Creative-entrepreneurs and new venture performance: a study of the creative class at the firm-level.

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Abstract

Human capital has been a central topic since the beginning of entrepreneurship as a field of academic research. This paper analyzes the association of the human capital level of entrepreneurial teams on the performance of nascent projects by applying a relatively new theory of human capital. The creative class theory, widely used in the research of entrepreneurship at the regional level, is applied here for its first time at the firm level. This article's findings indicate similar results at the firm level to those found at the regional level. More creative-entrepreneur-owned startups are strongly associated with job creation, and to less extent, with projects' survival. As in regional studies, the results of this research also question the classic measures of human capital focused on entrepreneurs' formal education, but now at the firm level.

Keywords: entrepreneurship, human capital, creative class.

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1. INTRODUCTION

Creative Class Theory (CCT) proposed by Richard Florida in his book *The Rise of the Creative Class* (2002) had a vast influence on regional studies and economic geography. Today, when talented individuals' mobility is thought to be increasing, CCT describes what factors lead these skilled people to settle in specific regions and not in others, and more importantly, their impact on regional economic development.

Since the release of Florida's book, CCT and its relation to entrepreneurship and innovation have been extensively applied to most of the high-income countries of the world. The conceptual framework of the creative class has been extended and criticized in the academy, while at the same time, it has been understood by policy-makers as a critical guide for today's urban and regional growth. There is significant evidence supporting CCT's central thesis, which states that there is a relationship between the percentage of creative workers and economic development in a region, specifically regarding entrepreneurship and innovation for U.S., Canadian, and European metropolitan areas. CCT suggests an alternative way of measuring human capital. Based on an individual's occupation, it specifies a set of professions that make up the "creative class," which includes scientists, artists, entertainers, and a wide range of knowledge-based professions across "classic" activities such as management, finance, law, healthcare, and education.

Instead of focusing on the regional level, this paper investigates the influence of creative individuals at the startup level. The creative class has been found to impact regional levels of entrepreneurship, but this alternative way of approaching human capital has been overlooked at the firm level. Given the significant evidence of the relationship between the creative class and regional entrepreneurship, this study focuses on new venture projects and their entrepreneurial

teams by investigating the following question: Does a higher number of creative individuals on entrepreneurial teams improve startup performance?

2. THE CREATIVE CLASS THEORY AND ENTREPRENEURSHIP

2.1 - The creative class theory

According to The Creative Class Theory (CCT), the availability and quality of people shape differences in regional economic performance; thus, it is possible to classify CCT among human capital theories. The conventional approach to human capital is based on educational attainment, usually measured by an individuals' years of formal education or other indicators such as having or lacking a bachelor's degree or postgraduate studies. CCT relies on a different approach, measuring people's activities on their work instead of what they have studied. The critical difference between this occupation-based approach and the classical human capital approach is its focus on individuals' daily activities instead of the educational level or the economic sector in which people work since people do not necessarily receive formal schooling for the jobs they perform. For example, one person without formal information technologies (IT) degree can perform IT tasks in his or her job for a company not related to the IT industry. The educational background and economic sector do not entirely reveal what people do on their jobs.

Florida (2002, 2012) theorized that there is a social group, the creative class, with a shared core of norms and values that identify problems and new solutions by creating new knowledge. The creative workers are valued primarily for their mental work. CCT differentiates creative workers to those who are paid mainly for performing physical tasks, namely the working class, or for their physical presence, which is the service class.

The creative class also has an internal composition. Florida established a hierarchy of different creative individuals, the super-creative core, the creative professionals, and the

bohemians. The super-creative core consists of those specialists who focus primarily on research activities, finding and anticipating new problems to solve. These individuals have a high degree of formal education and often received a college degree, at least. Engineers, mathematicians, doctors, physicists, chemists, economists, and astronomers, among others, characterize this subgroup. A second creative class sub-group is the "creative professionals," who work primarily on creative problem-solving. The creative professionals regularly perform tasks that require thinking on their own and applying and combining standard approaches to fit different situations. They use their great deal of judgment to create radically new solutions in their work, for example, various management occupations. Lastly, the third sub-group is the bohemians, defined as those who spend a significant proportion of their working time performing artistic tasks, such as designers or musicians[1].

CCT outperforms conventional human capital measurements based on individuals' educational levels in accounting for regional development. For example, Florida, Mellander, and Stolarick (2008) found that while the classical approach to human capital impact positively product and wealth, the creative class-related variables have been found to have a stronger impact on employment and wage growth. Similarly, Qian (2017a) estimated spatial regressions to analyze regional entrepreneurship levels, finding that labor skills, rather than education, are positively related to high-tech entrepreneurship in the US metropolitan regions. In a second study, Qian (2017b) examined Florida's hypothesis with the goal of enhancing his precision; to do so, he investigated the relationship between skill categories and entrepreneurship, finding that problem-solving skills, like the ones proposed in CCT, revealed both a direct and moderating effect on high-technology entrepreneurship regionally.

[1] The codes used for creating the creative class occupations are available in Appendix 2.

In summary, the central thesis of CCT hypothesizes a positive relationship between the presence of these creative workers and regional economic development (Florida, 2002). A higher percentage of creative workers in a region fosters higher rates of new firm formation and employment creation. CCT has been applied to several regions of North-America (Florida, 2012, Kundsen, Florida, Gates, and Stolarick, 2008; Florida, Mellander and Stolarick, 2006; Lee, Florida, and Acs, 2004), and Europe (Andersen, Hansen, Isaksen, and Raunio, 2010; Boschma and Fritsch, 2009; Marlet and Van Woerkens, 2004).

2.2 The creatives at the firm level

Past research has been found that human capital dimensions influence new ventures through different mechanisms. Supply and demand factors related to human capital can foster regional entrepreneurship. From the supply side, the entrepreneur's educational level positively influences new venture productivity (Fairlie and Robb, 2007; Smith, Collins, and Clark, 2005; Davidsson and Honig, 2003) as well as a more educated labor force (Subramaniam and Youndt, 2005). From the demand side, the level of education shapes consumption (Witt, 2001) and fosters the creation of innovative startups. The demand for more innovative products increases in regions where the human capital level of the population is high (Buenstorf, 2003).

The classical approach to human capital using education-related variables has been widely applied in understanding new venture performance. However, the creative class approach, which questions the classical human capital approach at the regional level, has not been investigated at the firm level. Thus, this paper explores the latter, specifically focusing on the supply side by examining how the number of creative entrepreneurs on startup teams affects new venture performance. The underlying hypothesis of this study is a superior startup performance among entrepreneurial teams increases as the number of individuals with a creative background increases.

Although a positive association between a higher creative class presence has been found with regional entrepreneurial rates, it has not been investigated if the creative class affects the supply side, the demand side, or both. This paper aims to investigate the supply side, specifically focusing on entrepreneurial teams aiming to create a new company and evaluating how creative members foster or inhibit their new venture performance.

One limitation of regional entrepreneurial studies is the dependent variable used. Often, the outcomes evaluated in regional studies a firms' births or death rates. These indicators are biased outcomes of the entrepreneurial process, as evaluating firm births ignores a significant number of projects that are still trying in the creation process at the moment of counting new births (primarily new registered companies). Thus, using firm births as the dependent variable biases the analysis of the entrepreneurial process towards the most successful companies. In addition, analyzing failure via firm deaths also biases the results; as an example, it only counts already registered companies that stop their operations. There is a significant number of startup projects that fail before than registration occurs. By analyzing only these outcomes, it is not possible to know how the higher availability of creative individuals affects regional entrepreneurship. One possibility is that having more creatives in a region might push the demand for more innovative and niche products provided by local new ventures. Another possibility is that entrepreneurs coming from creative occupations, namely in this research the creative-entrepreneur, perhaps can initiate better entrepreneurial projects, or could hire more such employees. Investigating the last requires research at the firm level. The objective of this research is to examine the relationship between creative-entrepreneurs and their performance at the startup microlevel.

Specifically, the goal is to estimate the contribution of an additional creative-entrepreneur in the startup team to several measurements of startup performance. The first performance outcome investigated is the survival of the new venture, aiming to test the persistence of entrepreneurial projects led by creative-entrepreneurs. Secondly, the transition from own-account to employ the first worker is evaluated. Then, the analysis focuses on the total number of employees hired by the new venture. These two indicators aim to examine if entrepreneurial projects led by more creative entrepreneurs generate a higher level of employment. Finally, the focus moves to startups' revenues, seeking to verify if entrepreneurial projects run by creatives-entrepreneurs are feasible in terms of profitability. The last outcome evaluated is the time to reach the sixth month of earnings in a row.

