented in Table 1.

Table 1. Activities of Academic Entrepreneurship, based on Klofsten & Jones-Evans (2000)

Activity	Description
Large Scale Science Projects	Large research projects are obtained with external funds, either through public awards or industrial sources
Research Contracts	Specific research projects are taken with the university system as a service for external organizations
Consultancy	Scientific or technological expertise is offered to solve specific issues
Patents / Licenses	The exploitation of patents / licenses by industry of the research results
Spin off	The formation of new firms or organizations to exploit the research results of the university
External Teaching	The development of short courses for non-university staff / students and external organizations
Commercial Sales	Sales of Products developed within the University
Testing	Provision of testing institutes, laboratories, examination or calibration to non-university individuals and external organizations

For this research, "Spin off" is defined as: "a new company that is formed by individuals who were previous employees of a parent organization (...) close to a main technology that originated in a parent organization and that was transferred to the new company "(Carayannis et al., 1998).

From the above, it is clear that a first step for the University could be to offer entrepreneurship opportunities to students through a business incubator, and then, some years

after the development of the model of business or technological incubator, the University could offer the creation of Spin off companies.

Along the same path, about the motivations and obstacles to generating incubators, Cooper, Hamel, & Connaughton (2012) state that the physical proximity of resident companies influences the rest of the incubators to which they compete. This suggests that the design of the incubator site is important to create a business environment. Based on the case study created by Cooper et al., (2012) also indicates that the motivations of the company for networking include a strong desire for social support to help manage stress, membership security as part of a group, and access to incremental material or information resources.

Likewise, the main obstacles start-ups face in order to participate in networking and build relationships with others, include extreme time constraints during the start-up phase, lack of information from other residents, lack of confidence about keeping the information of the innovations safe, and lack of confident anchoring sources of funding, such as seed capital, (Cooper, Hamel, & Connaughton 2012).

Based on Bergek and Norrman (2008), incubators have become a phenomenon in many parts of the world and they are seen as a tool for the development of technology-based growth firms. Also, considering the large amounts of money invested in incubators and the identification of best practices of models of incubator is of importance. The framework suggested by these authors has three components: **selection, business support and mediation**, as well as, two forms of project selection are distinguished: **idea-focused selection and entrepreneur-focused selection.** The model also proposes a selection of **"picking The Winners"** and **"survival-of the fittest".** Apparently there is a difference in business support from "let-do-let go" to a model of "strong intervention".

For the authors, Hernández & Carrà (2016) business incubators possess limited resources to create value. The incubators need to ensure sufficient resources to provide the demanded incubation services at the level and quality required. These authors quote Somsuk & Laosirihongthong (2014) proposing how resources are divided in the business incubator:

- Human resources composed by the management team of the incubator and staff including knowledge and experience;
- Technology in product resources, e.g., laboratories, technological capabilities and skills;
- Financial resources referred to financial support; and
- Organizational resources which refer to planning, coordinating, monitoring routines and relationships of an organization.

The concept of Seed Capital (2018) for this research is the initial capital used when starting a business, often coming from the personal assets of the founders, family or friends, to cover operational expenses and attract venture capital funds. The type of funds is frequently obtained in exchange for a capital stock in the company, although with less contractual formality than the standard capital financing. For the same reason, that banks and capital investors see seed capital as an investment "at risk" by the promoters of a new company, capital providers can wait until a business is more established before making large venture capital funding investments.

For this research, Seed Capital investments are analyzed in a horizon of 2014-2018 and the average seed capital investment delivered to entrepreneurs oscillates from ($ 2,500 to $ 25,000) and is mainly offered by international organizations, foundations national or international incubators, and any other type of international fund.

Audretsch and Keilbach (2004) explain what we mean when talking about business capital and why it should influence economic production. They have also proposed a production function model that includes several different business capital measures for the German regions. The results indicate that business capital is an important and significant factor when determining production and productivity.

Research by Audretsch and Keilbach (2004) suggests a new direction for policies that focus on instruments aimed at increasing corporate capital. Business capital is defined as the endowment of factors in a region leading to the creation of new business, this implies a high number of individuals able to take the risk of starting a new business. It also implies the existence of a regional environment that supports start-up activities, such as innovation, formal and informal networks, and also a general social acceptance of the entrepreneurial activity, the activity of bankers and venture capital agents, willing to share risks and benefits involved.

