Recurrent funding in entrepreneurship: an analysis of repeated events.

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Abstract

There is extensive evidence of differential factors in accessing external capital for entrepreneurs. The effects of receiving monitored external funds on the survival probability of entrepreneurial projects have also been well-described by specialized literature. However, it has not yet been analyzed how entrepreneurs acquire different kinds of funds at different stages during the entrepreneurial process and their relationships with entrepreneurship success. This paper aims to fill these gaps by analyzing the relationship between a broad set of entrepreneurial tangible and intangible assets and their impact on receiving external funding several times during new ventures' gestation. Receiving external funding is a critical factor for entrepreneurial success. This article extends from the Matthew effect theory, explaining how initial advantages lead to further cumulative advantages in external funding access.

Keywords: entrepreuneurship, external funding, event history.

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1. INTRODUCTION

Attributes not related to entrepreneurial talent can determine who receives external funding. Previous research found that more than half of emerging ventures' funding comes from the personal contributions of founders (Gartner, Frid, and Alexander, 2012). In addition, more educated and affluent entrepreneurs are significantly more likely to obtain external funding (Gartner, Frid, and Alexander, 2012). Personal wealth is also a primary driver of acquiring external financing (Frid, Wyman, Gartner, and Hechavarria, 2016), reinforced by the circumstance that low-wealth entrepreneurs are less likely to obtain funding from formal institutions (Frid *et al.*, 2016). However, it has also been found that when low and moderately wealthy entrepreneurs get over the gestational phase (Reynolds and Curtin, 2008), their likelihood of abandoning their intentions of becoming a business owner is similar to any other entrepreneur (Frid, Wyman, and Coffey, 2016). Without economic constraints, less privileged entrepreneurs can perform as well as the wealthiest.

Based on the Matthew effect theory (Merton, 1968), which depicts the social phenomenon of accumulated advantage, this study examines the biases in entrepreneurial financing and their effects. Precisely, by using event history analysis, this research estimates the effect of receiving recurrent funding for firm creation and survival. Also, this research sheds light on the factors associated with receiving recurrent financing during the early entrepreneurial stages, applying event history analysis for repetitive events.

The estimates of this research result in several contributions. First, the study shows that the recurrence and timing of the external funding received by entrepreneurs matters for firm survival and creation. Second, this project found that some characteristics pointed out by the

Matthew effect theory shapes the entrepreneurial reward system, such as the entrepreneur's socio-economic background, but also some specific actions that entrepreneurs can take toward reducing asymmetrical information between them and lending agents. Finally, from a methodological perspective, this research highlights the necessity to account for the repeated nature of the funding event when analyzing entrepreneurial financing.

2. THEORY DEVELOPMENT AND HYPOTHESES

2.1 The Mathew Effect

External funding increases the likelihood for an entrepreneur to create a new company and reduces the probability of not being successful in this endeavor (Hechavarría, Matthews, and Reynolds, 2016). However, previous research has found that the possibility of being funded is not directly related to entrepreneurship talent. Several personal characteristics such as wealth, ethnicity, and other intangibles like human and social capital increase their probability of receiving these funds (Frid, Wyman, and Coffey, 2016; Frid, Wyman, Gartner, and Hechavarria, 2016; Frid, 2014; Gartner, Frid, and Alexander, 2012). Merton (1968) developed a framework for explaining why higher economic and social status actors receive greater rewards, such as funding, than those at a lower status for a similar activity. He turns this situation the Matthew effect[1] when rewards are allocated based on social status and not on the efforts made. As a result, a self-reinforcing mechanism appears in a reward system.

Fields such as Science and Technology and Society examined how access to funding reinforces a trajectory of gaining new grants, does confirming the Mathew effect (Azoulay,

[1] Inspired in the Bible verse found in the Gospel of Matthew: "For whosoever hath, to him shall be given, and he shall have more abundance: but whosoever hath not, from him shall be taken away even that he hath."

Stuart, and Wang, 2014; Petersen *et al*., 2013; Arora, David, and Gambardella, 1998; Arora and Gambardella, 1997; David, 1994; Medoff, 2006; Zuckerman, 1972). The self-reinforcement trajectory increases research group productivity and explains the increasing concentration of publications around a stable group of scholars. Further, successful grant funding impacts positively on a research group due to a cumulative advantage based on the positive feedback between research and resources, in turn, increasing a team's productivity (David, 1994). However, a reputation effect can also explain this increase in productivity, which emerges when other researchers focus their attention on the work of "the elite" (Arora *et al*., 1998; Medoff, 2006), minimizing allocation time in the search for new relevant publications. David (1994) claims that the "Matthew effect" could lead to a stable equilibrium, where the allocation of funds is targeted not necessarily on projects' quality, but rather on the number of citations that a particular researcher has. In Economics (Pereira and Suárez, 2017; Antonelli and Crespi, 2013; Medoff, 2006) and Education (Glasswell, 2001; Stanovich, 1986) the Mathew effect has been tested as well, the results finding a similar pattern.

Two theoretical considerations make the Matthew Effect worth investigating in Entrepreneurship Studies, first, the asymmetrical information between lenders and entrepreneurs, and second, the high transaction costs of the small business loan market. Asymmetrical information (Rothschild and Stiglitz, 1976; Akerlof, 1970) is found when there is unbalanced information between supply and demand, leading to inefficient outcomes in specific markets. Since new ventures typically do not disclose financial information about their trade, products, and services, asymmetric information is particularly problematic for small business loans (Berger and Udell, 1998). Lenders have to monitor borrowers, leading to a second theoretical argument for investigating the Matthew effect in entrepreneurship: the high transaction costs (Coase, 1937)

of the entrepreneurial loan market. While these costs are not problematic for larger companies, they can make these loans unreachable for NEs. Consequently, on the supply side, banks and lenders, in general, are typically not willing to lend capital to small companies, while on the demand side nascent small firms are off the market (Ang, 1992).

The evaluation of an entrepreneurial project is a cognitive activity. Like any other type of assessment, this activity requires an affirmative or negative decision about what is being evaluated. Any cognitive action involves information processing. However, complete information about entrepreneurial projects is hardly ever available, and for that reason, evaluators —banks, agencies, venture capitalists, and angel investors — search for signals for assessing entrepreneurial projects, because they need cognitive heuristics and shortcuts to process high amounts of incomplete and asymmetric information. These signals are reviewed in more detail in the next section and help in developing the hypotheses of this study.

2.2 Factors associated with entrepreneurial funding

Some factors associated with external funding are related to an entrepreneur's economic and social status, while others to the specific actions of an entrepreneur for acquiring funding. Among economic and social factors, a primary driver for acquiring external funding an entrepreneur wealth. Even the decision to become an entrepreneur is subject to an individual’s net worth capacity (Evans and Jovanovic, 1989). Frid, Wyman, Gartner, and Hechevarría (2016) found that personal wealth is a primary driver for acquiring external startup financing. Also, low-wealth entrepreneurs are less likely to get external funding, and even when they do so, they receive lower amounts compared to wealthier entrepreneurs (Frid, Wyman, Gartner, and Hechevarría, 2016; Frid, Wyman, and Coffey, 2016; Frid, 2014; Reynolds, 2011). Frid, Wyman, Gartner, and Hechevarría (2016) observed the impact of the wealth of an entrepreneur on venture

creation and performance during its gestational phase (Reynolds and Curtin, 2008). They found that low wealth and moderately wealthy nascent entrepreneurs face liquidity constraints, influencing the performance of the new ventures. Consequently, low and moderately wealth entrepreneurs are more likely to abandon the startup process during the gestation period. However, once low and middle wealth entrepreneurs pass that phase, their likelihood of deserting is similar to the wealthy entrepreneurs. Therefore, and as Frid Wyman, Gartner, and Hechevarría (2016) point out, low and middle-wealth entrepreneurs face liquidity constraints, but they are as capable as wealthier entrepreneurs once they pass the financial constraints of the gestational phase. Thus, personal wealth is a crucial factor in obtaining external funding recursively due to two reasons: first, its positive relationship with external funding and on second extending the gestational phase, which is the period when NEs could get external funding. Therefore, the first hypothesis is:

H1: *Less wealthy nascent entrepreneurs will be less likely to acquire external funds recurrently than wealthier business founders.*

A similar logic applies to social capital. Entrepreneurs' career trajectories have a remarkable impact on their firm's growth, as shown by Burton, Sørensen, and Beckman (2002). The accumulation of social capital facilitates access to information and tangible resources such as credit and financing tools. Uzzi (1999) found in his study on existing firms,

"the ability to meet financial selection criteria is a product of a firm's characteristics as well as the socially arranged opportunity structures within which it is embedded. Firms with embedded relations and high networks complementarity are more likely to be deemed credit

eligible and to receive lower cost financing (…) Thus, market-making –or the creation of exchanges for mutual benefit– depends on social relations and networks." (Uzzi; 1999, 502).

While there is no difference in the amount of social capital between entrepreneurs and the general population, the formers use it differently: entrepreneurs are more skillful in taking advantage of their connections and ties (Liao and Welsch, 2005). As mentioned, low-wealth entrepreneurs are less likely to get funded compared then wealthier entrepreneurs, as Casey (2014) demonstrated, the support provided by community-based organizations increases their credit access. As social capital seems to affect the quality and results of an entrepreneur's ability to get funded, it is hypothesized that

H2: *Entrepreneurs with higher levels of social capital are more likely to obtain external funding recurrently.*

In addition, there are also factors associated with receiving funding based on an entrepreneur's actions, and not from here social or economic origin. NEs can reduce the asymmetrical information and transaction costs by developing signals for lenders, such as business plans, patents, or financial projections. Entrepreneurs that develop business plans receive higher funding amounts (Hopp, 2015) because such plans are associated with persistence in the process of business creation (Liao and Gartner, 2006). Kirsch, Goldfarb, and Gera (2009) indicate that business plans have a critical purpose in entrepreneurship, namely the role of acquiring a costly signal. Honig and Karlsson (2004) also affirm that business plans are legitimation devices which communicate to investors that entrepreneurs understand the rules of the game but reveal little to none about their abilities. Scholars have pointed out that business planning reduces entrepreneurial uncertainty. Liao and Gartner (2006) found that pre-venture

planning increases the chances of emerging firm persistence in high uncertainty contexts. For those NEs who are confident about their competitive and financial situation, planning is less relevant. Also, Liao and Gartner (2006) found that business planning significantly increases the likelihood of firm creation and persistence. Brinckmann and Sung Ming (2015) also show that NEs look for external financing develop business planning activities, and finding that education helps them to engage in business planning activities and formally set up business plans. In contrast, prior work experience has a weak effect on developing business plans.