2. 2. 1 Firm survival

As pointed out previously, creatives individuals specialize in innovative tasks and products. Therefore, they can create niche markets or entirely new markets where competition is virtually nonexistent. Companies led by creative-entrepreneurs might seek to operate in those markets, and as a consequence, increase the survival chances of their new ventures precisely because of the limited competition they face (Kim and Mauborgne, 2014). Also, innovative entrepreneurs present higher survival chances of their startups since the demand for new products and services increases as consumer's wealth increases (Jackson, 1984). It also has been found that innovative firms tend to survive for a longer time (Cefis and Marsili, 2005) to less innovative ones, and as mentioned, the creatives are positively associated with more innovative places (Whitacre, Meadowcroft, and Gallardo, 2019; Knudsen, Florida, Gates, and Stolarick, 2008). Therefore, hypothetically, entrepreneurial teams in which there is a higher presence of

creative-entrepreneurs are more likely to maintain their companies operatives for a more extended period; formally, it is hypothesized that:

H1: *Having more creative entrepreneurs on entrepreneurial teams extends a firm survival*

2. 2. 2 Job creation

As mentioned previously, creatives individuals are innovative and have a special ability to solve problems. There is an ongoing debate about the role of innovation as a factor for job creation or the loss of existing jobs (Ciriaci, Moncada-Paternò-Castello, and Voigt, 2016; Mansury and Love, 2008; Greenan and Guellec, 2000). However, it has been found that young firms drive job creation (Haltiwanger, Jarmin, and Miranda, 2013; Haltiwanger, Hyatt, Mcentarfer, and Sousa, 2012), and additionally, there is evidence that a higher percentage of creative individuals is associated with higher levels of job creation regionally (Boschma and Fritsch, 2009), especially high-tech jobs (Andersen, Hansen, Isaksen, and Raunio, 2010). Thus, it is possible to formulate the second set of hypotheses for this study, suggesting that more creative-based entrepreneurial teams will create more jobs and more quickly. Formally:

H2a: *The higher the number of creatives on entrepreneurial teams, the faster the transition from own account projects to hire the first employee.*

H2b: *The more creatives on entrepreneurial teams, the more employees hired.*

2. 2. 3 New venture revenues

Florida *et al*. (2008) found that classical human capital is more strongly associated with the GDP than to creative occupations. Thus, following the logic of applying regional-level findings to firm-level findings, one could expect no association between creative-entrepreneurs and profitability. However, since creative individuals are innovation agents and thereby associated with the creation of niche markets or new markets, creative entrepreneurs could earn

higher profits by creating pioneering new ventures that face low competition (Kim and Mauborgne, 2014). Thus, it is hypothesized that:

H3: *The higher the number of creative in entrepreneurial teams, the faster the firm will reach the profitability status of their new ventures.*

3. METHODS

3.1 Scope and unit of analysis

The relationship between creative class and entrepreneurship has been investigated primarily by regional and urban scholars. As Perry reviewed (2011), CCT provides three primary types of evidence regarding its connection to economic development, at times using entrepreneurship-related variables as proxies. The most important approach explores situations where regionally the creative class is higher, using statistical methods to verify hypothetical relationships to determine superior business performance. The second approach tries to explain why there is a relationship between CCT and entrepreneurship, primarily mostly on case studies and qualitative methods, gathering primary information on individual participants in various urban settings. The third approach examines the regional context by focusing on policies, local features. While the first approach prevailed among CCT scholars, it has rarely informed about causal relationships. In these approaches analyzed by Perry, the unit of analysis was a region, such as a country, a state, or a metropolitan area. In contrast, the unit of analysis of this study is the entrepreneurial team, delimiting the scope of this investigation to the firm level instead of the regional level to analyze the impact of creative-entrepreneurs on startup performance, during the gestational phase.

The PSED project defines startup gestation as the moment of startup conception. This event occurs when an entrepreneurial team first reports having done a pair of "start-up activities"

within 12 months[2]. The earliest date of this first pair is considered the conception day of the start-up process (Reynolds, 2017). The startup gestation lasts until the nascent entrepreneur(s) achieve six months of profitability; this event is considered to be the birth of the new company. Thus, startup gestation extends until the new company is launched. However, during gestation, nascent entrepreneurs can disengage from the gestational phase before launching. By observing the gestational phase, it is possible to investigate the actual transition from not having a business to operating one in the US economy as well as other factors associated with this phenomenon.

3.2 Dataset and samples

Three datasets were combined for this research: The PSED I, the PSED II, and the PSED harmonized transition outcomes dataset. PSED-I and PSED-II offer representative and publicly available[3] samples of individuals attempting to start a company at the U.S. scale focused on the business formation process. It is one of the few studies that provide data on new venture founders about the timing to create a new firm or to disengage from the start-up process (Gartner and Shaver, 2012). To be considered a nascent entrepreneur during the screening process, the respondent had to answer positively that they *''(a) considered themselves in the firm creation process; (b) 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) expected to own part of the new venture; and (d) the new venture had not yet*

[2] 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 & 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.

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

become an operating business" (Reynolds and Curtin, 2008:172). Based on these screening questions, PSED-I and PSED-II ended up with 830 and 1214 respondents, respectively. PSED-I has a maximum of four waves for collected between 1999 and 2003, while PSED-II consists of a maximum of six waves, collected between 2005 and 2012.

Combining PSED-I and II resulted in 2044 cases, but only 1599 respondents are considered for analysis. These respondents are considered the "good cases" from PSED because these individuals are active nascent entrepreneurs interviewed at least twice (one or more follow-up interviews) in the PSED harmonized transitions dataset (Reynolds and Curtin, 2011). The final sample size for each model developed here differs. The number of cases under analysis in Models I to III (Hypothesis 1) is 1544, as a result of dropping 14 cases because their conception dates were defined after the first interview. These are problematic to this research because, by including these cases, it adds another period of observation before the conception date. In addition, 41 cases were removed due to the lack of information about household net-worth, one of the control variables described below. In the case of Models IV-IX, 25 cases were also dropped due to extreme outliers detected in the dependent and control variables[4]. As a result, when evaluating Hypotheses 2a and 2b, the number of cases is 1519. Finally, when evaluating profitability, the subsample represents those entrepreneurial teams who have not disengaged but have remained in gestation or created a new venture. Therefore, when evaluating Models X, XI, and XII, the number of cases is 901. All models are weighted to align the PSED II sample to the U.S. Department of the Census Current Population Survey using the weights provided in the PSED harmonized transition dataset, ensuring the generalizability of the findings to the population of nascent entrepreneurs in the USA.

[4] This study followed a conservative strategy of removing outliers by eliminating those cases exhibiting a standard deviation higher than |6| in any of the variables included in the model, resulting in dropping 25 cases.

3.2 Methodological strategy

The sample from the PSED project is representative of the number of U.S. individuals of individuals attempting to start ventures between 2000 and 2012. At some point during this gestation period, every respondent in the sample has started a new venture, has disengaged from the process, or is still trying to start a business through the end of the observational period. Four outcome variables are used here to evaluate the contribution of an additional creative entrepreneur on startup performance, and the modeling strategy varies depending on the outcome variable evaluated.

Various control variables that previous research found to influence the entrepreneurial process were also included, as they are likely to influence the startup outcomes. More specifically, the control variables included are similar to the ones in the models of Hechavarría, Matthews, and Reynolds (2016), who evaluated new venture survival combining PSED-I and II. When the times of the first employee hired, the number of employees, and the profitability for six consecutive months are evaluated, the variables used by Frid, Wyman, and Coffey (2016) are applied. The outcomes from Frid *et al.* (2016) are comparable to the ones in this study, except that they used PSED II only and not PSED I and II combined, as in this study. Frid, Wyman, and Coffey (2016) used the total revenue as a dependent variable, and instead of that variable, six months consecutive of profits is evaluated in this study. It is not possible to use revenues when combining PSED-I and II since both projects measure different outcomes: in PSED-I, asked for expected revenues instead of the actual revenues, are asked in PSED-II. Therefore, six consecutive months of profitability, or under the PSED approach, refers to firm births, is used as an outcome variable of profitability here.

3.3 Dependent variables

The primary interest of this study is to explain variations in the business performance of entrepreneurial teams. The first outcome analyzed is a performance measure of survival of the entrepreneur's start-up using the variable QUIT to detect whether entrepreneurial projects have disengaged or not. QUIT is coded as "1'" for entrepreneurial teams or solo projects who disengaged during startup gestation and "0" for those remained in gestation and or started a new firm. This study is interested in those cases that did not disengage from the entrepreneurial process, the cases coded "0." The PSED project defines disengagement differently for PSED-I and II. In the former dataset, it is coded "1" if the respondents claim they have terminated work on the start-up, while in the latter they claim little recent work on the start-up, no future work on it, and that future career plans do not include any new effort on this start-up (Reynolds and Curtin, 2011).

Secondly, as a proxy for how fast a startup project creates jobs, this study analyses the time taken to hire the first employee. These startups include those that have disengaged from the entrepreneurial process, or still trying to become profitable firms, or are already profitable. The time in months from the conception of entrepreneurial projects to the first employee hired is the time used, and it is labeled "1" in the variable FEMP and as "0" for those startups that never hired an employee. These last cases are treated as right-censored if they are interviewed in the last PSED wave and have not hired their first employee yet.

The third outcome variable evaluated also aims to analyze the entrepreneurial teams' capacity to create jobs. EMPlog, which is the number of employees hired (in logs) for each wave in the panel dataset, is a left-censored variable since many entrepreneurial projects never hired an

employee or did not hire one within the PSED's observation period. This situation inflates the number of zero cases in this variable, and the remaining part of the curve shows a close to normal distribution. Section 3.6A discusses the special treatment of this variable.

The fourth outcome variable aims to measure the ability of entrepreneurial teams to design profitable ventures, and it is analyzed using dummy variable PRF6. If the revenues of the new venture cover all expenses, including owners' wages and salaries during the last six of the past twelve months, this variable is coded "1" and "0" if otherwise. The time in months from the conception of the entrepreneurial projects to the date of six consecutive months of profits reported is the time of the event "becoming a profitable new firm."

3.4 Independent variable

The primary independent variable is the number of creative entrepreneurs on the entrepreneurial teams. Creatives, as mentioned previously, are individuals who make their living based on their inventiveness and originality. For each entrepreneurial team and each PSED wave, this treatment variable measures the number of startup owners that held a creative job before initiating the current startup project. The occupational codes used to compute the creative jobs are the same provided by the USDA's Economic Research Service (ERS) using Standard Occupation Code (SOC), which is available in the PSED datasets, and available in Table 1.