It is intended to state in this introduction, that there is some relation of the lack of creation of new companies in our society, the same lack of growth of employment sources and social deterioration, such as crime and violence since it is expected that private companies either developed in isolation or, in the best case, as a product of the entrepreneurial ecosystem through business incubators and through access to financing, will be able to unleash this vicious cycle and turn it into a virtuous cycle.

According to Shane & Venkataraman (2000) there are methods to exploit entrepreneurship opportunities that are organized in the economy; the most common is the creation of new companies. For purposes of this research, the impact of each new company created is analyzed from the seed capital funds. Research in industrial organization has shown that entrepreneurship is less likely to take the form of new ventures when imperfections in the capital markets make it difficult for independent entrepreneurs to get financing (Cohen & Levin, 1989).

From the analyzed information above, the following hypothesis is proposed:

H1: ***The creation of new companies has a positive relationship with the sustainability of investments in a horizon of at least three years.***

It is important to note that in 2017-2018 El Salvador was the worst-ranked country in the world, in Organized Crime by the World Economic Forum (Schwab, 2018) and that the problems of violence and crime do not allow the development of business freely in a market economy. Moreover, it is estimated that in El Salvador 9 out of 10 businesses suffer extortions, hence the innovative business models that universities can offer, through: spin off, business incubators, accelerators, virtual offices, e-commerce, legal firms that manage the legal status of a company, can be a few examples of the entire ocean of possibilities that university students can create.

The research tries to answer the following questions: **What are the sources of seed capital and access to financing that exist for University students in El Salvador? Is there any relationship between the creation of new ventures and the investment in seed capital over time?** This first question might indicate the future steps, which the University should promote as an alternative to the shortage of employment, which have accelerated as found in this investigation; the second question may indicate the accelerated model of seed capital growth throughout time and the impact on the creation of new companies.

Methodology

The research was exploratory and descriptive, in such a way that the results are representative for the study population who was composed by incubators or investment funds in the country of El Salvador, and that are supported on a permanent basis at least with 3 years of sustainability of the fund, whether by the State or by national or international programs in support of economic development and creation of new enterprises or ventures.

The sample was probabilistic, of the simple random type, of all incubators or investment funds in companies that exist in El Salvador, due to the concentration of these investment offices or incubators with investment funds located geographically in San Salvador (capital city) and Santa Ana (second city in economic activity), of course, the creation of new companies served by these seed capital funds occurs throughout the geographical area of El Salvador. The unit of analysis of this research is the incubator or the investment fund, whether national or international.

The sources of information have been obtained with the support of the relationship that the Association of Entrepreneurs of El Salvador (AESAL) holds with these institutions. The face-to-face interview was mainly used in all cases to obtain, at first hand, the relevant information from the case studies that are the subject of the investigation. Although it was a constrained that very few funds 22% of those contacted, denied access or did not provide information, arguing that they did not have the information requested. Being this a study focused on quantitative research, it was necessary that all the institutions involved had statistical data. All institutions were informed of the origin and purpose of the study.

It should be noted that in all the cases of incubators and funds studied, the information was ordered or at least it was well managed by the institutions. In all cases the meeting was in person and the first point of contact was to request a meeting by email. In addition, documents related to the subject, provided by the incubators themselves, the entrepreneurial ecosystem and other sources of international funds, were consulted.

In order to analyze data, the information obtained was collected in a Meta Matrix, with 7 funds, and after analyzing the growing behavior of almost all seed capital funds for enterprises in a horizon of at least 3 consecutive years, the graph shown in Fig.3, in the same way, by Annual Investments (Inv1 = Investment in Year 1, Inv2 = Investment in Year 2, Inv3 = Investment in Year 3), versus variable P (Number of New Projects or Companies) shown in Fig. 4. This presents a trend which has been analyzed by econometric regressions, based on the GRETL software. After the GRETL software offers the regressor or coefficient that describes the behavior of The Equation of Investment of Entrepreneurship for this country. Based on that, at the end of the paper, it suggests, it could exist a different Equation for each country, or industrial sector (cluster) based on the Seed Capital or Initial Investments needed.

Results

For simplicity and presentation reasons, the information obtained from the interviews made to each seed capital fund that was considered to meet 3 important conditions: the fund had statistics of at least 3 consecutive years, the fund is available to serve university students in a minimum range of 19 years of age, the continuity of the program or project or its contribution will generate more entrepreneurship programs in the future.

