

Douglas Cumming - Uwe Walz - Jochen Christian Werth

# The Dynamics of Entrepreneurial Careers in High-Tech Ventures: Experience, Education, and Exit

SAFE Working Paper No. 122

**SAFE | Sustainable Architecture for Finance in Europe**

A cooperation of the Center for Financial Studies and Goethe University Frankfurt

House of Finance | Goethe University  
Theodor-W.-Adorno-Platz 3 | 60323 Frankfurt am Main

Tel. +49 69 798 34006 | Fax +49 69 798 33910  
info@safe-frankfurt.de | www.safe-frankfurt.de

## Non-Technical Summary

Venture capital (VC) backed firms are among the most dynamic entrepreneurial firms contributing significantly to innovation and economic growth. This is particularly true for firms in high-tech industries on which most of venture-capital financing is concentrated on. One of the key inputs in this process is, besides VC financing, the spirit and human capital of the founders and entrepreneurs.

While being a decisive input in this process, rather little is known about the career paths (after leaving the VC-backed venture) and personal backgrounds of VC-backed entrepreneurs. An important benefit of venture capital finance is that it spawns the creation of new ventures. That is, entrepreneurs backed by venture capitalists (VCs) tend to form new companies, or become coaches for new entrepreneurs in the form of business angels, after VCs exit the venture. Nevertheless, hitherto existing literature, which addresses the exit issue of entrepreneurs, mostly focuses (exclusively) on non-high-tech firms and hence, look – given the very different type of activities and firms – into a very different setting. Yet in this context, it would be of considerable importance to understand the role of VC in spawning new entrepreneurial activity, since it has implications for practice and policymakers alike. Where VC spawns new entrepreneurial activity, positive externalities emerge that exacerbate the benefits of VC finance.

Hence, we aim to narrow this gap in the literature on the analysis of career paths of entrepreneurs in high-tech firms. In order to do so we address two main research questions. First, we relate the entry decision of founders (that is, whether they have worked for a start-up before, and their founding experience and education) with their exit decision, i.e. whether they stick with entrepreneurial activity or become dependently employed. Second, we investigate other drivers of the founders' exit decision such as the exit choice of the company itself or the financial success of the company. By answering both questions, we depict a broader picture of the dynamics of entrepreneurial careers, their patterns as well as the driving forces. We thereby also provide important new insights into the dynamics of the corporate governance of venture-financed high-tech firms. In order to achieve these goals, we deploy a hand-collected sample of high-tech firms, which have received venture financing. Thereby, we focus on the patterns of the entrepreneurs' career paths as well as on the determinants of the likelihood of an entrepreneur and founder to stick with entrepreneurial activity.

The analysis shows that experiencing VC-backing does not lead entrepreneurs to become repeat entrepreneurs, unless they had prior experience either founding or working for a start-up, or unless the entrepreneur is a 'jack-of-all-trades' with a general management education. VC-backing by itself will give rise to future entrepreneurial activities in terms of repeat founders or creating business angels only where the VC-backed venture generates a substantial financial return to the entrepreneur. Hence, future academic and policy work on the role of VC in creating serial entrepreneurs should recognize that entrepreneurial characteristics, including their prior experience with entrepreneurship and their education, appear to play a stronger role

than the experience of VC itself. VC-backing spawns new entrepreneurial activity only insofar as there is a large financial reward to entrepreneurs associated with VC exit. It is the large financial success in entrepreneurship making founders more inclined to become repeat entrepreneurs and business angels.

# **THE DYNAMICS OF ENTREPRENEURIAL CAREERS IN HIGH-TECH VENTURES: EXPERIENCE, EDUCATION, AND EXIT\***

**Douglas Cumming**

Professor in Finance and Entrepreneurship  
York University  
Schulich School of Business  
4700 Keele Street  
Toronto, Ontario M3J 1P3  
Canada  
dcumming@schulich.yorku.ca

**Uwe Walz**

Professor of Economics  
Goethe University Frankfurt  
School of Economics and Business Administration  
SAFE & CFS  
Grüneburgplatz 1  
60323 Frankfurt  
Germany  
uwalz@wiwi.uni-frankfurt.de

**Jochen Christian Werth**

Goethe University Frankfurt  
School of Economics and Business Administration  
Grüneburgplatz 1  
60323 Frankfurt  
Germany  
werth@em.uni-frankfurt.de

**August 19, 2015**

\* We owe thanks to the seminar participants at the 2015 Conference on New Trends in Entrepreneurial Finance in Trier, Germany. Financial support by the LOEWE Center SAFE is gratefully acknowledged.

# **THE DYNAMICS OF ENTREPRENEURIAL CAREERS IN HIGH-TECH VENTURES: EXPERIENCE, EDUCATION, AND EXIT**

## **Abstract**

We investigate the career dynamics of high-tech entrepreneurs by analyzing the exit choice of entrepreneurs: to found another firm, to become dependently employed, or to act as a business angel. Our detailed data resting on the CrunchBase online database indicate that founders stick with entrepreneurship as a serial entrepreneur or as an angel investor only in cases where the founder (1) had experience either in founding other startups or working for a startup, (2) had a 'jack-of-all-trades' education, or (3) achieved substantial financial success upon a venture capital exit transaction.