Table 1 – Occupation of the Creative Class, SOC code

	Standard Occupation Code (SOC)
Management occupations	
Top executives	11-1000
Advertising, marketing, promotions, public relations, and sales managers	11-2000
Financial managers	11-3030
Operations specialties managers, except financial managers	11-3010, 11-3020, 11-3040 through 11-3070
Other management occupations, except farmers and farm managers	11-9020 through 11-9190
Business and financial operations occupations	
Accountants and auditors	13-2011

Computer and mathematical occupations	
Computer specialists	15-1000
Mathematical science occupations	15-2000
Architecture and engineering occupations	
Architects, surveyors, and cartographers	17-1000
Engineers	17-2000
Drafters, engineering, and mapping technicians	17-3000
Life, physical, and social science occupations	
Life and physical scientists	19-1000 and 19-2000
Social scientists and related workers	19-3000
Legal occupations	
Lawyers	23-1011
Education, training, and library occupations	
Postsecondary teachers	25-1000
Librarians, curators, and archivists	25-4000
Arts, design, entertainment, sports, and media occupations	
Art and design workers*	27-1000*
Entertainers and performers, sports, and related workers*	27-2000*
Media and communications workers	27-3000 and 27-4000
Sales and related occupations	
Sales representatives, services, wholesale and manufacturing	41-3000 and 41-4000
Other sales and related occupations, including supervisors	41-1000 and 41-9000

**These two categories comprise the arts occupation subset.*

Source: USDA, Research Division: available at www.ers.usda.gov/data-products/creative-class-county-codes/documentation/

In both PSED I and II, respondents were asked to disclose their and their teammates' (if any) previous job. In addition, if new team members join the venture during the period of observation, respondents must report their previous jobs as well. Therefore, the variable CCE is a time-varying variable that measures the number of creative entrepreneurs observed for each entrepreneurial team (j) in each PSED wave (t). The PSED variables that report the previous job of the entrepreneur are T(1-5)OCC, R, S, and T-686_1-6, for PSED I, and for PSED II the variables used are A, B, and C-H1_6, and D, E, F-H1_10. Further, another variable that accounts for the percentage of creatives among entrepreneurial teams is tested. This variable is calculated using the CCE divided by the number of startup owners (TEAM), resulting in the variable CC% = (CCE/TEAM*100).

3.5 Additional control variables

The variables used in this paper are similar to those used in Hechaverría *et al*. (2016) and Frid, Wyman, and Coffey (2016). In their study, Hechavarría *et al*. (2016) investigated the effect of funding sources (equity and debt) on firm survival and creation. Because under the PSED approach, the firm creation happens when the revenue received in 6 of the past 12 months covers all expenses, including owners' wages and salaries. Thus it is directly linked to the new venture's profitability. Since Hechaverría *et al*. (2016) merge both PSED I and II as is done in this study, the control variables used here are very similar to theirs. However, in the case of the employment models, the research reported here is unique in evaluating this dimension using both PSED datasets. After exploring earlier articles on the topic, Frid *et al*. (2016) analyzed the number of employees hired during the first year of the startup's operations using only PSED II. In this study, extends Frid's *et al*. (2016) models using both PSED I and II[5].

3.5.1 Variables in Survival models

Some controls have been found to affect new venture survival in previous studies, specifically in Hechavarría *et al's* (2016) research. Among these controls, human capital related variables are those more important for this study since the current theoretical debate is between this occupation-based approach and the classical human capital approach, which focuses on the individual educational level. EDUC is the variable used here that measures the respondent's educational level. Since PSED-I only asks this information for the respondent, it is measured using a categorical variable that accounts for his/her level and not for the entire team. This categorical variable has the category high school degree or less as the base (=0), which is

[5] Some of the control variables used by Frid et al. (2016) are impossible to be included in the models of this study. For example, that is the case of "gainfully employed at the decision to start" because is only available for PSED II as well as "community support". Also, this study does not explicitly control for "time in gestation" as Frid et al. (2016) did, since our modeling strategy considers time as an intrinsic part of it (survival analysis and Tobit random effect models using panel data).

compared it with other four categories, first entrepreneurs who have finished a tech, community, or have some college studies (=1), those who finished college or some graduate training (=2), those holding a Master's degree, (=3), and those who have a Ph.D. degree (=4).

As mentioned previously, the creative class approach aims to measure what people do in their daily tasks instead of what they have studied. Thus, other variables aimed to measure the tacit knowledge of entrepreneurial teams have to be included. In this sense, INDXP is a variable that measures the number of years of experience for each owner in the same industry that the startup aims to operate. Similarly, STPXP, which is a variable that measures the number of prior start-up attempts for each team member since previous exposure to an entrepreneurial experience can reinforce positive attitudes towards it (McCann, 2017) can also provide the team with the implicit experience of being an entrepreneur. Both INDXP and STPXP are measured for each PSED wave; thus, it is a time-varying variable, and its fluctuation is caused by the number of new entrepreneurs joining or former members entrepreneurs leaving the startup project.

HNW is the entrepreneur's household net-worth, 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 accounts only for the respondent's household net worth, similar to Frid, Wyman, and Coffey, (2016) and Frid, Wyman, Gartner, and Hechavarría (2016). Also, TOTFUND is the team's total funds invested in the startup regardless of the source. In addition, FUNPER is a variable that measures the personal funds invested as a percentage of the total funding invested. Frid, Wyman, Gartner, and Hecheverría (2016) found that the more personal funds invested in the startup, the higher the chances of obtaining external funds, which positively impact future revenues (Gartner, Frid, and Alexander, 2012) and a subsequently potentially has a positive impact on startup survival.

TEAM measures the number of entrepreneurial team members (owners defined as either individuals or organizations) for each PSED wave. This variable is also included since it affects disengagement from the start-up process (Carroll and Hannan, 2000). However, the number of members does not necessarily have a relationship with the effort each put into the startup. Therefore, the variable SWE accounts for sweat equity, which is the team's total hours of work on the startup, for each PSED interview.

Demographics also affects survival. The variable MEN controls for the number of male entrepreneurs on the entrepreneurial teams (Owen *et al*., 2013; Fairlie and Robb, 2009), and WHITE accounts for the number of whites-Caucasians (Sabbaghi, 2018; Singh, Know, and Crump, 2008). The number of members on the entrepreneurial teams aged 18-24, 25–34, 35–44, 45–54, and 55–99 are controlled using specific variables for each range (AGE<25, AGE35-44, AGE45-54, AGE>54). These demographic controls vary with each PSED wave depending on the number of new entrepreneurs joining or former members leaving the startup project[6].

The variable GRW is the growth aspiration of the respondent entrepreneur, coded =1 when the entrepreneur wants his or her company to be "as large as possible" and =0 when entrepreneurs want to keep the project manageable "by self or with key employees." Over-optimism is an issue for firm founders, and sometimes it might lead them to underestimate the competition, impacting firm survival (Delmar and Shane, 2003). INNOV controls for the innovativeness of the start-up, measured as a categorical variable adapting Aldrich and Ruef's (2006) definition, labeled "0" when the start-up is a reproducer venture and "3" if the start-up is an innovator venture. Having a business plan is associated with firm survival during the entrepreneurial process (Liao and Gartner, 2006). Thus, BPLAN controls for having a plan or

[6] 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%.

not, as well as for the type of business plan used for each PSED wave. This categorical variable ranged from 0 to 3, with 0 representing when the entrepreneurs did not develop a business plan, 1 when they have an unwritten plan, 2 when they have developed an informal plan, and 3 when they developed a formal written plan. Financial projections reduce uncertainty in highly uncertain markets (Cassar, 2009); thus, FPRO is a time-varying variable included labeled =1 when the entrepreneur reports have financial projections for each PSED interview and 0 otherwise.

The start-up principal economic activity (PRAC) is included to control for the effects of the economic sector. This variable is coded 0 when the startup expects to operate in the business service market, 1 in the extractive sectors, 2 in transforming sectors, 3 in consumer-oriented sectors, and 4 for other sectors. Lastly, conception lag is included, following the recommendation of Yang and Aldrich (2012), to account for left truncation when evaluating firm survival and creation using PSED, measuring the time in months between the first interview and the conception date.

3.5.2 Variables in employment and profitability models

In their paper estimating the effect of the entrepreneur's wealth on employment and future profits, Frid, Wyman, and Coffey (2016) used the PSED II dataset. Since this study combines PSED I and II, thus, the models for employment outcomes replicate as best as possible those used in Frid et al. (2016)[7]. Their variables TEAM, MEN, WHITE, INNOV, STPXP, and EDUC are included in the survival model developed here. In addition, as in Frid et al. (2016), HELPERS is a variable that counts the number of non-owner helpers since it can have an impact on the need to hire employees. The variable PFUND records personal funds invested in natural

[7] Community support, are not available in PSED I, as well as Gainfully employed since only the respondent is asked about this variable in PSED I; thus they are excluded for the controls.

logarithms. This variable changes for each PSED interview, depending on the amount invested. MANG accounts for the team's managerial experience in years, measured only in the first interview, and thus, it is a fixed covariate. The variable STYPE controls for the type of startup, coded 0 = independent startups, 1 = takeover, 2 = franchise, 3 = marketing initiatives, 4 = sponsored new businesses, and 5 = others/no reply.

3.6 Models and estimation procedures

To test Hypothesis 1, the new venture's likelihood of disengaging is estimated using Cox regressions (Allison, 2014; Mills, 2011; Cox, 1972). Similarly, to test Hypothesis 2a, a series of Cox regressions estimate the likelihood of transitioning from own account work (entrepreneurial teams without personnel) to employer (entrepreneur teams with personnel). To test Hypotheses 2b, the number of employees hired (in logs) is regressed, and equations are estimated using a random-effects Tobit regression for panel data (Henningsen, 2010). Also, to test Hypothesis 3, a series of Cox regressions estimate the likelihood for a team to develop a profitable startup.

When Cox models are applied, this study adopts Allison's (2014) guidelines and the following modeling strategy. The probability that an entrepreneur experiences the event of interest 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 time interval, and if s is left to become smaller until the ratio reaches a limit, it is defined as the continuous-time hazard, denoted by $\lambda(t)$: F

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

A basic Cox regression model explaining the continuous-time hazard for subject i is formally defined as

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

where the baseline hazard function λ_0 is unspecified, but it is interpreted as the hazard function for subject *i* whose covariates all have the value of zero. For this reason, Cox models do not have an intercept term. The second part of the equation represents a linear function of an exponentiated set of β covariates, some of which them fixed and others time-varying. The φ coefficient is a continuous and time-varying variable measuring either the number of creative-entrepreneurs or the percentage of them among entrepreneurial teams, aimed to test Hypothesis 1, 2a, and 3.