As signals for obtaining funding, financial projections have been the focus of research less than business plans. However, there is evidence that entrepreneurs develop them more often when their new venture operates in markets where intangible assets such as patents or R&D spending are critical to reducing uncertainty (Cassar, 2009). Also, patents infer reputation for NEs' (Hsu, 2004; Lounsbury and Glynn, 2001). Funders interested in high-tech new ventures look for evidence of NEs' prior accomplishments, like patents (D. H. Hsu, 2007). Thus, a set of hypotheses is proposed to test how these signals affect NEs' recursive financing:

H3a: *Nascent entrepreneurs who develop business plans are more likely to receive external funding recurrently.*

H3b: *Nascent entrepreneurs who develop financial projections are more likely to receive external funding recurrently.*

H3c: *Nascent entrepreneurs who develop patents are more likely to receive external funding recurrently.*

2.3 Effects of recurrent external monitored funding

Behind the idea of a potential Matthew effect in entrepreneurial financing, there is an underlying hypothesis: Receiving externally monitored funding several times provides an

advantage to NEs in their goal of creating a new firm. Frid (2014) and Gartner, Frid and Alexander (2012) studied new companies' capital structure in the nascent context, demonstrating that NEs tend to use personal funds as the primary funding source during the earliest stages of the entrepreneurial process. Hecheverria *et al*. (2016) challenged these findings by using event history analysis and confirming that a capital structure that contains external funds (equity) is positively associated with accelerating new firm creation during the gestational phase. They also found that firms with a capital structure that contains external loans and equity are less likely to disengage from the entrepreneurial process. They suggest that external sources of capital could add more value to investee firms than private money from savings. As a result, there appears to be a relationship between a firm's capital structure and external funds, with firm creation and survival. Thus, receiving external funding recursively during the early stages could accelerate firm creation and reduce disengagement, because acquiring these funds steadily during the gestational phase can increase the share of external funds in the capital structure new venture. Therefore, the underlying hypotheses are;

H0a*: Receiving monitored external funding several times extends firm survival*

H0b*: Receiving monitored external funding several times accelerates firm creation*

3. METHODS

Receiving external funding can happen several times during a new venture's gestational phase. Thus, time is a central dimension for this research reported here, and longitudinal studies offer the appropriate data structures to follow NEs through time. The Panel Study of Entrepreneurial Dynamics (PSED) is a representative longitudinal sample of individuals attempting to start businesses in the U.S. PSED offers substantial research advantages, such as

avoiding the biases found in other longitudinal studies for entrepreneurship, such as the survivorship and the recall biases. The former happens when the study gathers information about operating ventures and not for those that disengage during the period of study, while the latter occurs when surveying established entrepreneurs about past events (Gartner *et al*., 2004). The PSED-I and II datasets are the primary sources used in this study

3.1 Sample

The sample in this study resulted from matching PSED-I, II, and the PSED harmonized transitions database. PSED-I and II offer a representative and a publicly available[2] sample of NEs at the U.S. scale focused on the business formation process. This study provides data on new venture founders on the timing to create a new firm or to disengage from the start-up process (Gartner and Shaver, 2012). To be considered a NE during the screening process, the respondent had to answer that:

a) "[they] considered themselves in the firm creation process;

b) [they] had been engaged in some behavior to implement a new firm—such as having sought a bank loan, prepared a business plan, looked for a business location, or taken other similar actions;

c) [they] expected to own part of the new venture;

d) the new venture had not yet become an operating business" (Reynolds and Curtin, 2008, p. 172).

Based on these screening questions, 830 and 1214 individuals were selected for the samples of PSED-I and PSED-II, respectively. PSED-I has a maximum of four waves for each

[2] Access for PSED-I, PSED-II and the consolidated data set can be found at www.psed.isr.umich.edu

entrepreneur collected between 1999 and 2003, while PSED-II consists of a maximum of six waves for each case, collected between 2005 and 2012.

Matching PSED-I and II resulted in 2044 cases. However, only those categorized as "good cases"[3] (1599 entrepreneurs) in the PSED harmonized transition dataset were considered. From those cases, 41 were removed due to the lack of information about household net-worth as other 26 cases because their conception dates were defined after the first interview, adding another period of observation (before gestation) for those cases which was not of interest for this study (see Figure 1). As a result, 1532 cases are under analysis for this research.

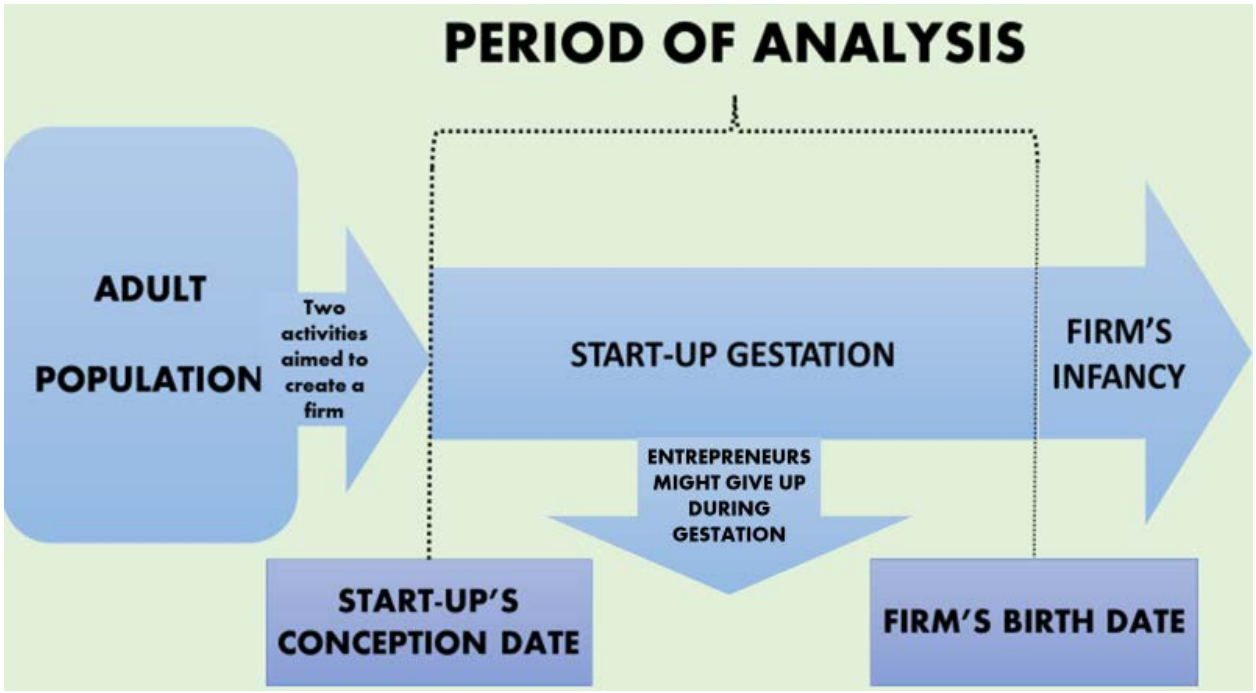
The period under observation was the entrepreneurial gestational phase. Gestation starts when conception, and it is completed when NEs disengage from creating the new firm or when it is finally created. More specifically, conception takes place when two intended activities aimed to create a firm[4] has have been taken within a twelve-month window[5] (Reynolds and Curtin, 2008, 2011). Figure 1, based on the work of Reynolds, Gartner, Greene, Cox, and Carter (2008), describes the entrepreneurship process under the PSED framework, highlighting the gestational phase in it (Reynolds, 2017; Reynolds and Curtin, 2008; Reynolds, Carter, Gartner, and Greene, 2004).

[3] "Good cases" are those qualified as active nascent entrepreneurs for which there are one or more follow-up interviews

[4] These possible startup activities are: Invested own money; Began business plan Developed model, prototype; Purchased materials, supplies, parts; Define markets to enter; Promote products or services; Sales, income, or revenue; Leased, acquired major assets; Talk to customers; Financial projections; Full time start-up work; Saving money to invest in firm; Phone book listing for business; Established bank account for firm; Obtained supplier credit; Began to organize start-up team; First use of physical space; Hire lawyer; Business plan finished; Model, prototype fully developed; Signed ownership agreement; Proprietary technology developed; Invested own money; Investment in legal business; Know listed in Dun and Bradstreet; Signed ownership agreement; Full-time start-up work; Invested own money; Received patent, copyright, trademark; Signed ownership agreement; Signed ownership agreement; Invested own money; Full time start-up work; Signed ownership agreement; Invested own money; Full time start-up work; Full time start-up work. Serious thought on starting a company it is an activity asked, but it is not considered to start or end counting gestations since virtually all entrepreneurs mentioned it. (from Reynolds, 2017)

[5] The specific date that defines gestation is the first of the two activities within the 12 months period.

Figure 1 - Conceptualization of the entrepreneurial process period



During the gestational phase, the startup's creation or disengagement from the entrepreneurial process can occur. The definitions of startup creation and disengagement are defined in section 3.2.1.

3.2 Variables

3.2.1 Dependent variables

When the objective is to analyze the time-to-events, there is a need for using an event indicator and either time-to-event or time-to-censoring measurement. Based on the hypotheses of

this research, there are several time-to-event variables modeled: firm creation, survival, receiving external monitored funding, or duration of gestation period until none of these events happens (censoring). Time begins with the startup's conception date, and it is measured as the number of months-to-event or months-to-censoring.

The event indicator changes depending on the model evaluated. The first model tests the underlying hypotheses, whether the recurrent reception of monitored funding matters for firm survival. In this case, disengaging from the gestational phase occurs when an entrepreneur reports that no one is managing the startup anymore. The second model tests whether receiving monitored funding several times affects firm creation. In this case, the event occurs when the entrepreneur reports start-up profits for the first time, defined as positive month cash flow for six of the past twelve months in PSED-II and three of the past twelve months in PSED-I (Reynolds and Curtin, 2008). Those cases that have not reached a resolution (firm's disengagement or creation) after the observation period constitute entrepreneurs labeled as "still trying" and will be the right-censored cases.

After evaluating the effects of recurrent monitored funding, this research aimed to understand the factors associated with receiving it. For that exercise, the event is receiving external monitored funding (REMF). The definition of external monitored funding used in this research is the same applied by (William B. Gartner, Frid, Alexander, & Carter, 2009a), in other studies done using PSED datasets (Frid, Wyman, Gartner, and Hechavarria, 2016; Frid, 2014). Virtually all entrepreneurs use personal and other team members' funds to invest in their projects. However, in terms of acquiring funds from external sources, Gartner *et al*. (2009) note that two categories emerge with different levels of oversight and involvement: unmonitored and monitored funding sources. If the former includes funding coming from family members,

friends, second mortgage, or credit cards. These sources are not strictly monitored in terms of how the funds are or will be used.

In contrast, monitored sources include bank or finance company loans, Small Business Administration credit, venture capital, and credit coming from a current employer granted after a thorough understanding of the business or financial plan. In those cases, NEs must provide some indication of how they are planning to use these funds or, in case of loans, when they will be paid back. Also, this type of funding can be subject to governmental policy, through public funding or through programs to foster and facilitate loans for NEs. Thus, receiving externally monitored funding (REMF) is the third event of interest.

Since there is no exact date associated with REMF in PSED, it is approximated using the time from conception to the first interview when the entrepreneur reported receiving its first externally monitored fund. The subsequent REMF events are the time-gaps in months between the interviews that the entrepreneur reported receiving externally monitored funds. The PSED interviews usually were conducted approximately every 12 months[6] for each entrepreneur (Appendix E). This date is the most effective and accurate approximation of the time of receipt of external funding. In the case of models explaining externally monitored funding, censoring defines for those companies that have either disengaged, created the company, or have never received externally monitored funding during the period of observation.