Keywords: Entrepreneurship, entrepreneurial spawning, angel finance, venture capital, exit

JEL Codes: G24, G34, L26

## **1. Introduction**

Gompers et al. (2005, 2010) show an important benefit of venture capital (VC) finance is that it spawns the creation of new ventures. That is, entrepreneurs backed by venture capitalists (VCs) tend to form new companies, or become coaches for new entrepreneurs in the form of business angels, after VCs exit the venture. In this paper, we examine for the first time the specific conditions under which entrepreneurs actually stick with entrepreneurship in the form of starting a new company or becoming a business angel. We address the question of when does entrepreneurial finance spawn the creation of new ventures by examining detailed data on the personal characteristics of these spawned entrepreneurs.

VC backed firms are among the most dynamic entrepreneurial firms contributing significantly to innovation and economic growth (Sapienza et al. (1996); Manigart et al. (2007); Yung (2009); Ritter (2015)). This is particularly true for firms in high-tech industries on which most of venture-capital financing is concentrated on. One of the key inputs in this process is, besides VC financing, the spirit and human capital of the founders and entrepreneurs (Meoli et al. (2013)). While being a decisive input in this process, rather little is known about the career paths (after leaving the VC-backed venture) and personal backgrounds of VC-backed entrepreneurs. Papers which address the exit issue of entrepreneurs mostly focus (exclusively) on non-high-tech firms (see e.g. Wennberg and DeTienne (2014)) and hence, look – given the very different type of activities and firms – into a very different setting.

We aim to narrow this gap in the literature on the analysis of career paths of entrepreneurs in high-tech firms. In order to do so we address two main research questions. First, we relate the entry decision of founders (that is, whether they have worked for a start-

up before, and their founding experience and education) with their exit decision (i.e. whether they stick with entrepreneurial activity or become dependently employed). Second, we investigate other drivers of the founders' exit decision such as the exit choice of the company itself or the financial success of the company. By answering both questions we depict a broader picture of the dynamics of entrepreneurial careers, their patterns as well as the driving forces.

We analyze these dynamics of the career paths of VC-backed entrepreneurs by using a hand-collected sample of high-tech firms which have received venture financing. Thereby, we focus on the patterns of the entrepreneurs' career paths as well as on the determinants of the likelihood of an entrepreneur and founder to stick with entrepreneurial activity. We relate different patterns of career paths to characteristics of the entrepreneurs (e.g. starting point of the career, education and work experience) as well as to company and industry characteristics but also to temporary shocks such as the success of the venture. Thereby we aim to draw a picture of the dynamics of career paths of VC-backed entrepreneurs and hence contribute to a better understanding of the link between entrepreneurial finance and entrepreneurial spawning.

In particular, we show that working for a start-up firm provides a spawning ground for repeated entrepreneurial activity. With this finding we reject the notion that large companies are the starting point of entrepreneurs who are not able or willing to pursue their new ideas within the large organization. Furthermore, our analysis provides clear-cut support for the jack-of-all-trades theory: non-specialists are more likely to become and stay entrepreneurs. Serial entrepreneurship seems to be a persistent pattern: people who have founded a venture before, are significantly more likely to stick with entrepreneurship after having left the current venture they have founded, thereby pointing to the existence of an entrepreneurial genotype. It also turns out that (large) financial success of venture makes

founders more inclined to stay in the entrepreneurial arena. Founders seem to use success as a signal for their entrepreneurial skills rather than resting on their laurels.

The paper is organized as follows. In the next section we discuss the nexus of our paper with the existing literature. In the third section we describe our data set and provide an overview of the main variables of our data sample. In the fourth section we develop the hypotheses which form the base for our empirical analysis in the fifth section. In the sixth section we provide a brief conclusion.

## **2. Literature Review**

Our analysis is related to a number of branches of the literature. First, there exists considerable research on the entry decision into entrepreneurship that investigates driving forces behind this decision using rather large data sets (see e.g. Evans and Jovanovic (1989), Georgarakos and Tatsiramos (2009)). However, these studies also include the decision to own a business in general, hence, also the choice to become self-employed.

The approach of Lazear (2002) in contrast focuses on the decisions to found new ventures and stresses the “jack of all trades” characteristics of successful entrepreneurs by showing that successful entrants into entrepreneurship are more likely to be generalists rather than specialists. Wagner (2003) and Silva (2007) provide further empirical evidence that “jack of all trades” individuals are more likely to become first-time entrepreneurs (see, however, Astrebo and Thompson (2011) for a more differentiated view). We ask in our analysis to what extent this carries over into the decision to become a serial entrepreneur, i.e. to exit the newly founded venture into further entrepreneurship.



A second strand of the literature analyzes “entrepreneurial spawning”, tackling the question of how entrepreneurs are “born”. From a theoretical point of view, a number of studies investigate how new ideas are implemented given disclosure risk and idea-stealing risk (see, e.g. Anton and Yao (2002) or Biais and Perrotti (2007)). Innovations may be implemented when employees leave their companies to become entrepreneurs, or when employees of established organizations stay and develop innovation internally. Gompers, Lerner and Scharfstein (2005) test the decision to become a first-time entrepreneur in the context of venture capital backed IPOs. They show that, controlling for firm size, patents, and industry, the most prolific spawners are venture-backed companies located in Silicon Valley and Massachusetts. We extend the analysis of whether or not entrepreneurs become serial entrepreneurs by examining all types of venture capital backed exits, successful and otherwise, as well as the full array of career choices including serial entrepreneurship, paid employment, and becoming a business angel that invests in other entrepreneurs.