Hypothesis 2b is evaluated by fitting a series of Tobit models since they are useful when an important percentage of observations have the value zero. In this study, using employment data as the dependent variable highlight the issue of having a high proportion of zero values (i.e., startups that never hired an employee). In this situation, parameter estimates obtained by conventional regression methods such as OLS are biased. The method proposed by Tobin (1958), commonly known as the Tobit provides consistent estimates in such settings. The standard Tobit model applied in this study, following Henningsen's (2010) recommendations, it is defined as

$$y^*_{i,t} = x'_{i,t-1}\beta + \varepsilon_{i,t-1} + \omega_i$$

$$y_{i,t} \begin{cases} 0 \; if \; y^*_{i,t} \leq 0 \\ y^*_{i,t} \; if \; y^*_{i,t} > 0 \end{cases}$$

where the subscript $i = 1$…,n, indicates the entrepreneurial team, and the subscript $t = 1$, …,n, indicates time, specifically in this case the number of the interview the PSED dataset; $y^*_{i,t}$, is an unobserved or latent variable; $x'_{i,t}$ is a vector of independent variables; β a vector of unknown

parameters; and $\varepsilon_{i,t}$ is the error term. As it is denoted, the independent variables were lagged in time *(t-1)*, using as explanatory variables the values of the previous PSED wave. While this research cannot inform about causality, at least it reduces as much as possible potential reverse causality issues between the dependent and the independent variables. Finally, for each entrepreneurial team *i*, there is a random effect that is shared and constant over time, represented in the ω_i coefficient. The variables are included in the same sequence as Liao and Gartner (2006), who created a base model that includes the control variables first and then introduce the primary independent variable of interest. Survival (Therneau and Lumley, 2015) and censReg (Henningsen, 2010) packages are used for model estimation here, using the R version 3.5.2

4. RESULTS

4.1 Descriptive statistics

The mean of the performance variables evaluated by entrepreneurial teams with either none or at least one creative entrepreneur can be seen in Table 2. The first outcome variable is the time from conception to disengagement from the entrepreneurial process, measured by the time in months from conception until its abandonment, i.e., when the entrepreneur reports that no one is any longer working on the startup project.

Table 2 – Outcome variables by entrepreneurial teams with and without creative owners

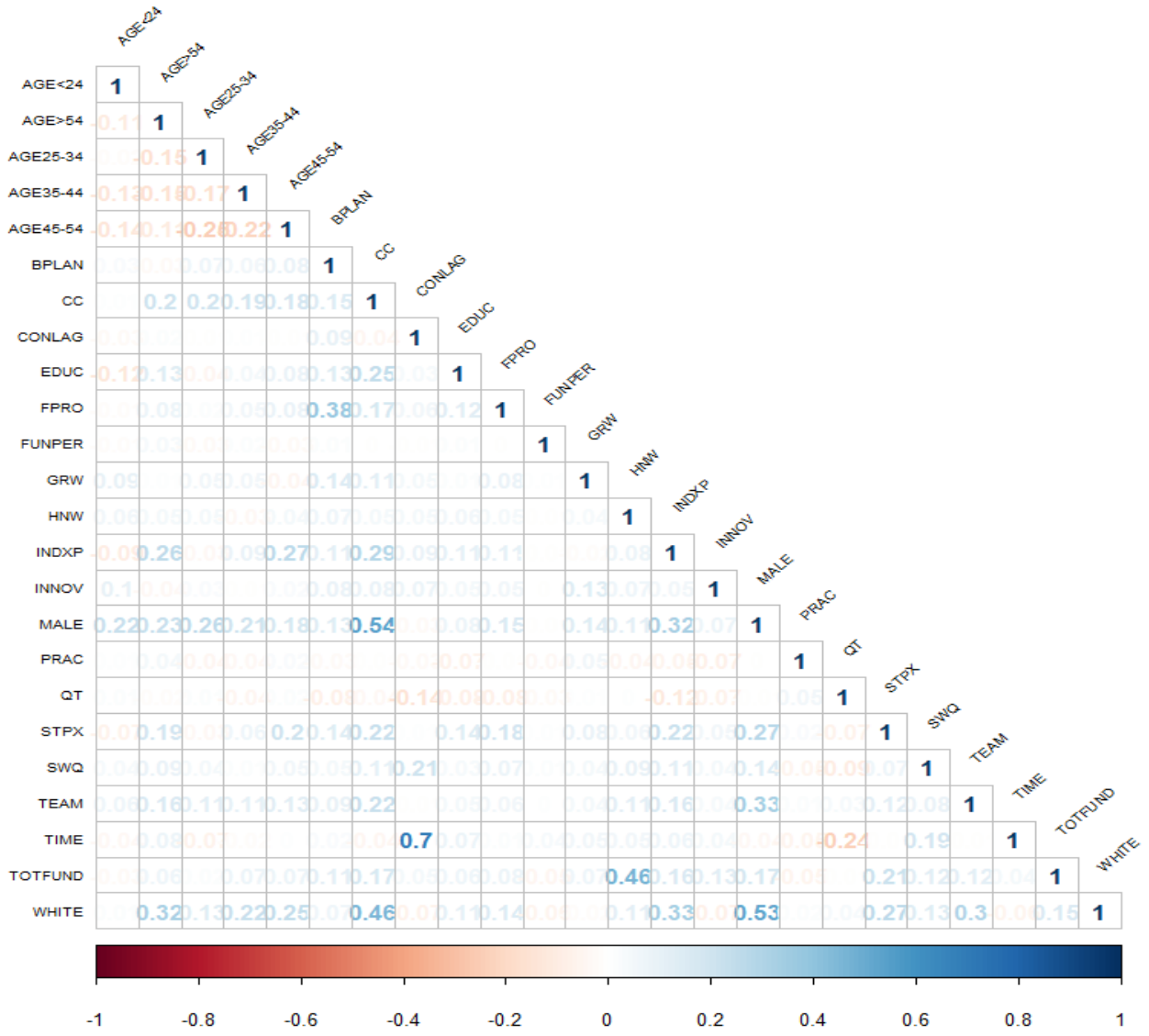
	Months to disengage from the entrepreneurial process	Months to first employee hired	Mean number of employees hired	Months to six months of profitability in a row
No creative member	34.8	22.3	0.9	31.3
At least one creative member	33.9	21.1	5.1	27.7

By analyzing the raw data from 1,599 cases without taking into account control variables, right-censoring, or nonlinearity treatment, it is possible to see differences among entrepreneurial

teams with one creative entrepreneur compared to those who have none. Unexpectedly, teams with creative members show a shorter mean time to disengagement than those with no creative members. On the other hand, entrepreneurial teams with at least one creative member are more likely to reach profitability with their new venture projects and hire employees faster and in higher numbers. This previous data should be carefully considered. Table 2 is provided only to show that there are potential effects based on the number of creative entrepreneurs on new venture performance that could be worth investigating. To examine these possible associations, a comprehensive analysis of the outcome variables helps to address the right-censored in all event-history analyses and to address heterogeneity issues as well in the case of random Tobit models. A random-effect model was chosen because it allows estimation of the effects of time-invariant determinants. Including a random effect is especially important in this research since human capital variables, such as the creative background or the educational attainment vary little with time.

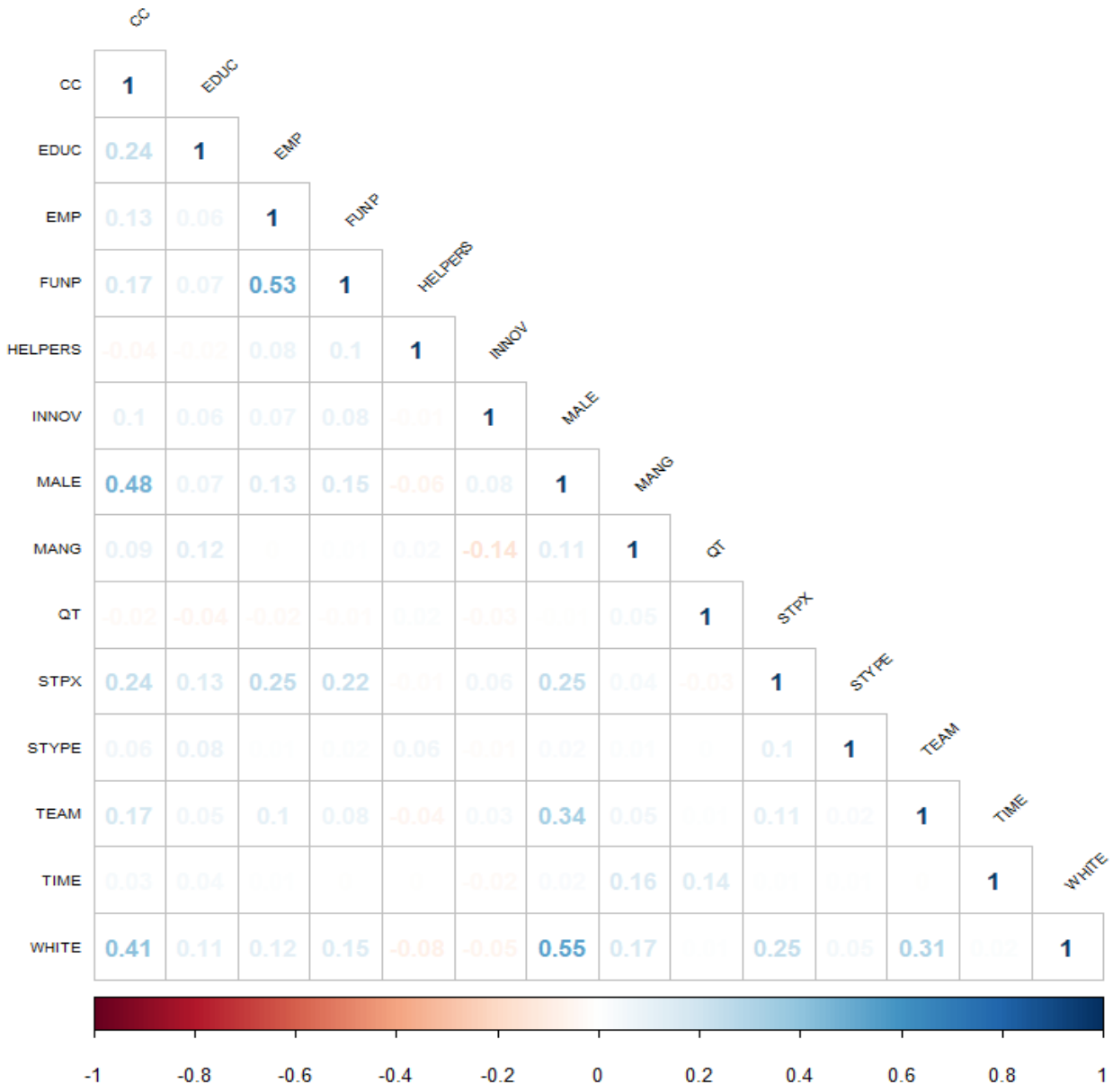
Severe multicollinearity is not an issue for survival models developed here. Chart 1 shows a correlation matrix for the variables included in the survival models, but only the first PSED interview given the unbalanced nature of the dataset. The only case of concern is the high correlation found between time and conception lag (0.7). Including CONLAG in the Cox regression could result in a violation of the proportional hazard assumption. A special treatment for this issue based on Alisson's (2014) recommendation, described in Section 4 for Models I, II, and III. The second coefficient of importance is between CC and MALE, which has a value of 0.54. The third most important is a Pearson correlation of 0.53 between MALES and WHITE.