Of the 7 funds interviewed that meet the above conditions, there is a scenario of different capital funds in Entrepreneurship that ranges from ($ 96,600; $ 3,000,000) per incubator as

shown in Fig. 1. Likewise, the Seed Capital assigned for entrepreneurs for each Incubator as seen in Fig. 2, ranges from ($ 10,000; $ 1,800,000). This shows the differences in the impact and scope of each incubator.

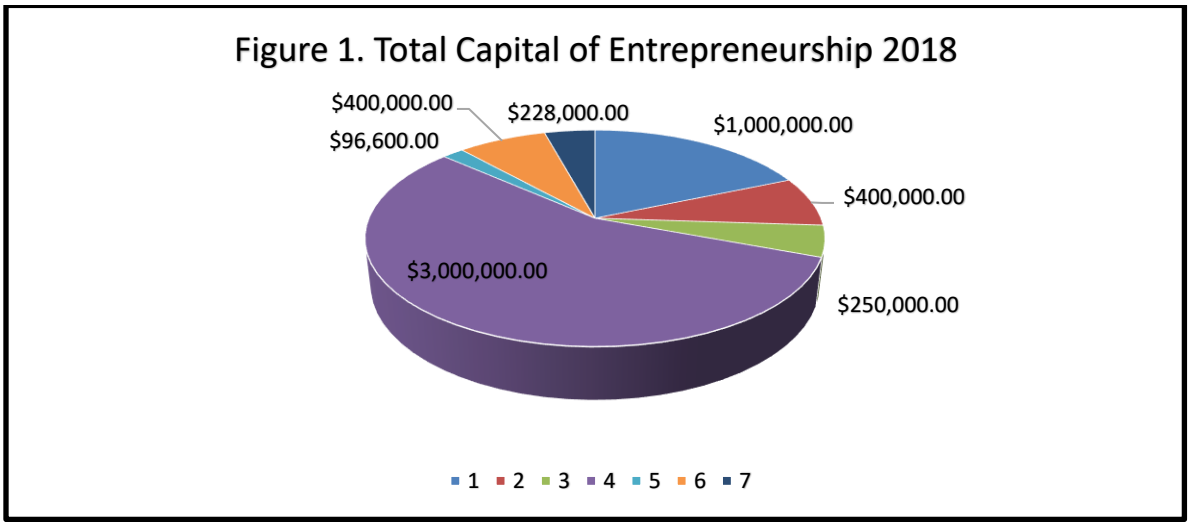

Figure 1. Total of Capital for Entrepreneurship 2018 per incubator.

When analyzing the growing behavior of almost all seed capital funds for enterprises in a horizon of at least 3 consecutive years, the graph shown in Fig.3 can be analyzed, in the same way, by Annual Investments (Inv1 = Investment in Year 1, Inv2 = Investment in Year 2, Inv3 = Investment in Year 3), versus variable P (Number of New Projects or Companies) shown in Fig. 4. This presents a trend which has been analyzed by econometric regressions, based on the GRETL software.

The aim is to find a relationship of the creation of new companies with the sustainability of investments over a period of at least three years. The base line represented by the total of all the funds of incubators accessible to university students would be: Total Capital in Ventures 2018 ($ 5,374,600.00) and Total Investments in Seed Capital 2018 ($ 2,976,800.00).

Results of Investments in Seed Capital during 3 years.

In the seven analyzed incubators the hypothesis about the sustainability of investments and the creation of companies is accepted because there is an increasing growing relationship in investments every year. The data is composed by incubators that have been operating in El Salvador for at least three years and the behavior of these incubators presents incremental and sustainable investments every year. This is the best fitted model with the function evaluating between $P = f [Inv1, Inv2, Inv3] + \varepsilon$, and a corrected R-square of 0.995998 with p-values of Inv1 = 0.0486, Inv2 = 0.0390, Inv3 = 0.0106, considering a very good explanatory capacity of the model in 99.60% over the creation of new companies and simultaneously taking into account the complexity of the model.

Finally, in this case, the hypothesis about the function is strongly supported by the database at a confidence level of 0.05, see table 2.