3.2.2 Independent variables

3.2.2.1 Firm survival and creation models

The effects of REMF on firm creation and survival are analyzed by developing a similar model that Hechavarría *et al*. (2016) applied to understand the effect of funding sources (equity

[6] While there are some extreme observations, most cases have time-gaps around 12 months between PSED interviews. That is possible to be seen in the average time as well as the median time between interviews available in Appendix A.

and debt) on the same dependent variables used here. With some adjustments adapted to the questions of this study, virtually the same variables that Hecheverria *et al*. (2016) used are included here, but letting them vary with time. This study included funding times, a categorical variable that measures whether the startup has not received any external monitored funding (=0), has received it once (=1), has received least twice (=2). This variable aims to test hypotheses 0a and 0b, the effect of REMF on firm survival and creation.[7]

Wealth impacts the probability of disengaging from the entrepreneurial process (Frid, Wyman, and Coffey, 2016; Frid, Wyman, Gartner, and Hechavarria, 2016). For that reason, the entrepreneur's household net-worth is included. Values were standardized using 2005 prices based on the recommendations of Reynolds and Curtin (2008). Since this variable was asked only for the first PSED interview, it is not time-dependent and accounts only for the respondent's household net worth. The size of the organization influences the disengagement from the start-up process, as Carroll and Hannan (2000) demonstrated. For this reason, a time-varying variable that measures the number of start-up owners (individuals or organizations) for each PSED wave is included. The variable sweat equity accounts for the team's total hours of work on the startup, for each PSED interview.

The number of men on the start-up team (owners) is also included females start smaller businesses compared to males (Fairlie and Robb, 2009). There are also links between motivations and aspirations to become entrepreneurs based on race: whites are more internally motivated and have higher expectations to become entrepreneurs, and on the other hand, unemployment and low wages motivate African-Americans to start new companies (Sabbaghi, 2018; Singh, Know, and Crump, 2008). Thus, the number of men on the startup team is included

[7] It could have been possible to create a variable that measures the number of all funding events, but the second category was restricted to two or more to avoid the possible correlation with the time that a counting variable of funding events can have.

to account for the former, and the number of Caucasians on the startup for the latter. Because these variables can vary with time, both are time-varying variables for each PSED wave available. Entrepreneurs' age is an essential factor for start-up survival and creation. Hechavarría *et al*. (2016) used five variables to control for the number of members on the start-up teams age between 18-24, 25–34, 35–44, 45–54, and 55–99 and the same variables were applied in this study. These variables vary with time, depending on the number of owners within each age-range[8].

Entrepreneur's growth preference is a dummy variable that accounts for entrepreneurs' over-optimistic tendencies, leading them to underestimate competition and overestimate growth aspirations (Delmar and Shane, 2003). Startup's degree of innovativeness is a categorical variable ranging from 0 to 3. This variable is categorized 0 when the (a) entrepreneur reports that the products and services are not a novelty[9], (b) their report the decision to not spending funds on R&D, and (c) report that their new venture is not hi-tech. When the entrepreneurs affirm one of these three categories, the degree of innovativeness is labeled 1. This variable is categorized 2 when the entrepreneur reports at least two of these and 3 when all of them were affirmed.

A business plan is associated with persistence in the entrepreneurial process, especially if entrepreneurs develop them one during the early stages (Liao and Gartner, 2006). Thus, a control for having a plan or not, and for the type of business plan for each PSED wave is included. This variable is categorical ranged from 0 to 3, and it is labeled 0 when the entrepreneurs did not develop a business plan, 1 when they have an unwritten plan, 2 when they have an informal plan, and 3 when they developed a formal written plan. Financial projections reduce uncertainty in

[8] Unfortunately, PSED I asked age only for the five more important owners; thus, when one of these variables is "5" it means that there are five or more startup owners within that range. However, less than 0.05% of total PSED-I observations declared having more than 5 owners. In the case of PSED II, this number increases to 1.06%.
[9] This category measures if products or services to be provided by the new venture were available five years ago

highly uncertain markets (Cassar, 2009); thus, this time-varying variable is included, and it is labeled 1 when the entrepreneur report having financial projections in a specific PSED interview and 0 otherwise. Team industry experience is a variable that measures the number of years of experience in the same industry of the startup for each owner. It is an aggregate of each owners' years of experience, and it is also time-varying. Based on the positive attitudes that can emerge towards entrepreneurship due to previous exposure to it (McCann, 2017), the number of *prior start-up attempts* is also a time-varying variable, accounting for the number of former startups that each team member individually intended. Since PSED-I contains only the respondent's educational level, it is measured using a categorical variable that accounts for only the respondents' level and not the entire team. This variable uses 0 as base if the entrepreneur has a high school degree or less; tech, community, or some college = 1, college or some graduate training = 2, master's degree =3, or Ph.D. degree = 4.

A categorical variable start-up principal economic activity is included to control for the effects of the economic sector. This variable equals 0 when the startup expects to operate in the business service market, 1 in the extractive sector, 2 in transforming sectors, =3 in consumer-oriented sectors, and 4 for other sectors/NA. Also, total funds in logs are included regardless of the source secured by the start-up team. Gartner, Frid, and Alexander (2012) demonstrated that NE uses their funds as the primary source of funding during the early gestational phase and as these individuals advance in the process, their likelihood of acquiring external sources of debt and equity increases. Therefore, a time-varying variable that accounts for the percentage of personal funds on start-up total funding is included. Also, a time-varying variable is used, measuring the unmonitored external funds as a percentage of total startup funding. Lastly, conception lag is included based on the recommendation of Yang and Aldrich (2012) to account

for left truncation when evaluating firm survival and creation using PSED. This variable accounts for the time in months of the first interview minus the conception date in months. This variable was interacted with time to account for the proportional hazard assumption of the Cox regression model (Cox, 1972), described in Section 4.

3.2.2.2 Recursive funding models

As a second step after analyzing firm survival and creation using Cox regression models, the goal will be to test hypotheses 1, 2, and 3a, b, and c. To meet these objectives, a set of standard and conditional frailty models (explained in the next section) are applied. One of the most cited articles aimed to understand the effects of social and economic origin on receiving funding grants using PSED is the article of Frid, Wyman, Gartner, and Hechavarría (2016). Receiving "funding" can happen several times, making it a potential repeated event. For that reason, the models used in this paper differ from those applied in Frid, Wyman, and Coffey (2016). The same variables utilized in Frid, Wyman, Gartner, and Hechavarría (2016) were included, to have a threshold to compare with, adding the specific variables to test the hypotheses of this paper.

Some variables already described are also used for these models. These variables are conception lag, type of business, level of education variables, number of team's prior start-up attempts, the number of white/caucasians in team, the number of men in team, percentage of personal funding in total funding, and the age-range variables. Household net worth was divided into tertiles to test hypothesis 1. If it is addressed linearly using a continuous variable, it will be possible to know how an additional dollar of net-worth affects receiving funding. However, and taking into account that information is lost when a continuous variable is transformed into a

categorical one (Osborne, 2017b), testing a continuous variable adds no value to test the hypothesis of this study. Using a continuous variable will not help in the objective to know how the wealthier performs against the non-wealthy. Also, it will not reveal at which threshold net-worth becomes explicative of receiving external monitored funding. The option of dividing house-hold net-worth into three equal percentiles was done following Frid, Wyman, and Coffey's (2016) study, which addressed a similar issue using tertiles.

In entrepreneurship studies, scholars have measured social capital using different approaches. Casey (2014) used years of industry experience, and years of management experience, as proxies for social capital. It is well-known from the literature that entrepreneurs with senior management experience are perceived as being stronger candidates by third parties, making them more likely to obtain external funding (Burton *et al.*, 2002). Therefore, team managerial experience (in years) measures a status-based social capital. Regarding industry experience, Hellmann and Puri (2002) found that teams with relevant experience in a specific industry are aware of critical resources and key individuals in that domain.

It is important to highlight that industry experience has been linked with entrepreneurs' human capital, as well. Previous work experience in the same industry can help entrepreneurs in enhancing their tacit knowledge on different dimensions, especially about how to interpret information, and then perceive and evaluate opportunities in the economic sector within which they aim to operate (Muñoz-Bullon, Sanchez-Bueno, and Vos-Saz, 2015; Shane, 2000). While recognizing the former, for the goal of this research, which is to investigate the entrepreneur's access to external funding, it is more important to consider the social capital side of industry experience. That is because industry experience operates connecting entrepreneurs to funding networks that may otherwise not be available, or signal lower risk to outside investors, as argued

by Gartner *et al*. (2012). Thus, industry experience is interpreted here as a status-based social capital as well. Therefore, team industry experience (years) in the start-up economic sector is measured as described in the previous section, but it is entered squared since Frid, Wyman, Gartner, and Hechevarría (2016) found a curvilinear relationship between this variable and receiving external funding.

Additionally, Newbert and Tornikoski (2012) quantified entrepreneurs' social capital through its networks measuring a specific number of individuals, who have provided resources to the emerging organization and are not part of the start-up team. To properly evaluate the data, family and friends were removed to ensure that strong ties will not be related to the weak ties that can provide an emerging firm with new resources. This approach relies on Granovetter's (1985) distinction between strong and weak ties (bonding and bridging social capital). Strong ties involve significant investments of time and energy, whereas weak ties are acquaintances. Strong ties may help gain access to emotional support and assistance in the case of emergencies. Weak ties may especially aid in finding assets (Green and Haines, 2008). It is through weak ties that entrepreneurs can exploit social capital. Based on the previous, a numeric variable, social capital – bridging, will count numbers of non-family and non-friend helpers, aiming to measure the concrete entrepreneurs' network. Social capital – bonding is another control variable that measures the number of non-owner family helpers. Table 1 simplifies the social capital concepts and variables used in this research.

Table 1- Social capital concept, variables, and previous research

Social capital concept	***Variables applied***	***Previous PSED research that applied the concepty***
Status-based social capital	Team's managerial experience (years) Team's Industry experience (years)	Casey (2014)
Network-based social capital	Bridging social capital (numberf of people)	Newbert an Tornikoski (2012)

Regarding hypothesis 3a, 3b, and 3c, the aim is testing three signals that might reduce asymmetrical information. A business plan is measured as described previously, as well as financial projection. Regarding patents, they are placed into the same question as other signals: the specific question is: *"there are trademarks, and copyrights (as well as patents) granted for the new venture?"*. Thus, the variable patents, trademarks, and copyrights granted will = 1 when the entrepreneurs answered "yes" to the last question, otherwise is coded = 0.

Following Frid, Wyman, Gartner, and Hechavarría (2016), this study includes another set of control variables. Startups located in or near a metropolitan area have more opportunities to acquire formal, external financing compared to those in rural zones. Thus, a dummy variable, *new venture in metropolitan area* will be coded = 1 when the startup is located in metro areas, otherwise will be coded 0. The *start-up legal form* coded as 0 = sole- proprietorship (base); 1=partnership; 2=limited liability company; 3=C- or S-corporation; and 4=not yet determined; 5=other. Startup type codes are 0= independent new venture; 1=takeover of existing business; 2=franchise; 3=multilevel marketing initiative; and 4=startup sponsored by an existing business[10].