Chart 1 - Correlation Matrix, Survival Models



Multicollinearity was not an issue when analyzing employment and profitability models. Again, by creating a correlation matrix of the first PSED interview using all variables of these models, it is possible to see that the highest Pearson correlation is 0.55 between MALE and WHITE. The second Pearson correlation in order of importance is between FUNP and EMP.

Chart 2 - Correlation Matrix, Employment Models



Therefore, in both cases, an acceptable amount of remaining variation allows this study to identify significant effects for the number of creative individuals among entrepreneurial teams. Thus, including the control variables benefit this research by reducing biases without great concern of multicollinearity.

4.2 Estimation results

Tables 3 to 6 provide the estimation results, where each table corresponds to one of the four outcomes of entrepreneurial performance. All tables show the results from four model variants. Three models help to evaluate each hypothesis. Models I, IV, VII, and X serve as a benchmark and include the only control variables. The second and third models test the hypotheses utilizing two measures of creative individuals at the startup level: (i) the number of creative individuals among the team in Models II, V, VIII, and XI, and (ii) the share of creatives on the team in Models III, VI, IX, and XII. The decision for including both measurements is to obtain more information about the absolute and relative measurements since solo projects composed 51% of the original PSED harmonized transition dataset.

Each specification is presented in a three-column format. The exponentiated coefficients and the 95% confidence intervals are shown for the survival models. Similarly, when evaluating the employment outcomes using the Tobit models including random effects, coefficients are reported with their 95% confidence intervals. Also, at the bottom of each table are the results of the likelihood ratio test, and for the survival models, the proportional hazard test. Results for each of the performance outcomes are reported in separate subsections below. In each subsection, first, findings related to the hypothesis are discussed, then the results concerning both creative entrepreneurs and educational variables, and finally, the results regarding control variables.

4.2.1 Firm Survival

Table 3 presents the empirical results. Model I evaluates firm survival, including the control variables. At least one of the covariates contributes significantly to the explanation of the duration of the events of interest since the likelihood-ratio chi-square statistic, which is the

difference between -2 partial log-likelihood for the model with 32 covariates and the null model with no covariates, reveal a *p-value* <0.001. Thus, it is possible to reject the null hypothesis of the overall significance of the model. The proportional hazard assumption implied in any Cox model was met: Schoenfeld residual is = 0.51. This assumption was not met in the original model with no interaction term due to the variable CONLAG, and therefore is not shown here. For this reason, following Allison's (2014) and Mills' (2011) recommendation, an interaction was included between this variable and time, and then the proportional hazard assumption was met.

Table 3 presents the estimation results of the Cox regression for startup survival. The risk considered is disengaging from the entrepreneurial process. To test Hypothesis 1, Models II to III focus first on the number of creatives and the percentage of creative individuals' effect within entrepreneurial teams. Both Models II and III contribute at least one covariate that significantly explains survival duration. The results from Model II reveal that the rate of disengagement decreases 13% for each additional creative member on the start-up team. Model III indicates a similar pattern, meaning that for an additional 1% increase in the percentage of creatives in the startup team, the rate of disengagement decreases 0.1%. However, it is good to bear in mind that an actual 1% increase of creative-entrepreneurs among startup owners is unlikely. The addition of one creative owner will increase the percentage of creatives-entrepreneurs significantly more than 1%, since the maximum number of team members is fifteen (see Appendix 1). However, this result should be taken with caution since it is only significant at the 90% level.

Table 3 – Cox Regression Models, Start-up Survival Analysis

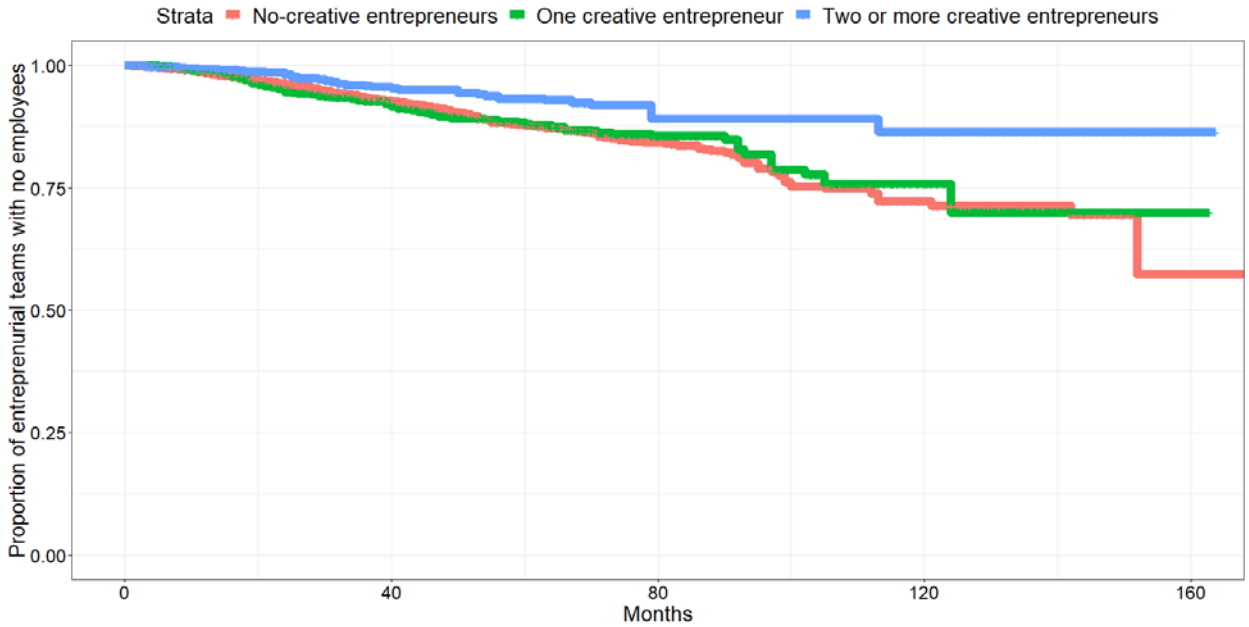
	MODEL I: Cox regression model (disengagement)			MODEL II: Cox regression model (disengagement)			MODEL III: Cox regression model (disengagement)		
	Exp (coef)	**Lower .95**	**Upper .95**	**Exp (coef)**	**Lower .95**	**Upper .95**	**Exp (coef)**	**Lower .95**	**Upper .95**
CCE				***0.87****	***0.76***	***0.97***			
CC%							***0.99***$^{+}$	***0.99***	***1.01***
EDUC, *base: high school degree or less*									
Tech, community, or some college	0.78*	0.63	0.95	0.79*	0.64	0.97	0.78*	0.64	0.96
College or some graduate training	0.95	0.76	1.18	1.00	0.80	1.25	0.99	0.79	1.23
Master's degree	0.69*	0.49	0.98	0.72^{+}	0.51	1.02	0.71^{+}	0.50	1.00
PhD degree	0.54*	0.31	0.95	0.59^{+}	0.34	1.02	0.57^{+}	0.32	1.00
INDXP	0.99***	0.98	0.99	0.99**	0.98	1.00	0.98**	0.98	0.99
STPXP	0.99	0.95	1.03	0.99	0.95	1.03	0.98	0.95	1.02
MEN	1.00	0.88	1.12	1.02	0.90	1.16	1.00	0.88	1.13
WHITE	1.06^{+}	0.99	1.14	1.06^{+}	1.00	1.14	1.06^{+}	0.99	1.13
AGE<24	1.02	0.84	1.23	1.03	0.85	1.24	1.01	0.83	1.21
AGE25-34	1.25**	1.09	1.44	1.29**	1.12	1.48	1.25**	1.09	1.44
AGE35-44	1.05	0.90	1.22	1.07	0.92	1.24	1.05	0.90	1.22
AGE45-54	1.11	0.95	1.30	1.12	0.95	1.31	1.10	0.94	1.29
AGE>54	0.93	0.79	1.09	0.93	0.79	1.09	0.92	0.78	1.08
HNW	1.01*	1.00	1.00	1.01*	1.00	1.00	1.01^{+}	1.00	1.00
TEAM	1.01	0.98	1.02	1.00	0.98	1.02	1.01	0.98	1.02
SWQ	0.99*	0.99	1.00	0.99*	0.99	1.00	0.99*	0.99	1.00
GRW, *base: as large as possible =1*	1.15	0.96	1.39	1.16	0.96	1.40	1.16	0.96	1.40
INNOV, *base = 0*									
Degree of innovativeness= 1	0.93	0.78	1.12	0.93	0.78	1.12	0.93	0.77	1.11
Degree of innovativeness= 2	0.92	0.73	1.16	0.93	0.74	1.18	0.92	0.73	1.16
Degree of innovativeness= 3	0.84	0.59	1.22	0.86	0.60	1.24	0.85*	0.59	1.23
BPLAN, *base: no business plan = 0*									
Unwritten business plan=1	0.86	0.57	1.29	0.86	0.57	1.29	0.86	0.57	1.29
Informal business plan=2	0.83	0.61	1.13	0.84	0.62	1.15	0.84	0.61	1.14
Formally written business plan=3	0.65*	0.43	0.97	0.66*	0.44	0.99	0.64	0.43	0.97
FPRO, *"have financial projections"=1*	1.44**	1.12	1.84	1.46**	1.14	1.86	1.45**	1.13	1.85
PRAC, business service sector, base									
Extractive sector	0.96	0.60	1.53	0.94	0.59	1.50	0.94	0.59	1.51
Transforming sectors	1.22^{+}	0.97	1.52	1.22^{+}	0.98	1.53	1.22^{+}	0.98	1.53
Consumer oriented sectors	1.08	0.91	1.30	1.10	0.92	1.32	1.09	0.91	1.31
Other sectors/NA	0.98	0.37	2.59	0.93	0.35	2.47	0.93	0.35	2.48
TOTFUND	0.99**	0.99	0.99	0.99**	0.99	0.99	0.99**	0.99	0.99
FUNPER	0.98***	0.98	0.98	0.98***	0.98	0.98	0.98***	0.97	0.98
CONLAG	0.94***	0.93	0.95	0.94***	0.93	0.95	0.94***	0.93	0.95
CONLAG*TIME	1.00***	1.00	1.00	1.00***	1.00	1.00	1.01***	1.00	1.01
Likelihood ratio χ^2	783.4***, on 32 df			789.4***, on 33 df			787.3***, on 33df		
Proportional Hazard test	p-value = 0.52			p-value = 0.61			p-value = 0.58		