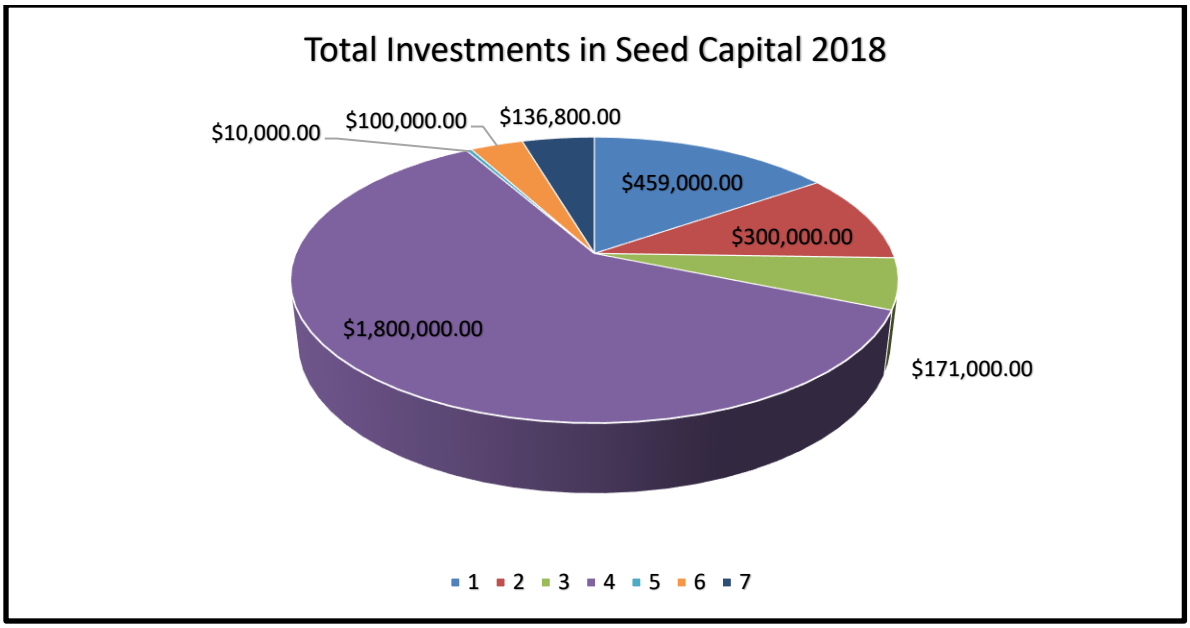

Figure 2. Total of Investments in Seed Capital for 2018 per incubator.

Discussion

The process of creating new companies in El Salvador is atomized and in some ways fragmented, but the results of this research allow us to visualize a path for the focus of funds in seed capital transparently audited by various actors such as: Universities, International Organizations, Civil Society Organizations, Government, Think Tanks, among others. Therefore, it is proposed that the principles for strengthening the collaboration of all the actors of the Entrepreneurial Ecosystem are very important.

The Equation of Investment in Entrepreneurship

Although it has not been clearly stated in the literature, a function and an equation of this type, on the variable P (Creation of New Companies) and the sustainability of Inv1 (Investments in Year 1), Inv2 and so on, in the horizon of this research (3 years at least), it is confirmed that there is a Function and an Equation of Investment in Entrepreneurship which is presented below:

$$\mathbf{P} = \boldsymbol{\alpha} + \boldsymbol{B_1}[\boldsymbol{Inv_1}] + \boldsymbol{B_2}[\boldsymbol{Inv_2}] + \boldsymbol{B_3}[\boldsymbol{Inv_3}] + \boldsymbol{\varepsilon}$$