3.3 Models

The first objective of this study is the impact of REMF on event occurrence while controlling for a wide range of fixed and time-varying covariates, using a similar model as Hechavarría's *et al*. (2016). The event of interest is exiting the gestational phase via either new firm creation or giving up the intention to do so. Previous efforts exploring external funding during startup gestation did not use event history analysis techniques and, therefore, did not account for censoring (Frid, 2014; Gartner e*t al.*, 2012). Consequently, this research uses event

[10] Procedures in R-script for variable construction and models can be provided by contacting the author.

history analysis and employed two Cox proportional hazards regressions (Cox, 1972) to investigate, if receiving funding more than one-time impacts positively on either firm survival or firm creation.

Based on Allison (2014), the modeling strategy is as follows. The probability that an entrepreneur experiences firm creation in the interval from *t* to *t + s*, given that the entrepreneur was at "risk" at time *t*, is denoted *P(t, t + s)*. This probability is divided by *s*, which is the length of the time interval, and if *s* become smaller until the ratio reaches a specified limit, it is defined as the continuous-time hazard, denoted by *λ(t)*, formally

$$\lambda(t) = \lim_{s \to 0} \frac{P(t, t+s)}{s}$$

A basic Cox regression model aims to explain the continuous-time hazard for subject *i* as formally defined

$$\lambda_i(t) = \lambda_0(t) e^{X_i \beta + X_i + \delta}$$

where the baseline hazard function λ_0 is unspecified, is interpreted as the hazard function for subject *i* whose covariates all have the value of zero. Consequently, Cox models do not have an intercept term. The second part of the equation shows a linear function of an exponentiated set of *β* covariates, some of them fixed and others time-varying. The δ coefficient is the categorical variable external monitored funding times aimed to test Hypothesis 0.

A different model set that accounts for the repeated nature of receiving external monitored funding was developed to explore associated with recurrent financing. Since REMF allowances can occur more than one time during the gestational phase, a methodological approach designed to explain repeated events is needed. If the repeated nature of a potential recurrent event is taken into account, estimators can be biased (Amorim and Cai, 2015; Allison,

2014; Mills, 2014; Twisk, Smidt, and De Vente, 2005). The Cox model is both biased and inefficient in typical repeated event problems due to the correlation among events. Using a simple Cox model in for addressing repeated events violate the assumption that events are independent (Box-Steffensmeier and De Boef, 2006).

There are several advantages of using recurrent event models; addressing heterogeneity issues is being the most prominent. In addition, some NEs can be "frailer" than others. For example, they have different levels of information about funding sources, how to complete forms, the funding process in general, and other unobservable characteristics that make some NEs more likely to receive external monitored funding. When there is heterogeneous susceptibility to the risk of recurrent events, the frailty model must be applied (Amorim and Cai, 2015).

Frailty models incorporate heterogeneity into the estimator by making assumptions about the frailty distribution and including it in the model estimates. The underlying logic of frailty models for the research questions explored here is that some entrepreneurs are inherently more or less likely to obtain REMF than others, and the distribution of these effects can be approximated. Frailty models treat repeated events as a particular case of more general unit-level heterogeneity. In this case, the random effect is across entrepreneurs and constant over time, as seen in the formula below

$$\lambda_i(t) = \lambda_0(t - t_{k-1})e^{X_{ik}\nu + X_{ik}\pi + X_{ik}\rho + X_i\beta + \omega_i}$$

where X_i is the *ith* row of a covariate matrix *X*. The frailty model incorporates a random effect ω to the Cox regression equation that represents the subgroup for individual frailties, assumed to be an independent sample of a distribution with a mean 0 and a variance of 1. The term $(t - t_{k-1})$ accounts for the gap time structure, meaning the hazard gives the risk for event *k* since the

previous event occurred. β gives the effect parameters of the control variables, while ρ, π, and ν, the effect of wealth, social capital, and signals parameters to test Hypothesis 1-3c.

In addition, if it is reasonable to assume that the occurrence of an event affects its re-occurrence, a conditional frailty model can address this issue by letting the baseline hazard vary for each event (Box-Steffensmeier and De Boef, 2006). Therefore, a conditional frailty model was applied,

$$\lambda_{ik}(t) = \lambda_{0k}(t - t_{k-1})e^{X_{ik}\nu + X_{ik}\pi + X_{ik}\rho + X_i\beta + \omega_i}$$

where k denotes the event number; λ_{0k} is the baseline hazard rate that varies by event number k; $(t - t_{k-1})$ incorporates a gap time structure so that the hazard gives the risk for event k since the previous event occurred; X is a vector of independent variables which may be time-varying; and β gives the effect parameters, while the standard frailty model ρ, π, ν, parameters account for the effect of wealth, social capital, and signals for testing Hypothesis 1-3c. The remaining portion of the hazard incorporates the random effect. Each subject i has a random effect that is shared and constant over time (across events) and ω is a vector containing unknown frailties.

4. RESULTS

4.1 Firm survival and creation

In an event model, the dependent variable is composed of an event indicator and a measure of time from the baseline to the event or censoring. The disengagement from the entrepreneurial process and firm creation (births) are the first events of interest of this research. In the first case, the interest relies on those who do not disengage (survival). As seen in Table 2, on average, NEs take about 43 months to reach some outcome event, 26% of startups finally became a new firm, and 44% disengage from the entrepreneurial process in the observation period.

Table 2 – Descriptive Statistics, for firm survival and creation

	Firm creation and Survival Models	
	Mean	S.D.
Dependent variables		
Time months	43.29	31.12
Firm birth	0.26	0.44
Disengagement from the entrepreneurial process	0.41	0.49
Independent variables		
Times received external monitored funding	0.31	0.62
Demographic controls		
Education	1.42	1.04
Number of men in the team	0.89	0.94
Number of white/Caucasians in team	1.34	1.25
Total number of under 24 years old team members	0.12	0.45
Total number of 25-34 years old team members	0.32	0.65
Total number of 35-44 years old team members	0.44	0.68
Total number of 45-54 years old team members	0.45	0.66
Total number of above 54 years old team members	0.38	0.69
Entrepreneurs' experience and intentions controls		
Team industry experience in the start-up economic sector (years)	14.75	16.36
Number of team's prior start-up attempts	1.87	3.87
Growth preference dummy, "as large as possible" =1	0.22	0.41
Startup characteristics controls		
Number of people or institutions that owns the start-up	1.86	2.81
Degree of innovativeness	0.81	0.90
Business plan	0.79	1.12
Financial projections, "have developed financial projections" = 1	0.20	0.40
Type of business	1.37	1.34
Financial controls		
Household net worth, 2005 prices	803,281	7645779
Personal funding / total funding	44.18	45.21
Unmonitored external funding / total funding	10.24	23.21
Total startup funding (log)	5.49	4.82
Team's sweat equity (total hours)	2610	6381
Other controls		
Conception lag	33.07	28.40

In this research, the key independent variable of interest when evaluating firm survival and creation how many times it was funded during the entrepreneurial process. Receiving

monitored external funding show a mean value of 0.31, meaning that most of the firms did not receive any external monitored funding. External funding is not the most common source of funding for entrepreneurs, and as it is known from the work of Frid (2014) that most of the entrepreneurs use their funds as the principal source of funding.

One of the advantages of this research is the wide range of control variables applied (21). These variables ranged from entrepreneurs' demographic variables, their trajectories and future intentions regarding the startup, its characteristics, and the entrepreneurs' financial origin and investments. Among the demographic characteristics of the entrepreneurs, on average, they are educated, work in small teams, are males within 35- and 54 years old, and are from Caucasian ethnicity. Specifically, it is worth noting that most founding teams have at least a college degree since the education mean is 1.42. Entrepreneurs tend to work together ins small teams since on average, the number of people or institutions that owns the start-up is 1.8. Also, the average number of males on the startups of this sample is 0.9, meaning that in most entrepreneurial teams it is possible to find at least one male member. Also, most start-ups have one person of Caucasian ethnicity, because the mean is above 1 (1=Caucasian). Regarding age, 35–44 and 45–54 years of age are the most common age ranges for start-up team members.

Regarding entrepreneurial trajectories and intentions, entrepreneurs are experienced in their economic sector, have intended to create companies before, and do not show high aspirations in terms of their startup growth. As seen in Table 2, founding teams shows a mean of 14.7 years of industry experience and have, on average, engaged in 1.8 start-ups. Most entrepreneurs (78%) want to create a new company that is easy to manage, and only 22% of entrepreneurs want to maximize the growth of their startups.

Entrepreneurs create startups that are not technologically sophisticated on average. Also, they do not prepare their business using a business plan nor financial projections and aim to operate in the service sector. The degree of innovativeness accounts for an average of 0.81, which indicates that the vast majority do not aspire to offer new products or services and do not invest in R&D. Most of the entrepreneurs indicate they do not have a business plan, since the mean is 0.79, and only 20% have completed financial projections. A mean of 1.3 in the type of business informs that the majority operates in the business services sector. The distribution of this variable shows that 43% of startups will do business in the business services sector (base category), 4% in the extractive activities, 19% in transforming industries, 33% in consumer-oriented sectors, and 1% in other activities.

Financially, most of the entrepreneurs in this study are economically affluent, tend to use their funds for financing the startup instead of unmonitored external funds, and spent working a high number of hours on them. Specifically, the average household net worth in the sample is approximately $803,200[11]. and the percentage of personal funds on the total startup funding average is 44.18, meaning, as previous studies identified as well, that it is the most used funding source for startups compared to unmonitored external funding, which is on average only 10.24. The average amount of total funds (in logs) invested in the startup is 5.49, which is around $100.000, while the total working hours on the startup for teams is 2610.