****p <0.001, **p <0.01, *p <0.05, $^{+}$p <0.1*

In Chart 3, the number 1 on the y-axis represents the total number of entrepreneurial teams in the sample which are at risk of disengagement, and the x-axis represents the time in months. Any reduction from 1 means a startup disengaged from the entrepreneurial process. The survival curve indicates that entrepreneurial teams with two or more creative entrepreneurs

experience this event at a lower rate than those with one or zero creative entrepreneurs[8]. Entrepreneurial teams with none or one creative owner behave similarly in terms of disengagement. The results from the Cox estimations and the survival curve supports Hypothesis 1 that having more creatives among entrepreneurial team members extends firm survival.

Chart 3- Start-up Survival curve, stratified by the number of creative entrepreneurs in teams



The educational control variables show a stronger effect before including the CCE and CC%. For example, in Model I, EDUC is a categorical variable that reveals the odds of experiencing disengagement for each category compared with the base category (high school degree or less); three of four EDUC categories were significant in reducing the likelihood of disengagement compared to those entrepreneurs who have a high school degree or less. After including CCE and CC% in Model II and III, only one of the EDUC categories describing the entrepreneurs with a tech, community, or some college background remained significant in reducing disengagement when compared to the base category. Similarly, for each year of the

[8] The last also confirms the results shown in Model II. Since the number of creative entrepreneurs in teams ranges from 0 to 10, plotting survival curve for each number would be illegible. For that reason, CCE has been re-codified to plot the survival curves into three categories. First, no creative entrepreneurs in the team, second, one creative entrepreneur, and finally, two or more creative entrepreneurs in the startup.

team's industry experience, disengagement is reduced by 1.2%. This result was significant at the 0.1% level in Model I, but after the creatives variables are entered in Model II and III, its significance decreased to 99%, as well as the power of the coefficients to 1%. Previous startup experience shows no statistical significance in Models I to III.

Other control variables contributing to explaining disengagement and did not vary after entering CCE and CC%. For example, as the percentage of personal funds in total funds increases by 1%, disengagement is reduced by 2% for Models I to III. As expected, the total funds invested and entrepreneurs' household net worth, show a similar effect in reducing disengagement for all models. The effects of having financial projections and business plans did not vary in Models I to III either. However, having a financial projection increases the disengagement likelihood by 30%. This unexpected result could be explained because entrepreneurs with financial projections can monitor and forecast economic performance, meaning they can anticipate a decision to disengage as appropriate. Entrepreneurs that have a formal written business plan increase the likelihood of startup survival compared to those who do not have one. Having additional entrepreneurs between the ages of 25 and 34 decreases disengagement likelihood. Also, a small but significant effect is shown by sweat equity, which reduces disengagement slightly.

4.2.2 Transition from own account to employer

Table 4 shows results for the outcome measure “transitions from own-account worker to employer.” Model IV evaluates the event of hiring the first employee, including the control variables. At least one of the covariates contributes significantly in explaining the duration of the events of interest since the likelihood-ratio chi-square statistic, which is the difference between -2 partial log-likelihood for the model with 21 covariates and the null model with no covariates,

indicates a *p*-value <0.001, allowing the rejection of the null hypothesis of the model's overall significance. The proportional hazard assumption implied in a Cox model was met: the Schoenfeld residual is > 0.53. It was not possible to meet this assumption an original model which is not shown here, due to the variable QT, and therefore, again based on Allison (2014) and Mills (2011) recommendations, an interaction was included between this variable and time, resulting in meeting the proportional hazard assumption.

Concerning the role of creative-entrepreneur in hiring their first employee, the result is the relatively stable positive effect of the number of creatives. At the 0.1% significance level, the results in Model V show that the likelihood of hiring the first employee increases by 20% for each additional creative member on the start-up team. The percentage of creatives in the team shows a more robust significance in Model VI, where the exponentiated coefficient accounts for a 0.1% significance level. Regarding the magnitude of the effect, the results in Model VI reveal that holding other variables constant, an increase of 1% in creatives is associated with an increase in the "hazard" of hiring the first employee by 0.5%.

Table 4 – Cox Regression Models, Analysis of the Time to Hire the First Employee

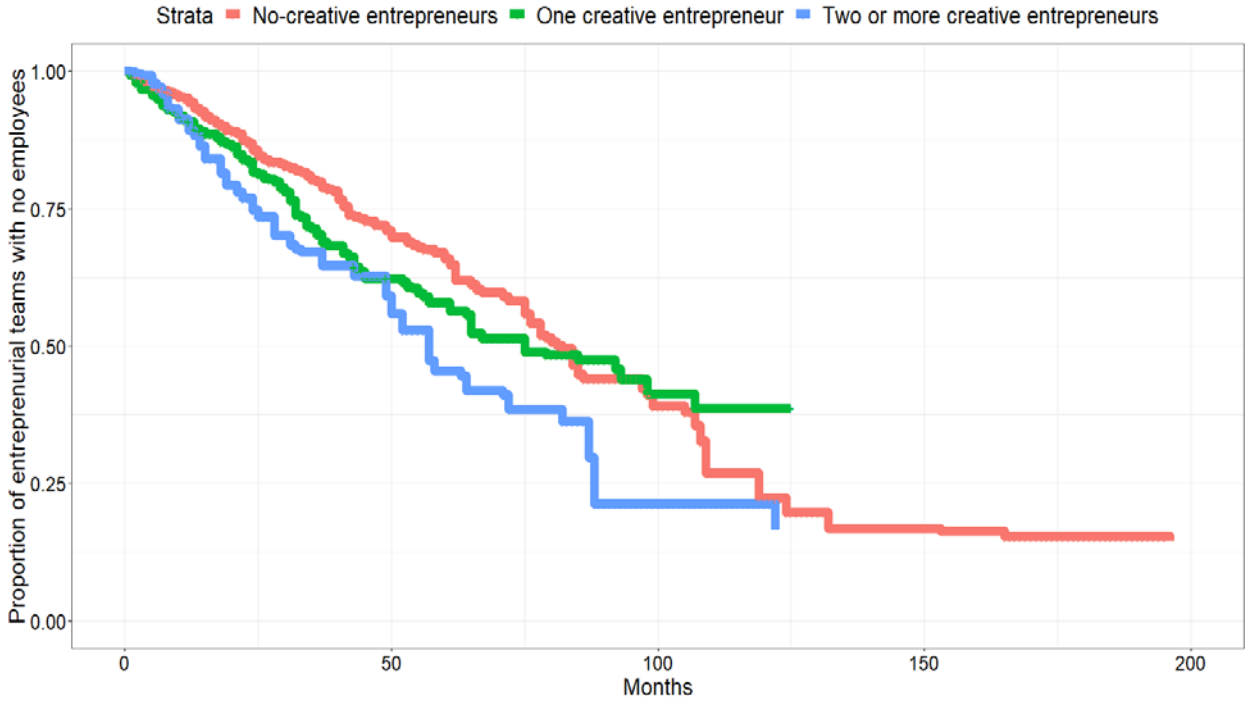
	MODEL IV: Cox regression model (first worker)			**MODEL V: Cox regression model (first worker)**			**MODEL VI: Cox regression model (first worker)**		
	Exp (coef)	**Lower .95**	**Upper .95**	**Exp (coef)**	**Lower .95**	**Upper .95**	**Exp (coef)**	**Lower .95**	**Upper .95**
CCE				***1.20*****	***01.05***	***1.37***			
CC%							**1.01*****	***1.00***	***1.01***
EDUC, base: high school degree or less									
Tech, community, or some college	1.12	*0.86*	*1.47*	1.09	*0.83*	*1.43*	1.09	*0.83*	*1.43*
College or some graduate training	1.21	*0.91*	*1.60*	1.08	*0.80*	*1.45*	1.06	*0.79*	*1.42*
Master's degree	1.37^{+}	*0.95*	*1.99*	1.26	*0.85*	*1.85*	1.28	*0.87*	*1.88*
PhD degree	1.33	*0.81*	*2.20*	1.25	*0.75*	*2.11*	1.23	*0.73*	*2.07*
STPXP	1.01*	*1.00*	*1.02*	1.04**	*1.01*	*1.08*	1.04**	*0.98*	*0.99*
MANG	0.99	*0.99*	*1.00*	0.99^{+}	*0.98*	*1.00*	0.99*	*0.98*	*0.99*
WHITE	1.05^{+}	*0.99*	*1.12*	1.03	*0.96*	*1.10*	1.03	*0.96*	*1.10*
MALE	1.08	*0.97*	*1.19*	1.08	*0.94*	*1.25*	1.10	*0.95*	*1.26*
TEAM	1.00	*0.95*	*1.04*	0.89	*0.78*	*1.02*	1.05	*0.98*	*1.12*
HELPRES	1.06^{+}	*1.00*	*1.12*	1.05^{+}	*0.98*	*1.11*	1.06^{+}	*1.00*	*1.13*
PFUND(log)	1.13***	*1.11*	*1.16*	1.13***	*1.11*	*1.16*	1.13***	*1.11*	*1.16*
INNOV, base = 0									
Degree of innovativeness= 1	0.87	*0.69*	*1.10*	0.85	*0.66*	*1.05*	0.85	*0.67*	*1.07*
Degree of innovativeness= 2	0.82	*0.62*	*1.10*	0.72*	*0.52*	*0.98*	0.75^{+}	*0.55*	*1.01*
Degree of innovativeness= 3	0.78	*0.51*	*1.21*	0.77	*0.47*	*1.25*	0.77	*0.47*	*1.25*
STYPE, base = independent startups									
takeover = 1	2.22***	*1.43*	*3.46*	2.22***	*1.41*	*3.44*	2.24***	*1.43*	*3.51*
franchise = 2	1.01	*0.59*	*1.71*	0.99	*0.54*	*1.59*	0.92	*0.54*	*1.58*
marketing initiatives = 3	1.08	*0.51*	*2.27*	1.05	*0.49*	*2.22*	1.01	*0.448*	*2.14*
sponsored new business = 4	1.89***	*1.35*	*2.66*	1.81***	*1.28*	*2.55*	1.78***	*1.26*	*2.52*
Others = 5	0.77	*0.23*	*2.57*	0.72	*0.23*	*2.56*	0.72	*0.21*	*2.42*
QT	6.27***	*3.71*	*10.59*	6.67***	*3.93*	*11.3*	6.63***	*3.91*	*11.24*
QT*TIME	1.03***	*1.02*	*1.04*	1.03***	*1.01*	*1.04*	1.03***	*1.01*	*1.04*
Likelihood ratio χ^2	620.3, on 21 df			599.9, on 22 df			602.8, on 22 df		
Proportional Hazard test	0.53			0.58			0.55		