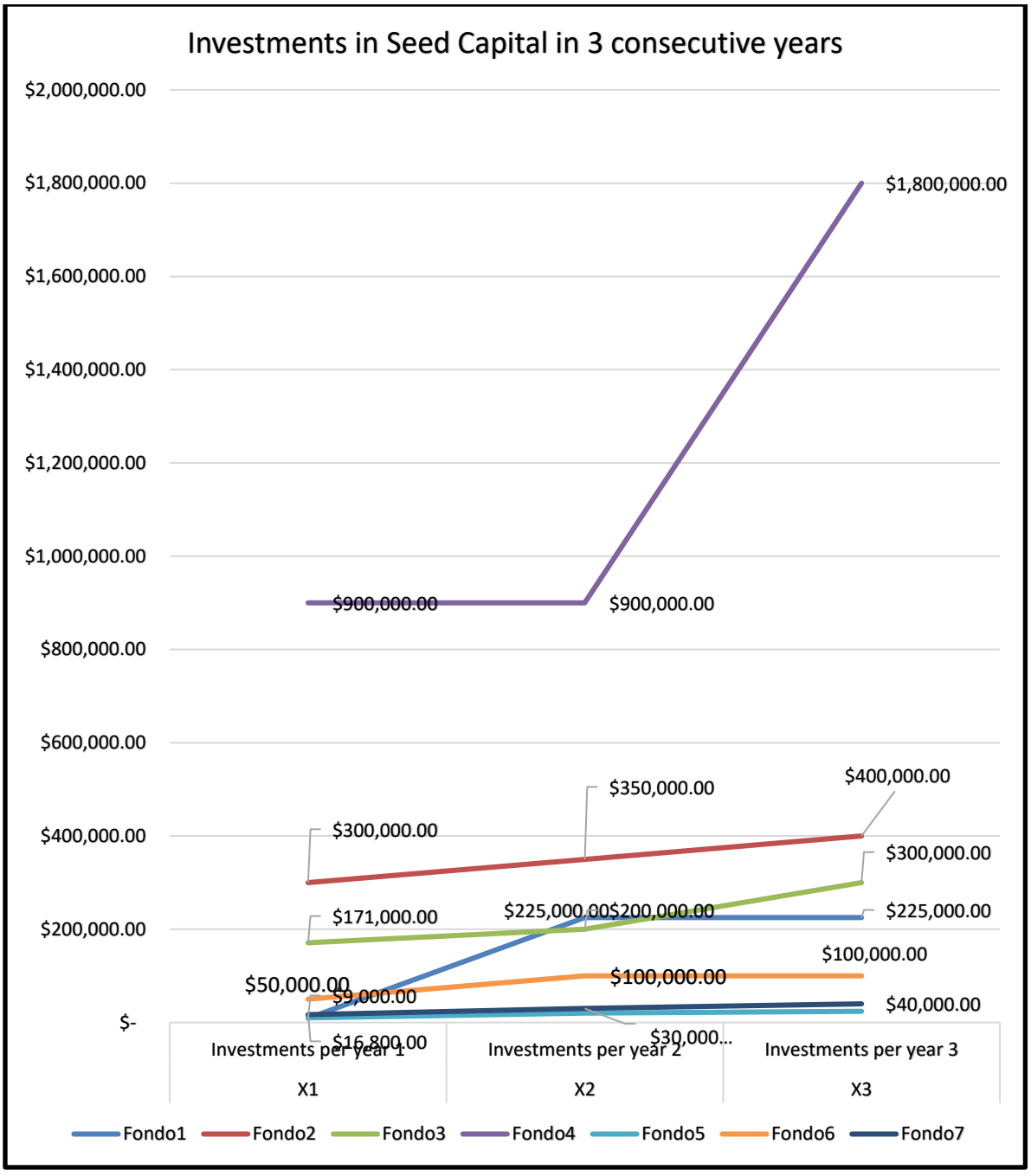

Figure 3. Investments in Seed Capital in 3 consecutive years per fund.

Similarly, for the sample defined as accessible funds in Seed Capital for University Students, this particular sample could present an investment behavior as the following, which could be of great interest for national and international funds:

$$\mathbf{P} = \mathbf{25.5487} + \mathbf{0.000403034}[\boldsymbol{Inv_1}] - \mathbf{0.000468855}[\boldsymbol{Inv_2}] + \mathbf{0.000464064}[\boldsymbol{Inv_3}] + \boldsymbol{\varepsilon}$$

Absolutely, I would recommend using this formula with the minimal investments of $100,000 in any year and increasing, due to the order of the investments that represents.