A third branch of literature is concerned with entrepreneurial exit decisions. This literature aims to overcome the view that entrepreneurial process is complete when the new venture is founded (see DeTienne (2010)). Most of these studies focus on the exit timing decisions (see e.g. Boeker and Karichalil (2002), Butler et al. (2001), DeTienne (2010), Sorensen and Philips (2011), or Wassermann (2003)). Papers which address the exit issue of entrepreneurs mostly focus (exclusively) on non-high-tech firms (Wennberg and DeTienne (2014)); given the very different type of activities of non-tech and high-tech firms, this is a very different setting.

In contrast to the prior literature, in this paper we do not consider only the exit choice per se but investigate where precisely founders go when they leave the startup they founded. We distinguish whether they found another venture, become angels or turn to

dependent employment. In that sense, we consider the exit channel after a phase of entrepreneurship. In contrast to Weinberg et al. (2007), we focus on the exit channel of the entrepreneur rather than the one of the company.

Given that we also consider the possibility that current founders have been founders before or decide to found another venture afterwards, our analysis also relates to the literature on serial entrepreneurship. Serial entrepreneurs are typically defined as persons who enter and exit entrepreneurship repeatedly (see Hyytinen and Ilmakunnas (2007)). A main focus of the literature on serial entrepreneurship is on the relative performance of such serial entrepreneurs (see e.g. Gompers et al. (2010) or Gottschalk et al. (2014)). The persistence of success proves to be a main issue. Gompers et al. (2010) show that success indeed breeds success, i.e. previously successful entrepreneurs are more likely to be successful in subsequent ventures, thereby strengthening performance persistence.

We distinguish ourselves from this by looking mainly into the determinants of serial entrepreneurship rather than on its performance consequences. Thereby, we are close to the seminal paper of Wright et al. (1997) on serial entrepreneurship. In addition, we focus on the determinants of serial entrepreneurship in high-tech industries. We consider this type of serial entrepreneurship to be potentially very different to serial entrepreneurship in other industries, especially since risk and upside are significantly more pronounced, but also because high-tech firms probably require specific skills.

### **3. Data**

#### **3.1 Data Sample**

Our analysis is based on venture-backed startups listed in the CrunchBase online database (see [www.CrunchBase.com](http://www.CrunchBase.com)). CrunchBase was developed and is maintained by TechCrunch, the most influential technology blog in the United States. Professionals in the technology community can add information to the database, which then goes through an approval process before being made available online. We focus on those startups that, among funding from VC firms, also received funding from a corporation. We define CVCs as NASDAQ100 companies, which either directly or indirectly (via their associated CVC fund) invest in the respective startups.

By focusing on startups that also have CVC investors we bias our sample by purpose on cases in which the company backing the CVC may become the spawning ground of entrepreneurs since founders may leave the company with the idea they had not been able to implement in the large organization due to e.g. organizational slackness. We show later on that this idea of spawning new ventures and entrepreneurs is rejected by our data. Using a retrieval mechanism we were able to detect 190 firms in the CrunchBase data which reportedly received CVC funding. Due to our aim to focus exclusively on startup firms we dropped carve-out firms leaving us with 178 observations. On the basis of this selection of the 178 CVC funded startup firms in the high-tech industries of the US we undertook a significant data collection effort.

Using websites of the respective companies as sources, we hand-collected information on the founder or the founder team of each of these startups. Information about the founders' education, employment and entrepreneurship experience stem from their

respective LinkedIn pages and personal websites as well as from other sources such as Bloomberg business week. We limit our analysis to those founders who have actually left the venture at the time of our latest observation (June 2014). This brings down the number of founders to 243. These 243 founders were with 111 startup firms. In the following we describe the characteristics of these founders as well as of their startup firms.

The details of the variables used are outlined in Table 1. Our data allows us to describe the characteristics of all founder teams.

INSERT TABLE 1 ABOUT HERE

### **3.2 Data Overview**

Our startup companies are - by construction of the data set - all from the high-tech industry. Despite this fact they cover quite a range of industries especially related to web-based and related products and services, but also covering the semiconductor and software industry as well as biotech firms (see Table 2).

INSERT TABLE 2 ABOUT HERE

Our sample covers in total 111 firms which are concentrated in California, where more than half of all firms are located there (61 firms). Thereof, 48 firms have their head office in Silicon Valley. We also have 14 high-tech firms in our sample that are based outside the US but which have received money from US venture capitalists. Most of them (5) are in Israel, the rest is disbursed across the globe. At the time we have observed these

firms for the last time (June 2014), a significant number of them have experienced an exit (83 out of 111 firms). Most of them have been acquired (71 firms) but we also observe some IPOs (6 cases) as well as some failures (7 firms ended up in the deadpool). The firms are by construction of the database very young. At the moment of the initial VC funding these companies were on average 2.3 years old. At the time of the observed exit (acquisition, IPO, liquidation) firms are on average 7.7 years old, indicating an average holding period of 5.4 years for the respective first VC investors in these 83 firms.