****p <0.001, **p <0.01, *p <0.05, $^{+}$p <0.1*

In Chart 4, the number 1 represents the total entrepreneurial teams, and any reduction from 1 means a startup transitioned from not having any employees to employing its first worker. Based on these estimates, entrepreneurial teams with two or more creatives, as shown by the blue line, hire their first employee faster than those with one or zero. Interestingly, entrepreneurial teams with at least one creative-entrepreneur hire its first employee at similar rates to those with two or more at the beginning of the entrepreneurial process. However, as time passes, entrepreneurial teams with one creative member, as shown by the green line, behave similarly to those with no creatives among the owners, as shown by the red line. It is also possible to see that

only startups with no creative-entrepreneurs remain until the last month of observation without having hired one employee.

Chart 4 – Curve of the transition from own-account to employer, stratified by the number of creative entrepreneurs in teams



Similar to Models I to III, the entrepreneurial teams' educational variables are again affected when CCE and CC% are included. In transitioning from sole proprietorships to hiring the first employee, EDUC seems to have virtually no effect except for the category entrepreneurs holding a Master's degree. These entrepreneurs are 31% more likely to hire their first employee compared to entrepreneurs having a high school degree or less but only at the 10% level. This last effect disappears when both CCE and CC% are entered in Models V and VI, respectively. The variable STPX is significant at the 95% level in Model IV, but its significance increases to 99% after introducing CCE and CC% in Models V and VI. The power of the STPX coefficient increases after entering CCE and CC% as well. Before introducing these variables, for a yearly increase of startup experience, the "risk" of hiring the first employee also increases by 1%. After CCE and CC% were introduced, this risk increases to 4% for every additional year of team

startup experience. These results also reveal a similar pattern for managerial years of experience (MANG). This variable exhibited a 90% significance level before CCE, and CC% were introduced. However, after the introduction of the creative variables in Models V and VI, its significance increases to 95% and 99%, respectively. In both models, an increase in the team's average years of managerial experience accounts for a small but decreasing “hazard” of hiring the first employee.

The coefficients of the control variables show that an increase in FUNP increases the “hazard” of employing the first worker. Two types of startups, takeover and sponsored businesses are associated with an increased “risk” of hiring the first employee. A shorter time to hiring the first employee is associated with QUIT as well because those startups that disengage were observed for a shorter period due to their exit. It is essential to control for this variable since it can bias the time if it is not included. All these effects of the control variables do not change significantly across Models IV to VI; the only exception been is the variable HELPERS. This variable is associated positively with the event of hiring the first employee, and it is significant at the 95% level before including the CCE and CC% in Model IV. After adding CCE and CC% in Models V and VI respectively, it is significant only at the 10% level.

4.2.3 Number of employees

Table 5 provides the result for the Tobit estimations. The coefficients capture the effect on the uncensored latent variable, not the observed outcome. Given that EMPlog is expressed in natural logarithms, these coefficients are interpreted as the percent change in the number of employees in the case of continuous variables. For dichotomous or categorical variables, the coefficients reflect the percent change in earnings for a discrete change in the category or from the change from 0 to 1 in the case of a dummy variable.

Table 5 presents the estimated results of the number of hired workers for every entrepreneurial project. Based on the log-likelihood, the inclusion of CCE and CC% improved the model fit. Model I accounts for a log-likelihood of -2640.1, while for Models VIII and IX, it was reduced to -2637.1, and -2637.9, respectively. According to Model VIII, as can be seen in Table 5, for an increase in the number of creative entrepreneurs by one individual, the expectation is an increase in the number of employees by 29%, holding other variables constant. This significant association is also found in Model IX when using CC%: An increase of just 1% of creative-entrepreneurs on the team is associated with 0.4% employment growth. Recall that a 1% increase in creative-entrepreneurs among startup owners is theoretical. Empirically it is unlikely to happen since just one additional creative owner on the team will have a higher impact than 1% because the maximum number of team owners is fifteen members.

Both results regarding CCE and CC% are significant at the 95% level. Thus, Hypothesis 2b is supported for both measures of creative individuals in entrepreneurial teams.

Table 5 – Tobit Regression Models, Number of Employees Hired

	MODEL VII: Tobit model (number of employees)			MODEL VIII: Tobit model (number of employees)			MODEL IX: Tobit model (number of employees)		
	Coef	**Lower .95**	**Upper .95**	**Coef**	**Lower .95**	**Upper .95**	**Coef**	**Lower .95**	**Upper .95**
Intercept	-4.48***	-5.16	-3.80	-4.32***	-5.02	-3.63	-4.42***	-5.09	-3.74
CCE				**0.29***	**0.07**	**0.52**			
CC%							**0.01***	**0.00**	**0.01**
EDUC, base: high school degree or less									
Tech, community, or some college	0.08	-0.38	0.54	-0.02	-0.48	0.43	0.01	-0.45	0.46
College or some graduate training	0.12	-0.37	0.62	-0.03	-0.53	0.47	-0.03	-0.53	0.47
Master's degree	0.01	-0.65	0.67	0.07	-0.57	0.71	-0.02	-0.67	0.63
PhD degree	1.33**	0.51	2.15	1.22**	0.43	2.02	1.23**	0.45	2.01
STPXP	0.03	-0.03	0.09	0.05^{+}	-0.01	0.10	0.04	-0.02	0.09
MANG	-0.02***	-0.03	-0.01	-0.02***	-0.03	-0.01	-0.02***	-0.03	-0.01
WHITE	0.10	-0.02	0.21	0.05	-0.07	0.17	0.08	-0.04	0.20
MALE	0.30	0.11	0.49	0.23	0.05	0.42	0.24	0.05	0.42
TEAM	0.04	-0.14	0.23	0.01	-0.16	0.19	0.07	-0.11	0.25
HELPRES	0.15***	0.09	0.20	0.14***	0.09	0.20	0.14***	0.09	0.20
PFUND	0.07***	0.05	0.10	0.07***	0.05	0.09	0.07***	0.05	0.10
INNOV, base = 0									
Degree of innovativeness= 1	0.32	-0.04	0.68	0.18	-0.18	0.54	0.29	-0.07	0.65
Degree of innovativeness= 2	0.05	-0.42	0.52	-0.07	-0.53	0.40	0.03	-0.43	0.49
Degree of innovativeness= 3	-0.38	-1.21	0.46	-0.55	-1.41	0.30	-0.45	-1.29	0.39
STYPE, base = independent startups									
takeover = 1	1.33***	0.61	2.04	1.33***	0.61	2.05	1.31***	0.57	2.04
franchise = 2	-0.36	-1.13	0.40	0.1	-0.58	0.78	-0.42	-1.21	0.38
marketing initiatives = 3	-0.17	-1.06	0.73	-0.15	-1.07	0.77	-0.2	-1.10	0.71
sponsored new business = 4	0.83	0.21	1.44	0.7	0.07	1.33	0.76	0.14	1.37
Others = 5	-0.90	-3.16	1.36	-0.92	-3.28	1.44	-0.88	-3.12	1.36
logSigmaMu	0.73	0.59	0.87	0.75	0.61	0.88	0.72	0.58	0.86
logSigmaNu	0.58	0.51	0.65	0.58	0.51	0.65	0.58	0.51	0.65
Log-Likelihood	-2640.1, on 22 df			-2637.1, on 23 df			-2637.9, on 23 df		

****p <0.001, **p <0.01, *p <0.05, +p <0.1*

The other human capital related variables show stable results in Models VII to IX. Concerning an entrepreneur's formal education, Model VIII suggests that entrepreneurs with a Ph.D. hire more than double the employees (132%) than entrepreneurs with a high-school degree or less, the only significant comparison among EDUC categories. After including CCE and CC% in Models VIII and IX, the coefficient power decreases slightly. Managerial experience is negatively associated with EMPlog. For a year increase in MANG, there is a reduction of 1.7% in the number of employees hired. When Models VIII and IX include CCE and CC% respectively, the MANG coefficient remained stable in its both significance and power. STPX never reached a 95% significance level in any of the Models VII to IX.