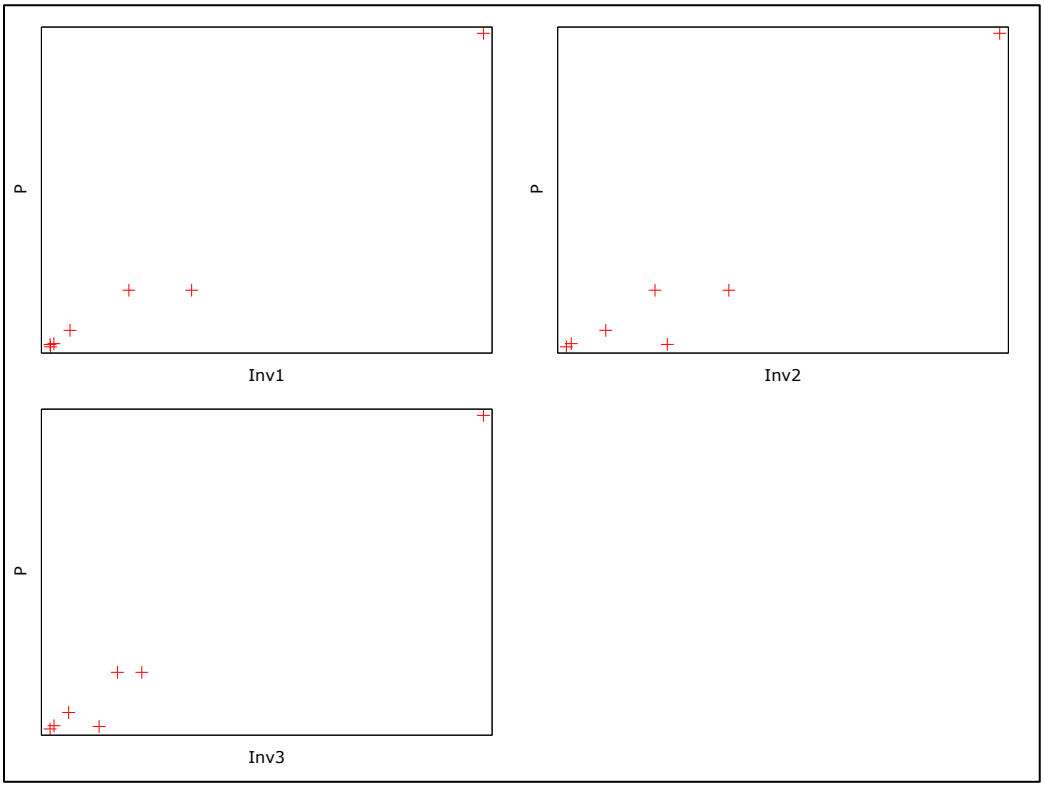

Figure 4. Investments in Seed Capital versus P in 3 consecutive years of analysis.

The future of Entrepreneurship in El Salvador

Based on Haar, Pradilla & Suárez (2011) venture capital is the driving force of entrepreneurship in Latin America. The access to debt financing was just beginning to expand when the credit crisis unfolded in 2007; major impediments remain in the Latin American region to the proliferation of venture capital and investments in ventures, from the lack of a business culture, which stops the development of new companies, to the imperfections of the credit markets, inadequate application of laws and regulations, insufficient investor protection and deficient corporate governance structures. In several countries, the perception of corruption is widespread and judicial systems are weak.

The previous panorama is not far away to El Salvador, but the opportunities are enormous for the growth of new companies, there are cases of study like the one in Alberta, Canada, decades ago, proposed by Dolan & Giffen (1988) which has introduced models of financing, through the ***Junior Capital Pool (JCP),*** which allows participating companies to gain access to the public offering of securities market, particularly in high-risk sectors, and the new companies in these areas make significant contributions to the economic diversification or job creation.

Table 2. Results of Empirical Research

Model 1: Econometric Regression, using observations 1-7

Dependent variable: P

	Coefficient	**Typical dev**	**Statistic t**	**P value**	
Const	25.5487	11.8195	2.162	0.1194	
Inv1	0.000403034	0.000125229	3.218	0.0486	**
Inv2	−0.000468855	0.000133355	−3.516	0.0390	**
Inv3	0.000464064	8.10422e-05	5.726	0.0106	**

Level of Significance: 0.05 **

Average of dep. variable	178.7143	D.T. dep. variable	280.7560
Sum of squares	946.4191	D.T. regresion	17.76156
R-cuadrado	0.997999	Adjusted R-squared	0.995998
F(3, 3)	498.7188	P Value (F)	0.000152
Log-likelihood	−27.10628	Crit. of Akaike	62.21257
Crit. de Schwarz	61.99621	Crit. of Hannan-Quinn	59.53841

In the same field, Dimov & Murray (2008) have found that factors such as: investor's age, investment time and location of the fund, are important, and also, the size of the fund and the existing number of firms in the portfolio exert opposite influences in the seed capital level of risk capital firms. As well, technology companies in the early stages are vulnerable to capital shortages and research is consistent with the availability of seed capital, which is seen as particularly valuable in the initial commercialization and exploration of new technologies (Gompers and Lerner, 1999). The stated above is a valuable example in the early stage of the innovation cycle where time and money must be invested significantly before the creation of a commercially viable product or service.