The main founder characteristics are displayed in Table 3. It turns out that almost all of our founders have completed a bachelor's degree (233 out of 243). One third of them (83 founders) has earned a master's degree while 45 (44) went successfully for a PhD (MBA). The majority of founders has specialized in IT and computer science (140 out of 243) while only a third of them has a management and/or economics background (71 founders). As can be seen from the numbers on Table 3, some of them have backgrounds from different fields. The work experience of founders is disperse, too. While most of them have already worked for other employers, 34 of them had no previous job position, i.e. became founders when they were still students. The majority of our founders have had more than one position before founding the venture under consideration (161 founders out of 243). When it comes to the previous entrepreneurial experience, table 3 reveals that most of our founders (144) did not pursue any entrepreneurial activity before founding the venture under observation. There are, however, a number of founders who have had significant entrepreneurial experience. 39 founders have already founded at least three ventures (including the present one).

INSERT TABLE 3 ABOUT HERE

#### 4. Hypotheses

In the following we develop a number of hypotheses which we then bring to our data. The “jack-of-all-trades” theory of Lazear (2004) can be extended to the decision to stay in entrepreneurship after having founded a venture in the first place. The main argument of the “jacks-of-all-trades”-theory is the notion that entrepreneurship requires balanced or more general skills. In contrast, specialists are less likely to succeed and, in anticipating this, are less likely to choose to found a new venture. We conjecture that this carries over to subsequent decisions to found a new company. Founders with a general-education background learn during the life-time of the current venture that this fits very well with skills required for entrepreneurship and hence decide to stick to the “entrepreneurial career.

**Hypothesis 1:** *[Jack-of-all-trades] The fact that founders have a more general (management) education makes them more likely to stay in the entrepreneurial arena. Hence, we would expect founders with such an educational background to be more likely to be engaged in subsequent entrepreneurship after having left the initially founded venture.*

A further aspect to look onto the exit decisions of our founders is to investigate where founders come from, hence, relating their entry decision (to become founders) to the actual exit decision. The entrepreneurial spawning discussion suggests that an entrepreneurial environment breeds entrepreneurs (Gompers et al. (2005) and Hsu (2007)). Working for a startup firm makes people more likely to go into entrepreneurship themselves. Learning from others in an entrepreneurial environment (see Lévesque et al.

(2009)) induces them to switch into entrepreneurship. This contrasts with the view that large companies are a spawning ground for founders. We postulate that this effect is even stronger and more lasting, thus extending the entrepreneurial spawning argument to the decision to become a serial entrepreneur. First experiences in a venture do not only spawn founders but make them significantly more inclined to stay in entrepreneurship thereafter, too.

**Hypothesis 2:** *[Entrepreneurial Spawning] Working for a (high-tech) startup company before becoming a founder makes founders more inclined to stick to entrepreneurship after leaving the initially founded venture.*

In line with the literature on serial entrepreneurs we investigate to which extent a pattern of serial entrepreneurship exists. By focusing on high-tech firms only we are able to investigate the pattern of serial entrepreneurship in very innovative, high-tech firms. We ask whether there is a genotype of founders which are able and willing to found not only one venture at a time but are founding high-tech ventures repeatedly. Hence, we establish:

**Hypothesis 3:** *[Serial Entrepreneurship in High-Tech Ventures] The likelihood to stay in an entrepreneurial environment after having left the venture is higher for founders who have previously been active in founding a new high-tech venture.*

Successful, especially very successful VC exits of high-tech firms also imply significant financial rewards for the founders. This obviously has two opposing potential implications. First, financially successful founders may interpret this as signal for their ability to establish successful and viable ventures. Hence, they are inclined to found a new high-tech company after leaving the present one and/or are able and willing to finance

another startup, i.e. to becoming business angels and by this staying in the entrepreneurial arena (see Colombo and Grilli (2005, 2010) on the opposite link of the relationship). The alternative is that successful entrepreneurs rest on the laurels and/or seek salaried employment.

**Hypothesis 4:** *[(Large) Successes] After having left a (very) successful venture, founders engage in subsequent entrepreneurial activity as a serial entrepreneur or as a business angel.*

#### **4. Empirical Analysis**

We test our hypotheses in two steps. First, we examine the univariate statistics of our main variables of interest. Second, we provide a number of regressions to test our main hypotheses.

##### **4.1. Descriptive Analysis**

Table 4 provides some summary statistics. It shows that roughly one quarter of all founders who have left the venture become subsequent founders. Of these 61 subsequent founders 11 also acted as business angel (see Table 6). In total, 41 founders become business angels (see Table 6), the remaining are dependently employed after having left the venture. We define the combination of subsequent founders and business angels as (subsequent) entrepreneurs. The average gap between college and the founding year of the venture is almost 13 years, ranging from -3years (indicating that founders were still students) to a maximum of 43 years.



#### INSERT TABLE 4 ABOUT HERE

We employ as a proxy for our non-specialist education (see Hypothesis 1) the management studies background, which roughly thirty percent of the founders in our sample have. The measure for a potential positive effect of employment with small firms as source for entrepreneurial spawning (see Hypothesis 2) is the fact whether the founder was previously employed with a startup firm. This holds true for approximately one quarter of our founder sample (23.5 percent). An alternative proxy for this is the Silicon Valley dummy, which measures whether the VC-backed venture is located in Silicon Valley. The idea behind this measure is the notion that founders of Silicon Valley firms have previously been living in the proximity of Silicon Valley and thus have been exposed to the entrepreneurial spirit stemming from young, innovative firms. This variable, however, also captures other effects such as access and exposure to ideas and financing. Hence, we rely in the following on our first success measure and use the Silicon Valley dummy as control variable. The serial entrepreneurship analysis (see Hypothesis 3) is based on our observation whether the founder has had previously entrepreneurial experience as measured by the number of prior ventures founded by the current entrepreneurs. We observe that founders have on average founded 0.66 ventures (see table 4).