There is also a group of control variables associated with employment levels in Models VII, VIII, and IX. For example, MALE indicates a positive relationship between male entrepreneurs and the number of employees hired, an association found in all models. The variable HELPERS exhibited the same pattern: Having more external non-owner helpers increases the number of employees. The higher personal funds invested (FUNP variable), the higher the number of employees hired, an association found across the three models evaluating the number of employees. Finally, the type of startup is controlled using the STYPE categories. As was expected, takeover startups are associated with having more employees when compared to independent startups (the base category).

4.2.4 Six consecutive months of profit reported

Table 5 presents the results for the time it takes to become a profitable firm, defined as six consecutive months of profits. Specifically, Models IX to XI use the subsample of those companies that did not disengage from the entrepreneurial process. As a result, companies can either become profitable or are labeled as "still trying" to achieve profitability. In all models, at least one of the covariates contributes significantly to the explanation of the profitability event. The likelihood-ratio chi-square statistic, which is the difference between -2 partial log-likelihood for the Model X with 21 covariates and Models XI and XII with 22 covariates, and the null model with no covariates, reveals a *p*-value <0.001in for these three cases.

The results cannot confirm hypotheses 3a and 3b. Given the significance of the chi-square statistic, at least one of the covariates contributes significantly to the explanation of becoming a profitable startup in Models X, XI, and XII. However, after the introduction of CCE and CC%, the likelihood-ratio chi-square statistic did not improve in Models XI and XII. In addition, both variables are not statistically significant in any model.

Table 6 – Cox Regression Models, Analysis of the Time to Achieve a Sixth Months of Profits

	MODEL IX: Cox regression model (first worker)			MODEL X: Cox regression model (first worker)			MODEL XI: Cox regression model (first worker)		
	Exp (coef)	**Lower .95**	**Upper .95**	**Exp (coef)**	**Lower .95**	**Upper .95**	**Exp (coef)**	**Lower .95**	**Upper .95**
CCE				**1.08**	**0.94**	**1.23**			
CC%							**1.00**	**1.00**	**1.00**
EDUC, base: high school degree or less									
Tech, community, or some college	1.07	0.80	1.41	1.06	0.80	1.40	1.05	0.79	1.39
College or some graduate training	0.96	0.70	1.30	0.92	0.67	1.27	0.91	0.67	1.26
Master's degree	0.78	0.52	1.17	0.76	0.51	1.15	0.76	0.50	1.14
PhD degree	0.91	0.54	1.54	0.88	0.52	1.49	0.87	0.51	1.48
STPXP	1.01	0.99	1.01	1.01	0.99	1.02	1.01	0.99	1.02
MANG	0.99	0.99	1.01	0.99	0.99	1.00	1.00	0.99	1.00
WHITE	1.09*	1.01	1.17	1.08*	1.00	1.16	1.08*	1.01	1.17
MALE	1.11^{+}	0.98	1.25	1.08	0.95	1.23	1.09	0.97	1.23
TEAM	1.00	0.93	1.07	1.00	0.94	1.08	1.01	0.94	1.08
HELPRES	1.07*	0.97	1.114	1.07	1.01	1.14	1.07	1.01	1.14
PFUND	0.99	0.97	1.01	1.00*	0.97	1.02	1.00*	0.97	1.02
INNOV, base = 0									
Degree of innovativeness= 1	0.95	0.75	1.20	0.94	0.74	1.19	0.95	0.75	1.20
Degree of innovativeness= 2	1.08	0.83	1.43	1.07	0.82	1.41	1.08	0.82	1.41
Degree of innovativeness= 3	0.82	0.52	1.28	0.80	0.51	1.26	0.81	0.52	1.26
STYPE, base = independent startups									
takeover = 1	1.37	0.84	2.25	1.40	0.85	2.29	1.41	0.86	2.30
franchise = 2	0.99	0.58	1.66	0.99	0.58	1.66	0.98	0.58	1.65
marketing initiatives = 3	0.82	0.39	1.73	0.82	0.39	1.73	0.81	0.39	1.70
sponsored new business = 4	1.70**	1.23	2.36	1.69**	1.22	2.35	1.70**	1.23	2.36
Others = 5	0.84	0.31	2.26	0.85	0.32	2.29	0.85	0.32	2.30
CONLAG	0.96***	0.95	0.97	1.06***	0.93	1.23	1.00***	0.99	1.00
CONLAG*TIME	1.01***	0.99	1.05	1.01***	1.00	1.01	1.00***	1.00	1.00
Likelihood ratio χ^2	126, on 21 df			127.2, on 22 df			127.5, on 22 df		
Proportional Hazard test	0.26			0.25			0.26		

****p <0.001, **p <0.01, *p <0.05, $^{+}$p <0.1*

Unexpectedly, neither of the educational variables shows any effect on profitability. Regarding the remaining control variables included, the variable HELPERS indicates that having more helpers shows a positive and significant relationship with profitability, as well as the number of whites/Caucasians in entrepreneurial teams. As expected, among the categories of STYPE, sponsored new business is the only category that accounts for a significant effect when compared to independent startups (the base category) in Models X to XII.

4.2.5 Summary of the primary results

The primary results from Tables 3 to 6 can be summarized as follows. Better startups performance outcomes during the gestational phase are expected in entrepreneurial teams led by

creative teams. This result is especially true when more than one creative entrepreneur leads the team. Having more creatives among startup owners increases the survival chances of the new venture. Also, there is a positive impact on the transition time from a startup without personnel to the hire of the first employee. Similarly, an entrepreneurial project owned by a higher number of creative individuals is positively related to the number of employees hired. Most of the analyses of this study indicated that when evaluating startup performance outcomes, variables measuring the entrepreneurs' creative background outperform the standard educational attainment measurements. However, this study did not find a relationship between having more creatives owners among teammates and startup profitability.

5. DISCUSSION

Human capital obtained through education is one of the most reliable drivers of entrepreneurship performance at the firm level. However, this standard measurement of human capital has been questioned at the regional level by Florida's CCT in many studies related to entrepreneurship and economic development. More specifically, Florida, Mellander, and Stolarick's (2008) research found that formal education positively impacts gross product and wealth, while creative-class related variables are strongly associated with employment and wage growth at the regional level. In this study, the firm level is the scope of the analysis. This study examined whether having a higher number of creative individuals on entrepreneurial teams improves startup performance, finding that there are micro-level fundaments for the macro-level findings of Florida, *et al*. (2008): More creative-entrepreneur-owned startups are strongly associated with job creation. This research also provides new results on the relationship between creative-entrepreneurs and the length of startup survival times.

Specifically, this research found support for a positive relationship between having more creative-entrepreneurs as owners and three of the four measures of startup success considered — survival, the transition from not having any to the hire of the first employee, and the number of employees hired. Regarding new venture survival, companies led by creatives might seek to operate in new and niche markets. Consequently, their survival chances increase because they face low competition levels (Kim and Mauborgne, 2014). In addition, innovative entrepreneurs exhibit higher survival chances since the demand for new innovative products and services increases consumers' growing wealth (Jackson, 1984). As described by CCT, creatives are innovative, problem-solving individuals, and their startups might be as well. However, one limitation of this study is not considering the markets where startups operate. Future research will have to consider the regional dimension interacting with the startup factors, and the regional variables to analyze firm survival. As mentioned previously, this study found that projects led by more creative entrepreneurs tend to survive longer, but it did not investigate whether it is an effect of operating in more sophisticated markets or not.

The more robust relations found in this study are between the creative-entrepreneur's variables and employment creation. Both the transition from not having employees to hiring the first worker and the startup's number of employees are positively associated with the number of creative-entrepreneurs as owners. As mentioned above, Florida, Mellander, and Stolarick's (2008) research found that creative-class related variables are strongly associated with employment and wage growth at the regional level. It is not possible to make the same argument based on this study since PSED does not provide information about employee's wages. This topic should be investigated using a dataset that contains the salaries provided by creative-led startups. However, at the startup micro-level, this study found that creative-led startups hire

employees faster and at higher numbers, supporting past results found at the macro-regional level.

6. CONCLUSIONS AND POLICY IMPLICATIONS

Human capital is a measurement of the knowledge that individuals possess. Knowledge for entrepreneurship matters. The policy implication of this study is to broaden the concept of knowledge applied to entrepreneurship. Education can be viewed and is used as a direct instrument for developing entrepreneurship behavior. However, highly educated individuals do not necessarily have the highest entrepreneurial ability. In this regard, non-mainstream human capital measurements such as the number of creative individuals helped in identifying these individuals. Creative individuals possess tacit knowledge that is difficult to measure through the standard human capital variables commonly used in entrepreneurship research. This idea is also reinforced since measurements such as the team's years of industry experience, managerial experience, and previous startups attempts were more impactful compared to the education variables on the outcomes tested in this study.

Data from PSED I and II were used to provide new evidence on entrepreneurs' characteristics associated with startup outcomes. Overall, as similar to the previous research about entrepreneurial development at the regional level, the findings from this study challenge the standard measurement of human capital through educational attainment. The creative entrepreneurs' measurements significantly explained three of the four performance outcomes tested in this research. Thus, the previous working background is important for entrepreneurship, especially on entrepreneurial teams in which members had a creative occupation before starting a new company. Therefore, policies targeted to support people in creative professions to join and

move towards entrepreneurship could benefit economic development, especially in employment deprived areas.

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