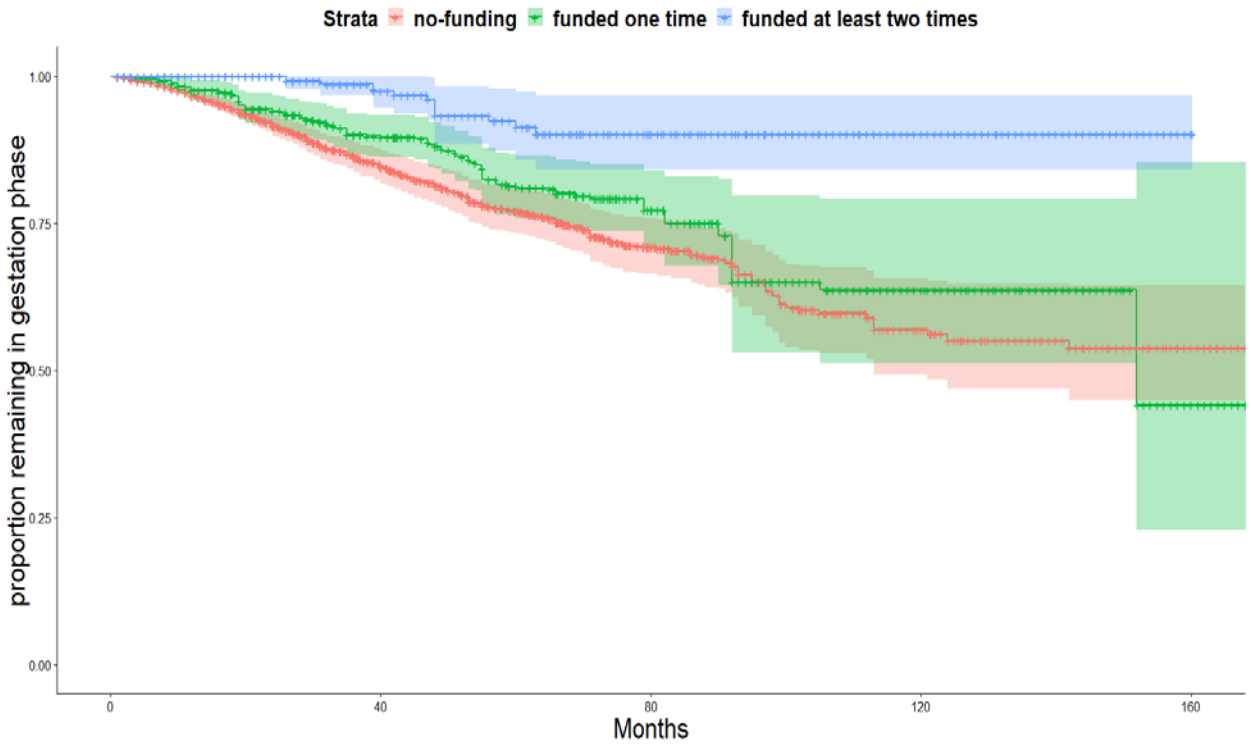
Hypotheses 0A and 0B were tested by fitting two Cox-regressions (Cox, 1972). For the analyses, the statistical models were performed using R packages survival (Therneau and Lumley, 2015) and survminer (Kassambara, Marcin, Przemyslaw, and Scheipl, 2018). Using the *surv* command, this set of regressions analyzed data from the 1532 NEs. First, a Cox regression

[11] The trimmed mean (0.025 for each distribution side) is around 245000, meaning that few households are accounting for a high net worth influencing on the mean results.

was fit using the firm disengagement from the entrepreneurial process as the event of interest. Next, a Cox regression using firm creation as the event investigated. In both models, cases that are still trying to create the firm are right-censored. To analyze time-varying variables, the dataset was transformed from wide to long format using the survSplit function of the survival R package. After this transformation, each row represents an entrepreneur's specific month during the gestational phase until an event happens.

In this sample, 406 cases reached new firm status, 630 were disengaged, and 495 are censored (still trying). Figure 2 presents Kaplan-Meier estimates for those new ventures in the still-trying phase. The analysis focused on parameter δ, which estimates the effect of a categorical variable aimed to measure how many times startups received external monitored funds. In Figure 2, the number 1 represents the total startups, and any reduction from 1 means a startup that disengaged from the entrepreneurial process. Based on these estimates, 90% of startups that receive funding at least two times (blue line) do not disengage from the entrepreneurial process during the period of observation. Interestingly, startups that received external funding one time (green line) disengage in similar numbers to those that have never receive external monitored funding (red line).

Figure 2 – Kaplan-Maier estimates for firm survival, stratified by the number of external monitored funding received



The survival function of startups that receive funding one time and those that never received start to look very similar after 80 months of being in the entrepreneurial process. Therefore, it seems that all the benefits of being funded one time might have for firm survival disappear if the startup does not receive another monitored external funding before its first 80 operating months. This finding reinforces the central thesis of this study: receiving external monitored funding recurrently during the gestational phase is vital for startup survival.

Table 3 presents the empirical results. Model 1 evaluates firm survival. At least one of the covariates contributes significantly to the explanation of the duration of the events of interest. The likelihood-ratio chi-square statistic is the difference between -2 partial log-likelihood for the model with 36 covariates and the null model with no covariates. Since its p-value is <0.001, it is possible to reject the null hypothesis of the model's overall significance. The proportional hazard assumption implied in a cox model was met: Schoenfeld residual is >0.05. Since conception lag was not meeting this assumption in a previous model (not shown), an interaction was included

between this variable and time, following as Allison, (2014) and Mills', (2014) recommendation, and therefore the proportional hazard assumption was met.

Table 3 – Cox Regression Models, firm survival and creation

	MODEL 1: Cox regression model (new venture disengagement)			MODEL 2: Cox regression model (new firm creation)		
	COEF	**SE**	**Exponentiated coefficient**	**COEF**	**SE**	**Exponentiated coefficient**
Funding: never received external monitored funding, base = 0						
Monitored external funding one time	-0.31*	-0.14	0.73*	0.1	-0.15	1.11
Monitored external funding at least two times	-1.22***	-0.34	0.30***	0.43*	-0.18	1.54*
Household net worth, 2005 prices	0.00*	0	1.00*	0	0	1.00
Number of people or institutions that owns the start-up	0	-0.01	1.00	-0.06	-0.06	0.94
Team's sweat equity (total hours)	-0.00*	0	1.00*	0	0	1.00
Number of men in team	0.01	-0.06	1.01	-0.02	-0.07	0.98
Number of white/caucasians in team	0.09*	-0.03	1.09*	0.05	-0.04	1.05
Total number of under 24 years old team members	-0.03	-0.1	0.97	0.17	-0.13	1.19
Total number of 25-34 years old team members	0.19**	-0.07	1.21**	0.19	-0.1	1.21
Total number of 35-44 years old team members	0.02	-0.08	1.02	0.12	-0.1	1.13
Total number of 45-54 years old team members	0.08	-0.08	1.08	0	-0.1	1.00
Total number of above 54 years old team members	-0.12	-0.08	0.89	0.03	-0.1	1.03
Growth preference dummy, "as large as possible" =1	0.16	-0.1	1.17	-0.28*	-0.13	0.76*
Degree of innovativeness, base = 0						
Degree of innovativeness 1	-0.09	-0.09	0.91	0.03	-0.12	1.03
Degree of innovativeness 2	-0.14	-0.12	0.87	0.24	-0.14	1.27
Degree of innovativeness 3	-0.09	-0.19	0.91	-0.28	-0.23	0.76
Business plan, base no business plan = 0						
Unwritten business plan	-0.08	-0.21	0.92	-0.13	-0.23	0.88
Informal business plan	-0.02	-0.16	0.98	0.32*	-0.14	1.38*
Formally written business plan	-0.49*	-0.21	0.61*	0.3	-0.17	1.35

Financial projections, "have developed financial projections" = 1	0.40**	-0.12	1.49**	-0.16	-0.14	0.85
Team industry experience in the start-up economic sector (years)	-0.01***	0	0.99***	0.01**	0	1.01**
Number of team's prior start-up attempts	0	-0.02	1.00	0.01	-0.01	1.01
Respondent education (base, high school degree or less)						
Tech, community, or some college	-0.23*	-0.11	0.79*	0.15	-0.14	1.16
College or some graduate training	-0.08	-0.11	0.92	0.02	-0.16	1.02
Master's degree	-0.32	-0.18	0.73	0.02	-0.21	1.02
PhD degree	-0.64*	-0.28	0.53*	0.14	-0.27	1.15
Start-up principal economic activity, base business services =0						
Extractive sector	0.1	-0.24	1.11	-0.57	-0.29	0.57
Transforming sectors	0.24*	-0.11	1.27*	0.36**	-0.13	1.43**
Consumer oriented sectors	0.11	-0.09	1.12	-0.01	-0.12	0.99
Other sectors/NA	0.02	-0.5	1.02	-0.77	-0.74	0.46
Total startup funding (log)	-0.11**	-0.04	0.90**	0.05*	-0.02	1.05*
Personal funding / total funding	-0.01**	0	0.99**	0	0	1.00
Unmonitored external funding / total funding	-0.01*	-0.01	0.99*	0	0	1.00
Conception lag	-0.06***	-0.01	0.94**	-0.04***	-0.01	0.96***
Conception lag*time	0.00***	0	1.00***	0.00***	0	1.00***
Likelihood ratio $\chi 2$	883.4***, on 35 df			166.6***, on 35 df		
Proportional Hazard test	0.61			0.30		

****p < 0.001, **p < 0.01, *p < 0.05*

By examining the hazard ratios in Model 1, specifically the exponentiated coefficients column reported in Table 3, it is possible to explore the nature of the relationship between variables and time to these events. If the estimated hazard ratio is greater than 1 for any variable of interest, higher levels of that covariate are associated with a higher incidence of disengagement, controlling for other variables in the model. For those firms that received externally monitored funding, results indicate the startup's hazard of disengagement is 73% of those startups that did not receive (p-value<0.05); start-ups which received monitored funding two or more times during gestation were revealed to be 30% of those that start-ups that did not receive any funding (p-value <0.001).

Other covariates of interest account for similar relationships found by Hechavarría *et al.* (2016). As mentioned previously, the main difference between the models of this study and those of Hecheverria *et al.* (2016) is the time-varying nature of many of the covariates added, with subsequent differences in results between the two studies. For example, holding all variables

constant, each additional dollar of the entrepreneurs' household net worth slightly raises the likelihood of disengagement (0.000006%) while in Hechavarria *et al's.* model this variable was not significant to explain this event.

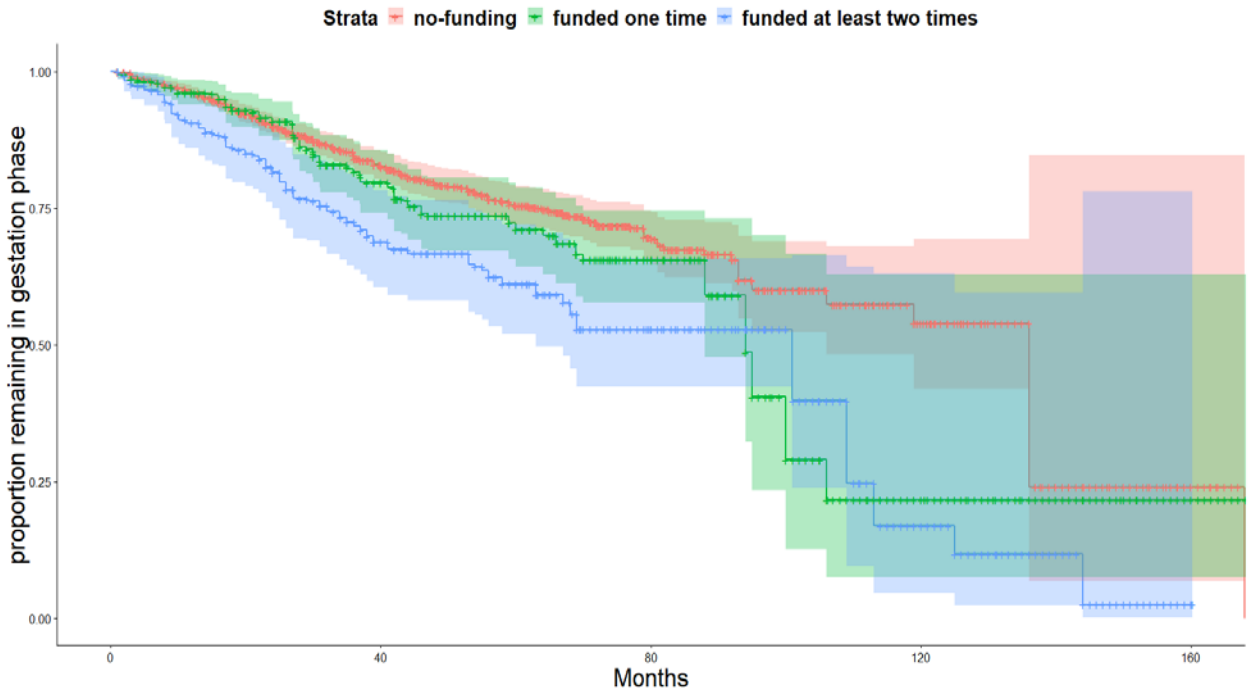
Sweat equity slightly reduces disengagement; for each additional hour of teamwork, the monthly hazard of disengagement decreases by 0.2%. Similarly, each additional Caucasian member on the start-up team reduces monthly disengagement from the gestational phase by 8.8%. As predictable, NEs whose business plan is formally written have a 21% hazard of disengagement compared to those without any business plan. Unexpectedly, the hazard ratio of disengagement of those entrepreneurs who have developed financial projections is 1.5 compared to those who have not developed one. For every team's year of industry experience in the same economic activity that the startup will operate, monthly disengagement hazard decreases by 1.3%. Respondent education accounts for an interesting association; the monthly disengagement hazard of those respondents who have a tech, community, or some college degree is 0.79% of those with a high school diploma or less. Ph.D. degree-holding entrepreneurs show a monthly disengagement hazard of 53% of those who have a high school diploma or less. Other educational categories were not significant compared to those who have a high school diploma or less.