#### INSERT TABLES 5 AND 6 ABOUT HERE

Table 7 reports the correlation matrix. There are a number of cases in which we observe a rather strong correlation between our explanatory variables. In particular, we note a significant correlation between our IPO variables and the no-exit as well as the successful-exit variable. We address this issue in our analysis below.

#### INSERT TABLE 7 ABOUT HERE

The main aim of our analysis is to investigate the determinants of the founder's exit decision and relate it to the entry choice of the founder. Therefore, we focus our analysis mainly on two "exit channels" which the founder may select after leaving the venture: to become a founder in a new venture or to become a business angel. The third exit route, namely to become dependently employed, is, together with those founders which state no activity after having left the venture (16 observations), the residual. We summarize the two former exit channels (to become a founder and/or business angel) in the (subsequent) entrepreneurship variable. In order to get a first impression on the determinants of these exit channels we provide some univariate statistics (see Table 8).

These univariate statistics reveal that there are a number of variables which seem to have a strong impact on the decision to become a subsequent founder after having left the venture. Comparing the means between subsamples indicates that entrepreneurs with management studies background have a 12.9% higher probability to become founders after their exit from the current venture. Entrepreneurs which have had previous entrepreneurship experience, i.e. are already serial entrepreneurs are significantly more likely to subsequently found a new company as compared to those entrepreneurs which have had no previous entrepreneurial experience. Our data also suggests that working in a startup company before founding the current venture makes people significantly more inclined to exit via the founding route. Female founders are also showing a tendency to create a new venture after having left the current one. In a nutshell, we are able to collect some first evidence for our Hypotheses 1, 2, and 3. With respect to the fourth Hypotheses, the picture is more blurry; the success measures (successful exit, IPO, exit multiple) do not show any significant differences in means.

Turning to our (subsequent) entrepreneurship variable the results for the variables just discussed do not alter (except for the female variable which turns out to be insignificant). We find, however, some support for the idea that success of the current venture has an impact on the decision to stay in the entrepreneurial arena after leaving the current venture. Founders leaving firms which either have gone through an IPO or in which the previous owner had a financially very successful exit (captured by our successful-exit variable) are significantly more likely to become a founder once again and/or a business angel, therefore pointing in favor of Hypothesis 4.

INSERT TABLE 8 ABOUT HERE

In order to analyze whether the univariate results carry over when taking controls into account, we move in a next step to multivariate regressions to test our hypotheses.

## **4.2. Regression Analysis**

We present the first set of regressions with our broader variable (comprising the exit channels subsequent founder or business angel) as dependent variable. In all our regressions we use a standard regression model with the following right-hand side variables: management studies (as proxy for a non-specialist background of the founder (H1)), startup employment (as proxy for young entrepreneurial firms being the spawning ground for future founders (H2)) and the number of prior employers (standing for the opposite notion) as well as prior ventures (depicting the idea of serial entrepreneurs (H3)). In addition to these variables we employ a number of control variables listed in Table 1 such as the Silicon Valley variable capturing geographical aspects as well as the exposure to ideas and financing, the B2B dummy (capturing industry effects) as well as the gender

effect in general measured by the female variable. Furthermore, we use year-fixed effects in all regressions. All specifications are logit regressions, the coefficients denote marginal effects.

The first set of regressions displayed in Table 9 confirms our findings from the univariate statistics. We find strong support for Hypotheses 1 and 2: Non-specialists (measured by the fact that they have earned a management degree) are significantly more likely to found a new venture after having left the current startup. Furthermore, startups rather than other firms are the spawning ground for future entrepreneurship over and above the current venture. We also find strong evidence for the serial entrepreneurship pattern (H3) as indicated by the fact that having been engaged in more prior ventures makes people significantly more likely to stick with entrepreneurship. The effect is not only statistically significant but also economically pronounced. Each additional venture increases the probability to stick to an entrepreneurial activity by 8.68 percent.

In addition, in table 9 we test our Hypothesis 4 using the IPO dummy. The IPO dummy proves to be highly statistically and economically significant. Founders leaving a venture which has gone through an IPO are more than 35% more likely to stick with entrepreneurial activity thereafter. In order to consider the multicollinearity problem discussed above, we check whether the inclusion of other exit related variables changes the result. Models (2)-(4) in Table 9 indicate that our results are robust vis-à-vis the inclusion of other exit related variables, either separately or jointly. All our main results carry over to the inclusion of the no-exit as well as the successful-exit variable.