The behavior of national and international funds and university and government projects can focus on industrial sectors towards smart specialization, that ensure the creation of new companies that offer products and services of high value added, even for export. This is what the ***Equation of Investment in Entrepreneurship*** tries to explain in this seminal work.

Finally, Uribe (2017) clarifies that Seed Capital is characterized by having no return and being associated to federal or national funds in Mexico, unlike, it can be seen that in El Salvador there is a diversification of national and foreign funds by international organizations, NGOs, Governments, Foundations and even Universities. Although after interviewing various incubators, the actors of the entrepreneurial ecosystem still interact with each other and that this system is fragmented, atomized and dispersed. This research proposes that there was a promising advance in the last 5 years (2014-2018) in the creation of new seed capital funds and these have a positive relationship with the creation of new companies. It is necessary to carry out more research and to be able to measure in the future the success rates in the creation of new

companies and the sustainability of the new companies for the economic development in both developing and developed countries.

Acknowledgment:

This research has been carried out by Catholic University of El Salvador (UNICAES) during the year of 2018. Through this, the University was connected with ventures such as the ***Young Industry Project of ASI-USAID***. The ***Yawal-Insert*** Incubator, the ***BCIE*** (Central American Bank for Economic Integration), which provide of international funds for different projects of the Entrepreneurial Ecosystem of El Salvador. Thanks to all the incubators participating in this research.

References

Aernoudt, R. (2004). Incubators: tool for entrepreneurship?. *Small Business Economics, 23*(2), 127-135.

Audretsch, D., & Keilbach, M. (2004). Entrepreneurship capital and economic performance. *Regional Studies*, 38(8), 949-959.

Bergek, A., & Norrman, C. (2008). Incubator Best Practice: A Framework. *Technovation*, 28(1-2), 20-28.

Carayannis, E. G., Rogers, E. M., Kurihara, K., & Allbritton, M. M. (1998). High-Technology Spin-Offs from Government R&D Laboratories and Research Universities. *Technovation*, *18*(1), 1-11.

Cohen, W. M., & Levin, R. C. (1989). Empirical studies of innovation and market structure. *Handbook of Industrial Organization*, 2, 1059-1107.

Cooper, C. E., Hamel, S. A., & Connaughton, S. L. (2012). Motivations and obstacles to networking in a university business incubator. *The Journal of Technology Transfer*, 37(4), 433-453.

Dimov, D., & Murray, G. (2008). Determinants of the incidence and scale of seed capital investments by venture capital firms. *Small Business Economics*, 30(2), 127-152.

Dolan, A., & Giffen, B. (1988). The Alberta junior capital pool: assessing effectiveness as a seed capital instrument. *Journal of Small Business & Entrepreneurship*, 6(1), 19-28.

Gompers, P. A., & Lerner, J. (1999). What drives venture capital fundraising? (No. w6906). *National Bureau of Economic Research, Harvard Business School.*

Haar, J., Pradilla, M., & Suárez, L. (2011). CAPITAL DE RIESGO IMPULSOR DEL EMPRENDIMIENTO EN AMÉRICA LATINA. *Debates IESA*, 16(4).

Hernández, R., & Carrà, G. (2016). A conceptual approach for business incubator interdependencies and sustainable development. *Agriculture and Agricultural Science Procedia*, 8, 718-724.

Klofsten, M., & Jones-Evans, D. (2000). Comparing academic entrepreneurship in Europe–the case of Sweden and Ireland. *Small Business Economics*, 14(4), 299-309.

Schwab (2018). Reporte de Competitividad Global 2018-2019. Foro Económico Mundial. Geneva, Suiza. Recuperado el 26 de noviembre de 2018. Disponible en:

http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf

Seed Capital (2018). INVESTOPEDIA. Recuperado de: https://www.investopedia.com/terms/s/seedcapital.asp

Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review*, 25(1), 217-226.

Somsuk, N., & Laosirihongthong, T. (2014). A fuzzy AHP to prioritize enabling factors for strategic management of university business incubators: Resource-based view. *Technological Forecasting and Social Change*, 85, 198-210.

Uribe, E. (2017). Capital Semilla y Capital Emprendedor. *Entrepreneur Mexico*, 25(11), 40-42.