The only statistically significant comparisons among economic sector categories of the startups are those that aim to operate in the transforming sector. These startups are more likely to disengage compared to those in the business services (base category): their monthly disengagement hazard is +12% of those who plan to operate in the business service sector. Each additional increment in total startup funding (in logs) reduces monthly disengagement hazard by 11%. In addition, for each additional percentage increment in private and external unmonitored

funding on total startup funding, disengagement decreases by approximately 1.20%. The only age-range variable that shows significant relationship with time to disengagement was the number of owners age ranged 25-34 (exp coefficient = 1.21, p value< 0.01), meaning that for each additional owner in that age new ventures survive; disengagement hazard decreases by 21% for each additional team member between 25 and 34 years old. The size of the startup team, men, growth preference, degree of innovativeness, and prior start-up attempts did not show any significant statistical relationship with time to disengagement.

Figure 3 shows the Kaplan-Meier estimate for firm creation, illustrating that companies that receive funding twice (blue line) are created faster than those funded once (green line) or never received funding (red line). Approximately 70 months from conception, close to 50% of startups that received external monitored funding at least two times were born. In the case of those that receive external monitored funding one time, it took around 100 months to reach the 50% creation mark. Startups that never received funding required 130 months to reach the same milestone. However, it is worth noting that confidence intervals overlap each other after month 100, due to the small number of cases that survive until that time.

Figure 3 – Kaplan-Maier estimates for firm creation, stratified by the number of external monitored funding received



Model 2 evaluates the time to the firm creation. At least one of the covariates contributes significantly to the explanation of firm creation. The null hypothesis of the model's overall significance is rejected, and the proportional hazard assumption was met. The model reveals that startups funded at least twice are 54% more likely to become a firm compared to start-ups that never received funding (Table 3). This effect is insignificant when comparing one-time funded startups to those that never received externally monitored funds. Figure 3 illustrates the slight differences between K-M estimates for the never-funded startups (red line) and those funded once (green line), especially during the first 100 months up the gestational phase.

Holding all variables constant, for those entrepreneurs that declared the intention of growing its startup "as large as possible," results reveal a 24% less chance of creating a firm compared to those who declared planning to maintain their company at a "manageable size." The firm creation hazard of entrepreneurs that developed an informal business plan is +38% of those who do not have one, and that number is +35% for whom that developed a formal written plan (but significant at the 10% level). For each additional year of experience of the team in the same

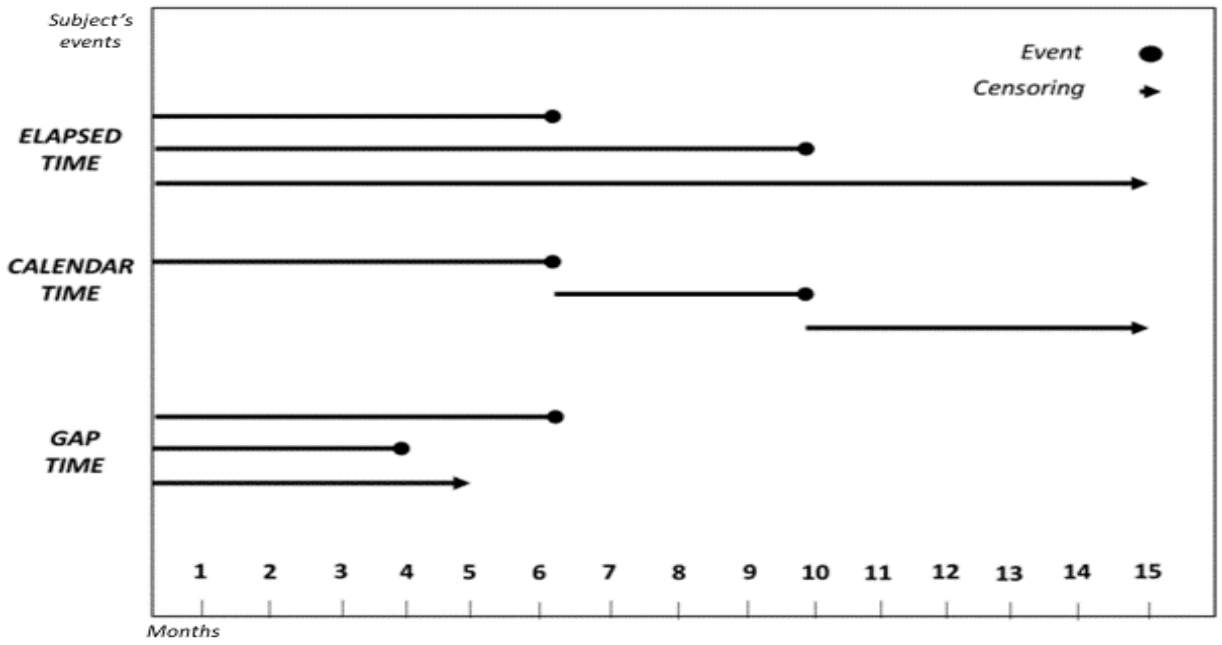
economic sector, the hazard of firm creation increases slightly more than 1%. When compared to startups that will operate in the business service sector, the firm creation hazard is +43% of planning to do it in the transforming sector. Finally, each additional increment in total startup funding (in logs) increases monthly firm creation hazard by 5%.

None of the age-range variables show a significant relationship with time to firm creation. None of the following variables are significant in addition: the entrepreneurs' household net-worth, the number of people or institutions that own the start-up, team's sweat equity (total hours), number of white/Caucasians in the team, degree of innovativeness, the financial projections, the prior start-up attempts, the percentage of personal or unmonitored external funding on total startup funding.

4.2 Firm funding

As previously stated, a startup could receive monitored funding many times during its gestational phase. This research accounts for this by analyzing the repeated nature of this event, and the dataset structure also was rearranged for that objective. Figure 4 displays a hypothetical example that describes the possible time-structures for this research. This illustration is the case of a NE who received funding two times in months 6, 10, and his last observation was at month 15.

Figure 4 - Elapsed, calendar, and gap-times structures, hypothetical example



The elapsed time structure will result in observation with events in months 6, 10, and 15 and would have a start and stop times of 0–6, 0–10, and 0–15, respectively. In a calendar time structure, it would result in a start and stop times of 0-6, 6-10, and 10-15, while for the gap time structure these values will be 0–6, 0–4, and 0-5. Gap time is the time-structure that this study uses.

A gap-time data structure was chosen since the underlying hypothesis of this paper argues that there is an effect from receiving external monitored funding for the first time and in subsequent external funding events. Thus, the clock should restart after each event to account for this. Otherwise, if an elapsed-time structure was be selected, the main interest will rely on the effect of covariates on the *kth* event since the time from the beginning of the study and not their effect on the *kth* event since the time from the previous event. Another possibility is the calendar time structure, where the focus is on the effect of covariates on the *kth* event since the time from the previous event, using a fixed starting point (the first observation). The gap time was chosen

over this calendar structure since this study does not focus on a specific starting point in time, but it is on the gaps between events.

As explained previously, frailty models are appropriate when there are issues related to heterogeneity. Two Cox regressions with a frailty component (standard and conditional) using a gap-time structure were fitted to explore the factors related to receiving recurrent monitored external funding. Also, Amorim and Cai (2015) and Box-Steffensmeier and De Boef (2006) recommend truncating the database when the number of events becomes small to avoid estimators became unreliable. Thus, the dataset was restricted to 1 (196 cases) and 2 (36 cases) funding events, since there are only ten startups with three and one with four funding events during gestation. The dataset is transformed into a long format where each row contains a startup time with a funding event or censoring time associated, which could be the last time of observation, a firm creation, or quitting from the startup process. As a result, the long format dataset contains 1764 rows, 1532 startups with this censoring time plus 232 funding events. As Allison (2014) pointed out, it is necessary to make all efforts possible to account for right censoring when it is non-random, and that is the case when a startup becomes a profitable new company (firm birth) or when give up the entrepreneurial process. Thus, firm birth and quitting were included as controls aiming to reduce the non-randomness censoring in these models.

Table 4 describes the variables of this dataset aimed to test hypotheses 1, 2, 3a 3b, and 3c. These are the same variables included in Frid, Wyman, Gartner, and Hechavarria (2016) to understand external funding with some additional variables. In these event models, the dependent variable is composed of an event indicator labeled “1” for each repeated event and “0” otherwise. Also, it includes a measure of time in months from the baseline to the first event, between events, or censoring. The event of interest is receiving external funding. As seen in Table 4, on average,

the gap times are of 37 months between the events of interest, and 15% of startups obtained external funding.

Table 4 – Descriptive Statistics, Model 3 and 4

	Frailty models	
	Mean	S.D.
Dependent variables		
External monitored funding	0.15	0.44
Time	37.63	29.23
Key Independent variables		
Household net worth, 2005 prices, tertiles	2.01	0.82
Team managerial experience (summation, years)	30.01	29.00
Team industry experience in the start-up economic sector (years)	14.47	16.96
Business plan (base, *no business plan*)	0.55	1.00
Social Capital - Bridging: number of non-owner and non-family helpers	0.96	1.36
dummy, "have developed financial projections" = 1	0.14	0.35
dummy, "Patents, trademarks and copyrights granted" = 1	0.02	0.14
Demographic controls		
Respondent education (base, *high school degree or less*)	1.38	1.03
Number of white/Caucasians in team	1.52	1.40
Number of men in the team	0.95	0.98
Total number of under 24 years old team members	0.13	0.46
Total number of 25-34 years old team members	0.34	0.67
Total number of 35-44 years old team members	0.46	0.70
Total number of 45-54 years old team members	0.44	0.67
Total number of above 54 years old team members	0.41	0.45
Startup characteristics controls		
Legal form of start-up, *base = sole proprietorship*	2.57	1.67
Startup type, *base = independent new venture*	1.48	1.15
Start-up principal economic activity, base = *business services*	1.44	1.33
Entrepreneurs' experience, background and location controls		
Number of team's prior start-up attempts	2.05	4.89
Personal funding / total funding	22.98	37.98
dummy, new venture in metropolitan area = 1	0.74	0.44
Social Capital - Bonding: number of non-owner family helpers	0.54	0.92
Other controls		
Startup creation	0.26	0.44
Startup quitting	0.40	0.49
Conception lag	22.81	22.34

In this section, the key independent variables of interest are those in the hypothesized relationships from H1 to H3b. For example, the mean of the household net-worth (categorical variable) is close to 2 since it is the category of the second tertile[12]. In the case of team managerial experience, it accounts for a mean of 30.01 years since it is the summation of the team's years of experience. For example, three startup owners with ten years of experience each

[12] Observations with funding more than one funding events appears more than one time in this dataset (more rows), and for that reason the mean of household net-worth is not exactly 2.

will result in a value of 30 for this variable. Another key independent variable is the entrepreneurial team's years of industry experience, which shows a mean of 14.4.