INSERT TABLE 9 ABOUT HERE

In Table 10, we address the success hypothesis (H4) in more detail, by employing a variable which measures financial success for the investors and founders. The advantage is that this variable enables a direct test of Hypothesis 4. The only downside is that due to missing observations with our exit-multiple variable, the sample size drops to 100 observations. Despite the reduced sample size, we find strong evidence for the fact that founders who have exited a financially successful venture are significantly more likely to pursue entrepreneurial activities (see Model 1 in Table 10). Hence, our analysis supports Hypothesis 4: founders of financially more successful venture rather than deciding for the less risky strategy of being dependently employed choose to undertake entrepreneurial activities after having left the venture. By looking into this in more detail we find that this effect is driven by the founder of financially successful firms becoming significantly more often business angels (see Model 3 in Table 10). The coefficient for the subsequent founder regression is positive (see Model 2 in Table 10), but statistically insignificant.

INSERT TABLE 10 ABOUT HERE

## **5. Discussion and Conclusion**

In this paper we present theory and empirical evidence consistent with the view that both the entrepreneur's experience prior to becoming a founder and the success of the business founded affect his career choices after VC exit. This issue is important for understanding the role of VC in spawning new entrepreneurial activity, which has implications for practice and policymakers alike. Where VC spawns new entrepreneurial activity, there is a positive externality that exacerbates the benefits of VC finance.

We analyze these entrepreneurial career dynamics by using a detailed sample of high-tech firms taken from the CrunchBase database and enhanced by hand-collected data on the respective founder and founder teams. Entrepreneurs are primarily from Silicon Valley but also other regions in the U.S. We focus on the patterns of the entrepreneurs' career paths as well as on the determinants of the likelihood of a founder to stick with entrepreneurial activity. We relate different patterns of career paths to characteristics of the entrepreneurs (e.g. education and work experience), to company and industry characteristics as well as to the success of the venture. In doing so, we draw a picture of the dynamics of career paths of VC-backed entrepreneurs and hence contribute to a better understanding of the evolution of entrepreneurial spawning and the positive externalities of VC investment.

The empirical analysis shows that experiencing VC-backing does not lead entrepreneurs to become repeat entrepreneurs, unless they had prior experience either founding or working for a startup, or unless the entrepreneur is a 'jack-of-all-trades' with a general management education. VC backing by itself will give rise to future entrepreneurial activities in terms of repeat founders or creating business angels only where the VC-backed venture generates a substantial financial return to the entrepreneur.

Much work has highlighted the importance of VC financing for spawning future entrepreneurial activity (e.g., Gompers et al. (2005)). Future academic and policy work on the role of VC in creating serial entrepreneurs should recognize that entrepreneurial characteristics, including their prior experience with entrepreneurship and their education, appear to play a stronger role than the experience of VC itself. VC backing spawns new entrepreneurial activity only insofar as there is a large financial reward to entrepreneurs

associated with VC exit. It is the large financial success in entrepreneurship that makes founders more inclined to become repeat entrepreneurs and business angels.

Future research with more detailed data could examine other aspects of VC-entrepreneur interactions in more detail, and what coaching activities better enable entrepreneurial spawning. Our empirical analysis provided an evaluation of the typical VC investment without accounting for specific things that entrepreneurs may or may not have done for their investees. Such detailed data could enable a more critical assessment of the value of VC coaching provided to entrepreneurs to enable long term entrepreneurial benefits after VCs exit their investment.

## References

- Anton, J. J., & Yao, D. A. (2002). The sale of ideas: Strategic disclosure, property rights, and contracting. *The Review of Economic Studies*, 69(3), 513-531.
- Astebro, Th., & Thomson, P. (2011), Entrepreneurs, Jacks of all trades or Hobos?, *Research Policy*, 40/5, 637-649.
- Biais, B., & Perotti, E. (2008). Entrepreneurs and new ideas. *The RAND Journal of Economics*, 39(4), 1105-1125.
- Boeker, W., & Karichalil, R. (2002). Entrepreneurial transitions: factors influencing founder departure. *Academy of Management Journal*, 45(4), 818-826.
- Braguinsky, S., Klepper, S., & Ohyama, A. (2012). High-tech entrepreneurship. *Journal of Law and Economics*, 55(4), 869-900.
- Butler, J. E., Phan, P. H., Saxberg, B. O., & Lee, S. H. (2001). Entrepreneurial succession, firm growth and performance. *Journal of Enterprising Culture*, 9(04), 407-436.
- Chen, J. (2013). Selection and serial entrepreneurs. *Journal of Economics & Management Strategy*, 22(2), 281-311.
- Colombo, M. G., & L. Grilli (2005). Founders' human capital and the growth of new technology-based firms: A competence-based view. *Research Policy*, 34/6, 795-816.
- Colombo, M. G., & L. Grilli (2005). On growth drivers of high-tech start-ups: Exploring the role of founders' human capital and venture capital. *Journal of Business Venturing*, 25/6, 610-626.
- Cumming, D. J., & Johan, S. A. (2013). *Venture capital and private equity contracting: An international perspective*. Academic Press.
- DeTienne, D. R. (2010). Entrepreneurial exit as a critical component of the entrepreneurial process: Theoretical development. *Journal of Business Venturing*, 25(2), 203-215.
- Evans, D. S., & Jovanovic, B. (1989). An estimated model of entrepreneurial choice under liquidity constraints. *The Journal of Political Economy*, 97(4), 808-827.
- Georgarakos, D., & Tatsiramos, K. (2009). Entrepreneurship and survival dynamics of immigrants to the US and their descendants. *Labour Economics*, 16(2), 161-170.
- Gompers, P., Lerner, J., & Scharfstein, D. (2005). Entrepreneurial spawning: Public corporations and the genesis of new ventures, 1986 to 1999. *The Journal of Finance*, 60(2), 577-614.
- Gompers, P., Kovner, A., Lerner, J., & Scharfstein, D. (2010). Performance persistence in entrepreneurship. *Journal of Financial Economics*, 96(1), 18-32.