Regarding entrepreneurs' networks, on average, each firm has approximately one non-family helper (mean 0.96). Among the signals that entrepreneurs can develop, it is possible to say that most of the entrepreneurs in this dataset do not have a business plan. However, 5% of them have an unwritten plan, 12% have an informal written plan, and 9% have a formal written business plan. About 14% of the cases have completed financial projections, and only 2% have been granted patents, trademarks, or copyrights.

Among the demographic characteristics, again on average, entrepreneurs are mostly educated, are males within 35- and 54 years old, and are from Caucasian ethnicity. Specifically, it is worth noting that most founding teams have at least a college degree since the education mean is 1.38. The average number of males in startups is very close to one (0.95). Thus, most have at least one male on the team, while most start-ups have about one person of Caucasian ethnicity on the team since the average number is 1.52. Regarding age, start-up averages are reported for the five ranges; 35–44 and 45–54 years of age are the most common ranges for start-ups team members.

The 5% of the new ventures operate in extractive sectors, 19% in transforming sectors, and 33% in the consumer-oriented sectors, 42% in the business services sector (base category). The most common startup type are independent new ventures, that account for 82% of cases, while the other categories range from a 7% of sponsored new ventures to a 4% for a takeover new venture. The most common startup legal form is unknown, since when this variable varies it is often not declared (62%) during gestation, while other categories are sole proprietorships (16%), partnerships (6%), limited liability company (3%), C or S-corporations (6%), not yet

determined (7%). Lastly, 22.08 is the average time-lag (in months) from conception to PSED initial interview. In terms of location, on average, 74% of entrepreneurial teams operate in metropolitan areas. Also, teams' prior startup attempts average is 2.05, so they are experienced entrepreneurs. The percentage of personal funds on the total startup funding average is 22.98, and only have an average of 0.54 of family members non-owner helpers in the team.

Regarding the model, the first relevant result that emerges from the standard frailty model is the significant within-entrepreneurs correlation seen in the random effect ($\omega = 1.11$, $p<0.001$). In the conditional frailty model (stratified by funding event number), while still significant, the random effect is reduced close to zero ($\omega= 0.17$, $p<0.001$). Hence, this is a signal that factors associated with receiving funding previously made entrepreneurs less heterogeneous.

Table 5 – Standard Frailty and Conditional Frailty Models

	MODEL 3: Standard frailty model, gap-times (event: external funding)			MODEL 4: Conditional frailty model, gap-times (event: external funding)		
	COEF	**SE**	**Exp. coefficient**	**COEF**	**SE**	**Exp. coefficient**
Household net worth, 2005 prices, tertiles, base = *beneath the 33rd percentile,*						
between the 33rd and 66th percentile	0.51*	-0.23	1.67*	0.53**	-0.20	1.70**
above the 66th percentile	0.69**	-0.23	1.99**	0.72***	-0.20	2.05***
Team managerial experience (years)	0.03***	-0.01	1.03***	0.02***	-0.01	1.03***
Team industry experience in the start-up economic sector (years)	-0.02	-0.01	0.98	-0.02	-0.01	0.98
Team industry experience in the start-up economic sector (years), squared	0.00	0.00	1.00	0.00	0.00	1.00
Social Capital - Bridging: number of non-owner and non-family helpers	-0.15*	-0.07	0.86*	-0.17**	-0.06	0.84**
Social Capital - Bonding: number of non-owner family helpers	-0.17	-0.1	0.84	-0.1	-0.08	0.90
Business plan (base, *no business plan*)						
unwritten business plan	0.56	-0.32	1.75	0.61*	-0.28	1.84*
informal business plan	0.62*	-0.25	1.86*	0.72**	-0.22	2.05**
formally written business plan	0.3	-0.29	1.35	0.43	-0.24	1.54
dummy, "have developed financial projections" = 1	0.74***	-0.22	2.10***	0.91***	-0.18	2.48***
dummy, "Patents, trademarks and copyrights granted" = 1	-1.09	-0.58	0.34	-0.87	-0.48	0.42
Number of white/Caucasians in team	0.16	-0.14	1.17	0.09	-0.12	1.09
Number of men in team	0.02	-0.09	1.02	0.00	-0.07	1.00
Personal funding / total funding	0.00	0.00	1.00	0.00	0.00	1.00
dummy, new venture in metropolitan area = 1	-0.05	-0.2	0.95	-0.1	-0.17	0.90
Number of team's prior start-up attempts	0.03*	-0.01	1.03*	0.02*	-0.01	1.02*
Respondent education (base, *high school degree or less*)						
tech, community, or some college	0.25	-0.24	1.28	0.13	-0.2	1.14
college or some graduate training	-0.14	-0.27	0.87	-0.07	-0.24	0.93
Master's degree	-0.18	-0.35	0.84	-0.26	-0.3	0.77
PhD degree	0.33	-0.45	1.39	0.35	-0.37	1.42
Legal form of start-up, *base = sole proprietorship*						
partnership	-0.03	-0.33	0.97	0.02	-0.27	1.02
limited liability company	0.16	-0.36	1.17	0.14	-0.29	1.15
C- or S-corporation	-0.06	-0.33	0.94	-0.19	-0.27	0.83
not yet determined	-0.67*	-0.33	0.51*	-0.73*	-0.28	0.48*
unknown	-2.87***	-0.25	0.06***	-2.70***	-0.22	0.07***
Startup type, *base = independent new venture*						
takeover of existing business	1.27***	-0.38	3.56***	0.89**	-0.31	2.44**
franchise	0.87*	-0.42	2.39*	0.78*	-0.36	2.18*
multilevel marketing initiative	-0.2	-0.5	0.82	0.07	-0.43	1.07
startup sponsored by existing business	0.36	-0.35	1.43	0.33	-0.3	1.39
Start-up principal economic activity, base = *business services*						
Extractive sector	1.05**	-0.35	2.86**	0.73*	-0.29	2.08*
Transforming sectors	0.58*	-0.23	1.79*	0.46*	-0.2	1.58*
Consumer oriented sectors	0.45*	-0.21	1.57*	0.43*	-0.18	1.54*
Total number of under 24 years old team members	0.06	-0.24	1.06	0.14	-0.19	1.15
Total number of 25-34 years old team members	0.22	-0.17	1.25	0.27*	-0.14	1.31*
Total number of 35-44 years old team members	0.29	-0.18	1.34	0.35*	-0.14	1.42*
Total number of 45-54 years old team members	-0.17	-0.18	0.84	-0.1	-0.16	0.90
Total number of above 54 years old team members	-0.48*	-0.19	0.62*	-0.43**	-0.17	0.65**
dummy Firm birth = 1	-0.31	-0.24	0.73	-0.11	-0.21	0.90
dummy, new venture quit = 1	0.02	-0.22	1.02	0.12	-0.19	1.13
Conception lag	-0.04***	-0.01	0.96***	-0.03***	0	0.97***
Variance of random effect=	1.190817***			0.1810787***		
R^2	0.37			0.27		

****p < 0.001, **p < 0.01, *p < 0.05*

Hypothesis 1 stated that less-wealthy NEs would be less likely to acquire external funds recursively compared to wealthier NEs. Conditional on the unmeasured heterogeneity, event dependence, and covariates, Model 4 indicates that the odds of a wealthier entrepreneur to get externally funded since the last funding is about 2:1 in comparison to the non-wealthy. When compared to coefficients in Model 3, those in Model 4 with less heterogeneity have more power (significance increased) and are more precise (standard errors decreased).

Hypotheses 2 stated that entrepreneurs with higher levels of social capital are more likely to obtain recurrent external funding. Recall that social capital was measured using different approaches, one related to the entrepreneur's network and another on their status. Model 3 and Model 4 have very similar results. For every one-year increase of NEs' managerial experience, the hazard of obtaining monitored external funds since the last one goes up by an estimated 3%. Industry experience did not account for any statistically significant effect in Model 3 and 4. The effect of non-family external helpers could be surprising: an increase in the number of helpers is associated with a decrease in the hazard of receiving monitored external funds since the last fund by 15% (once more, this effect is stronger in Model 4). This negative relationship should be investigated, but it could be the consequence that helpers are also potential funders for entrepreneurs. Thus, if entrepreneurs have more external non-owner helpers, the need for getting funding might decreases.

The set of hypotheses 3 aim to test the effects of NE's signals, postulating that nascent entrepreneurs that develop business plans, financial projections, or patents are more likely to receive recurrent external funding. Patents, copyrights, and trademarks did not show significant results in Models 3 and 4, but it is worth recalling that very few (2%) entrepreneurs during the gestational phase have granted a patent, copyright, or trademark (Table 4). However,

unsurprisingly, developing financial projections is the signal that accounts for the highest "hazard" in reducing gap times for receiving external monitored funding: the odds of being funded since the last external monitored funding event are 2.5 to 1 for those NEs that develop financial projections compared to those that did not. This effect is more precise in Model 4 than in Model 3, since standard errors are smaller in the former. In Model 4, business plan accounts for an interesting effect: The odds of NEs with an unwritten business plan receiving external funding since the last funding event is about 1.8:1 in comparison to those that did not develop any business plan. Compared to NE's without any business plan, the odds of receiving external funding for NEs with a non-formal written plan are 2:1. However, the hazard of getting funded for those that have a formal written business plan shows the expected sign, but only at a 10% level. Model 3 shows similar coefficients, but with higher standard errors and less power.

Regarding the control variables, an additional prior start-up attempt increases the hazard of receiving external funds recurrently by 3% and 2% in Model 3 and 4, respectively. Compared to sole proprietorships, other legal forms show a reduced hazard of receiving externally monitored funding since the last event. For example, "not yet determined" and "unknown" account for 48% and 7% of the sole proprietorship's hazards of receiving recurrent monitored external funding. Looking at the type of startup, the odds for receiving external monitored funding of takeover new ventures are almost 2.5:1 of those independent new ventures. In the case of franchises, their odds are 2.1:1 compared to independent new ventures. The odds of receiving *kth* funding since the previous one for those startups aiming to operate in extractive sectors are 2:1 of those in the business services sector. Startups intending to operate in transforming sectors and consumer-oriented sectors account for 58% and 54% of the hazard of

receiving external funding since the previous funding event compared to business services (Model 4) Always, Model 4 accounts for more precise and robust estimators.

In Model 4, an additional owner aged between 25-34 and 35-44 reduces the time-gap to receiving external monitored funding since the last event. For every extra member among 25-34, the hazard of receiving external monitored funding after the previous one goes up by 31%, and 41% in the case of owners aged 35-44. Contrarily, each additional owner of 54 years old or older, reduces the hazard of recurrent financing by 35%. This owner age range is the only significant variable in Model 3 among age-range variables. The number of non-owner family helpers, white/Caucasians, and the number of men in the entrepreneurial team were not of statistical significance in Model 3 or 4. Also, the percentage of personal funding in the startup total did not show any significant relationship with reducing the gap to receipt external funding. Neither did the following variables: the entrepreneur's household net-worth, the rural/urban location of the startup project, nor the respondent's educational level.

4.3. Summary of the main results

This paper provides evidence of the effects of receiving external monitored funding more than one time on firm survival and creation. Recurrent funding increases both the survival of new ventures and accelerates their creation significantly, with the relationship becomes statistically stronger in the case of survival. The Kaplan-Meier estimates show the effect of receiving monitored funding at least twice has on firm survival, with almost 90% of firms funded at least twice surviving during the observation period.

For this reason, this study also offers evidence about who receives external monitored funding recurrently. H1 hypothesizes those NEs coming from a more affluent background obtain external monitored funding recurrently sooner. The findings provide convincing evidence that those entrepreneurs have shorter time gaps between each external funding event than less

affluent counterparts. H2 hypothesizes that social capital reduces gap times between finding events, and the status-associated dimension of social capital, measured by teams' years of managerial experience, confirmed this relationship. However, teams' years of industry experience is not statistically associated with reducing gap-times in receiving external monitored funding. Social capital measured using entrepreneur's networks shows the opposite direction expected. We suggested an explanation for this unexpected relationship that requires additional investigation. The number of helpers who can potentially aid entrepreneurs in obtaining funding may explain this outcome, an area requiring further investigation.

In addition, this study found evidence that developing signals can reduce gap times in receiving external monitored funding, as the third set of hypotheses suggested. However, some signals are more powerful than others. For example, patents were not significant in reducing monitored funding gap times, but it is worth remembering that only a few NE's have one granted during gestation. NEs who developed financial projections reduced gap times in receiving external monitored funding, while the development of business plans did as well. Both unwritten and informally written business plan are significant in reducing monitored funding gap times compared to not having one, although the comparison between having a formal written business plan and not having one is significant only at the 10% level.

5. DISCUSSION

This study provides evidence that receiving external financing during the entrepreneurial process is a dynamic process influenced by social factors. Receiving external monitored funding several times during the gestational phase enhances firm survival and creation. Also, those who are more likely to receive funding several times during the gestational period are NEs coming from a wealthy background and high social status. This study provides initial evidence of a

potential Mathew effect in entrepreneurship financing. However, other factors related to entrepreneurs' actions in developing signals for investors and lenders are on influence and might reduce this effect.

This study extends on Hechavarría *et al*. (2016), a research that examined how the capital structure of startups impacts on their survival and creation. In our study, the dynamic nature of funding through the gestational phase revealed the importance of receiving external monitored funding several times as a critical determinant for a firm's survival and creation. Although there are some divergences in results regarding the control variables, most of the outcomes of this research agree with Hechavarría *et al*. (2016). For example, they found that firms primarily financed with external equity show a 47 % increase in the incidence of new firm founding over time (Hechavarría *et al*. , 2016). In our models, these variables were not of interest. However, this study found that receiving external monitored funding several times, which might increase the external equity in a startup's capital structure, supports Hechavarría *et al*. (2016). Additionally, they found that there is a significant decrease in the incidence of disengagement over time for startups financed primarily with debt and external equity. In this research, Model 1 revealed that receiving external monitored funding at least once during the gestation significantly decreases the risk of disengagement, as well.

Using a different modeling strategy and only data from PSED II, Frid, Wyman, and Coffey (2016) found that compared to wealthier entrepreneurs, those coming from a low-wealth background are less likely to acquire external financing. This study found evidence that supports their conclusion that wealthier entrepreneurs are more likely to receive external monitored funding several times. Previous research has found that social origin influences the reception of external funding (Frid, Wyman, Gartner, and Hechevarría, 2016; Frid, 2014). This study showed

that economic and social origin influence the reception of external funding several times during entrepreneurial gestation.

However, the models developed in this research analyzed the repetitive nature of the funding event, suggesting some differences with previous investigations. While race has been mentioned as a critical factor in explaining receiving monitored funding (Frid, Wyman, Gartner, and Hechavarría, 2016; Frid, 2014; Gartner *et al*., 2012), this research found that race is not a critical factor associated with recurrent external monitored funding. In Frid Wyman, Gartner, and Hechavarría's (2016) models, African-American entrepreneurs are less likely to acquire external funds than Caucasians. However, this relationship was found to be weak statistically, supporting Casey's (2014) findings regarding the external financial amount that non-Caucasians receive. Unlike these studies, our research measured race counting the number of White/Caucasian owners during the gestational phase, and did not find any significant association with the repeated event of monitored funding. In various other research fields, there are many examples where race effects disappear after including socioeconomic variables, and entrepreneurship research does not an exception. In this regard, another possibility to for future research is that race could be an inhibitor for minority-owned startups to get their first external funding, but, once funded for their first time, the effect of race as an inhibitor might disappear for further funding events.

The findings from this research also highlight that both business planning and preparing financial projections are associated with receiving external monitored funding. Thus, the entrepreneur's ability to develop signals might affect receiving external monitored funding recurrently and thus, accelerate firm creation and deaccelerate disengagement. It is possible to assert that preparing financial or business plans for potential investors likely diminishes the

information asymmetry between lenders and borrowers and subsequently reduces transaction costs for both parties. Therefore, the Mathew effect of the wealthier and well-connected entrepreneur is likely to be reduced if those coming from less privileged backgrounds are more exposed to these activities. These findings suggest that hands-on financial practice is associated with an increase in the likelihood of receiving funding recurrently. The heterogeneity reduction found when the model was stratified by a funding event (Model 4) indicates something a similar pattern. There is probably a learning process for entrepreneurs for getting funding for the first time, but this cannot be confirmed, only suspected, based on the models of this research since it was not directly tested. It is also possible that banks, institutions, and any lender in general, can ask for a business plan after identifying a viable project. A specific study designed to detect causality could shed light on this regard.

Other variables were not of significance in explaining getting funding more than once, and some of them can be even considered a contradiction to what has been found previously. For example, NEs that invested more personal funds, as a proportion of the total startup funding, are less likely to get funded recurrently as previous studies suggested (Frid, Wyman, Gartner, and Hechavarría, 2014; Frid 2014). Contrary to what has been found in Frid, Wyman, Gartner, and Hechavarría. (2016), entrepreneurs' private funding investments do not act as a signal for external borrowers who monitor their money or loans when all funding events during gestation are considered. These differences should be further investigated. However, one possible suggestion is that the "skin in the game" hypothesis is plausible just for the first funding received. After being funded for the first time, and therefore, after "signaled" the project as viable for external funders by obtaining an external fund previously, there may not be a relationship between the personal funds invested in obtaining further external financing.

6. IMPLICATIONS

Time is central to the understanding of entrepreneurship (Bird & Page West III, 1998), pg. 6) argue that *"temporal issues uniquely and explicitly characterize the entrepreneurial process"*; yet, temporal issues are some of the most challenging to comprehend. Time is a valuable, if scarce, resource, and one goal of this research was to understand whether receiving external funding several times during gestation has implications for accelerating firm creation or attenuating their disengagement from the entrepreneurial process. Being funded repeatedly was demonstrated to be a crucial resource for entrepreneurs to operate and survive the nascent stage of the startup process.

In this study, data from the PSED I and II were used to provide new evidence on entrepreneurs' characteristics associated with the reception of external funding. Overall, the findings challenge the assumed benefits associated with pecking order theory, where entrepreneurs first use their funds and then attempt to obtain external funding. When the repetitive nature of external monitored funding is taken into account by letting the hazard vary by event number and accounting for individual heterogeneity, the personal funds invested in the startup are not of significance in receiving external funding recurrently during gestation. However, signals that reduce asymmetrical information for investors and lenders do affect the hazard of receiving external monitored funding recurrently, as does as entrepreneurs' social background.

This study has three main implications. First, it adds another piece to the growing literature analyzing data from the PSED project by presenting new evidence on the benefits of external funding for entrepreneurs. Specifically, this study considers the repeated nature of receiving external monitored funding. When time is considered, the time-varying nature of the

variables must be considered as well, leading to outcomes that differ from previous research findings. Therefore, the need to account for time is emphasized when analyzing entrepreneurial funding.

Second, this research indicates that the number and the timing of the external monitored funding received by entrepreneurs impacts on firm survival and creation. Among startups that received funding several times, virtually all survived, and a high percentage become profitable firms. The startups that obtained external monitored funding only once survive longer than those that never received funding, but only during the first years of gestation. It seems that the impact of receiving external monitored funding decreases with time, and if the venture does not receive further funding, its positive effects on survival disappear.

Third, this research also suggests that some characteristics pointed out by the Matthew effect theory might operate in the entrepreneurial reward system. This study confirms that wealth and managerial experience are positively associated with receiving funding in shorter periods. Contrary to what can be inferred from previous studies, the personal funds invested do not seem to affect the reception of external monitored funding when the repetitive nature of this event is considered. The same applies to race, measured as the increasing presence of white owners in startups. Further investigations are needed to understand if these factors only affect the first funding received. However, factors such as socio-economic background (wealth and status) appear to be the critical factors for obtaining of getting external monitored funding as well as business plans and financial projections.

Fourth, as mentioned previously, signals for investors and lenders, such as business plans or financial projections, positively affects the likelihood of receiving funding more than once during the gestational phase. These factors are not necessarily related to entrepreneurs' social or

economic origin. Thus, there is room for targeted policy approaches that could provide opportunities to groups of potential entrepreneurs from underserved groups. Entrepreneurial education programs, hands-on internships, or mentoring can help these entrepreneurs in developing skills to formulate business plans and financial projections for their entrepreneurial projects. Future research evaluating the success of these types of programs and their costs and benefit would add value to our understanding of this process.

7. LIMITATIONS AND FUTURE RESEARCH

In this study, startups were not analyzed after gestation, and important limitation because profitable firms (based PSED definition, when firms born) could be more likely to attract investors and receive more external funding after gestation. In this research, the focus was on one phase of the entrepreneurial process. Future research can extend upon this study by more thoroughly exploring the start-up process during the nascent stage (after profitability).

This study also highlighted the importance of receiving external funding more than once during the gestational phase and the factors associated with it. However, there is a blind spot about performance outcomes other than startup creation and survival that could mediate the effect of receiving external funding. For example, are those startups that receive external funding repeatedly more likely to transition from a sole proprietorship to hiring its first employee? Have these startups increased their earnings after receiving external financing? Further research combining new venture's performance outcomes and the reception of funding could shed light on these questions.

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