- Gottschalk, S., Greene, F. J., Höwer, D., & Müller, B. (2014). If you don't succeed, should you try again? The role of entrepreneurial experience in venture survival. *ZEW Discussion Papers*, (No. 14-009).
- Groh, A. & v. Liechtenstein, H. (2011). The first step of the capital flow from institutions to entrepreneurs : the criteria for sorting venture capital funds. *European Financial Management*, 17(3), 532-559.
- Hoang, H., & Gimeno, J. (2010). Becoming a founder: How founder role identity affects entrepreneurial transitions and persistence in founding. *Journal of Business Venturing*, 25(1), 41-53.
- Hsu, D. (2007), Experienced entrepreneurial founders, organizational capital, and venture capital funding, *Research Policy*, 36/5, 722-741.
- Hyytinen, A., & Ilmakunnas, P. (2007). What distinguishes a serial entrepreneur?. *Industrial and Corporate Change*, 16(5), 793-821.
- Jääskeläinen, M., Maula, M., & Seppä, T. (2006). Allocation of attention to portfolio companies and the performance of venture capital firms. *Entrepreneurship Theory and Practice*, 30(2), 185-206.
- Kortum, S. & Lerner, J. (2000). Assessing the contribution of venture capital to innovation. *RAND Journal of Economics*, 674-692.
- Lazear, E. P. (2004). Balanced skills and entrepreneurship. *American Economic Review*, 208-211.
- Lévesque, M., Minniti, M., & Shepherd, D. (2009). Entrepreneurs' decisions on timing of entry: Learning from participation and from the experiences of others. *Entrepreneurship Theory and Practice*, 33(2), 547-570.
- Manigart, S., Collewaert, V., Wright, M., Pruthi, S., Lockett, A., Bruining, H., & Landstrom, H. (2007). Human capital and the internationalisation of venture capital firms. *International Entrepreneurship and Management Journal*, 3(1), 109-125.
- Meoli, M., S. Paleari, and S. Vismara, 2013. Completing the technology transfer process: M&As of science-based IPOs , *Small Business Economics* 40, 227-248.
- Ohyama, A., Braguinsky, S., & Klepper, S. (2009). Schumpeterian entrepreneurship. In *DRUID Summer Conference* (pp. 17-19).
- Nahata, R. (2008). Venture capital reputation and investment performance. *Journal of Financial Economics*, 90(2), 127-151.
- Reynolds, P. D., & Curtin, R. T. (2008). Business Creation in the United States: Panel Study of Entrepreneurial Dynamics II Initial Assessment. *Foundations and Trends (R) in Entrepreneurship*, 4(3), 155-307.

- Ritter, J. (2015). Growth capital IPOs. *Financial Review*, forthcoming.
- Ruef, M., Aldrich, H. E., & Carter, N. M. (2003). The structure of founding teams: Homophily, strong ties, and isolation among US entrepreneurs. *American Sociological Review*, 195-222.
- Sapienza, H. J., Manigart, S., & Vermeir, W. (1996). Venture capitalist governance and value added in four countries. *Journal of Business Venturing*, 11(6), 439-469.
- Schwienbacher, A. (2008). Innovation and Venture Capital Exits. *The Economic Journal*, 118(533), 1888-1916.
- Silva, O. (2007). The Jack-of-All-Trades entrepreneur: Innate talent or acquired skill?. *Economics Letters*, 97(2), 118-123.
- Sørensen, J. B., & Phillips, D. J. (2011). Competence and commitment: employer size and entrepreneurial endurance. *Industrial and Corporate Change*, 20; 1277-1304.
- Ucbasaran, D., Lockett, A., Wright, M., & Westhead, P. (2003). Entrepreneurial founder teams: Factors associated with member entry and exit. *Entrepreneurship Theory and Practice*, 28(2), 107-128.
- Wagner, J. (2003). Testing Lazear's jack-of-all-trades view of entrepreneurship with German micro data. *Applied Economics Letters*, 10(11), 687-689.
- Wasserman, N. (2003). Founder-CEO succession and the paradox of entrepreneurial success. *Organization Science*, 14(2), 149-172.
- Wennberg, K. & DeTienne, D. (2014). The end is the beginning - or not? A Critical Review of Research on Entrepreneurial Exit. *International Small Business Journal*, 32: 4-16.
- Wennberg, K., Wiklund, J., DeTienne, D. R., & Cardon, M. S. (2010). Reconceptualizing entrepreneurial exit: Divergent exit routes and their drivers. *Journal of Business Venturing*, 25(4), 361-375.
- Wright, M., Robbie, K., & Ennew, C. (1997). Serial entrepreneurs. *British Journal of Management*, 8(3), 251-268
- Yung, C., 2009. Entrepreneurial Financing and Costly Due Diligence. *Financial Review*, 44: 137-149.
- Zhao, H., Seibert, S. E., & Lumpkin, G. T. (2010). The relationship of personality to entrepreneurial intentions and performance: A meta-analytic review. *Journal of Management*, 36(2), 381-404.

**Table 1**  
**Variable definitions**

Variable	Description
<b>Dependent variables</b>	
Subsequent founder	After leaving the startup founder starts a new startup, i.e. the indicator is one if his first position after the is founder
Subsequent angel	After leaving the startup founder invests at least in one new startup, i.e. indicator is one if he becomes or is an angel investor
Subsequent Entrepreneurship	Summarizes subsequent founder and subsequent angel indicator, i.e. indicator is one if founder is subsequent founder and/or angel and zero if he is neither
<b>Founder variables</b>	
Prior employers	Number of founder's unique prior employers; only paid, dependent employment is considered
Prior ventures	Number of startups founded prior to the last startup; only startup firms are considered, not one-person consultancy positions etc.
Management studies	Founder studied management science, economics or finance; any degrees are considered (BSc., MSc., MBA, PhD)
Startup employment	The last employer prior to founding the venture was at a startup company, i.e. was raising funding and did not have an exit
Female	Founder is female
Years since college	Number of years since leaving college (approximates the founder's age or experience)
<b>Startup variables</b>	
IPO	Venture was by means of an initial public offering (IPO)
No exit	Venture has not yet experienced an exit (trade sale, liquidation or IPO)
Successful exit	Venture experienced an exit where the exit valuation (IPO) or the acquisition price was at least as high as the total VC funding
Exit multiple	Ratio of IPO valuation or acquisition price and total VC funding
Silicon valley	Venture is located in Silicon Valley
B2B	Venture offers services to other enterprises (B2B products or services)

**Table 2**  
**Firm characteristics**

Industry	B2B	B2C	Both	Total
Advertising	7	0	0	7
Biotech	0	0	5	5
Ecommerce	0	3	1	4
Enterprise	9	0	0	9
Games/Video	1	8	0	9
Hardware	6	1	0	7
Mobile	6	7	0	13
Network-hosting	6	0	1	7
Semiconductor	8	0	0	8
Software	18	1	0	19
Web	1	16	3	20
Other	1	1	1	3
Total	63	37	11	111

  

Geography	
USA (97; 87.4%)	Thereof California (61, thereof 48 in Silicon Valley), Massachusetts (9), New York (7), Washington (7), Texas (3), Maryland (2), Arizona (1), Colorado (1), D.C. (1), Georgia (1), Illinois (1), North Carolina (1), New Jersey (1), Pennsylvania (1)
Others (14; 12.6%)	Thereof Israel (5), China (2), U.K. (2), Australia (1), Canada (1), France (1), Spain (1), Turkey (1)

  

Ventures with exit	Obs.	Mean	S.D.	Minimum	Maximum
Age of venture at initial VC funding (years)	83	2.28	2.13	0	8.75
Age of venture at exit (years)	83	7.70	3.38	1.83	16.00

  

Exit mode	Obs
IPO	6
Acquisition	71
Liquidation	6

**Table 3**  
**Founder characteristics**

Education										
Degree	Bachelor									233
	Master									83
	MBA									44
	Ph.D.									45
Subject	Management, Economics									71
	IT, Computer science									140
	Natural sciences									56
	Social sciences, humanities									42
	Law									6
Experience										
Number of prior employers	0	1	2	3	4	5	6	7	8	
	Frequency	34	48	62	53	26	15	2	1	2
Number of prior ventures	0	1	2	3	4	5	6	7	8	
	Frequency	144	61	26	6	5	1	1	0	0

**Table 4**  
**Summary statistics**

	Obs.	Mean	S.D.	Minimum	Maximum
(Subseq.) Founder	243	0.243	0.430	0	1
(Subseq.) Angel	243	0.165	0.372	0	1
(Subseq.) Entrepreneurship	243	0.362	0.482	0	1
Prior employers	243	2.243	1.562	0	8
Prior ventures	243	0.658	1.018	0	6
Management studies	243	0.292	0.456	0	1
Startup employment	243	0.235	0.425	0	1
Female	243	0.054	0.226	0	1
Years since college	212	12.901	9.090	-3	43
Female interaction	212	0.236	0.152	0	1
IPO	243	0.074	0.262	0	1
No exit	243	0.210	0.408	0	1
Successful exit	243	0.510	0.501	0	1
Exit multiple	104	5.762	8.914	0.075	44.526
Silicon valley	243	0.465	0.499	0	1
B2B	243	0.646	0.479	0	1

**Table 5**  
**Career dynamics**

		<i>Subsequent role</i>			
		Employed	Founder	Angel	Neither
<i>Prior position/role</i>	Student (25 obs)	19	5	5	1
	Employee (176 obs.)	128	36	26	8
	Founder (49 obs.)	19	20	10	7

The category prior position/role captures the predominant occupation of the founder at the moment of starting the venture: student, employee, and founder. Subsequent role considers the immediate activities following the exit from the venture. Numbers do not add up to 100% as the role of being an angel investor is compatible with being an employee or a founder. Furthermore, seven observations were both employee and founder.

**Table 6**  
**Founder exit**

		<i>Subsequent angel</i>		Total
		0	1	
<i>Subsequent founder</i>	0	155 (63.8%)	29 (11.9%)	184 (75.7%)
	1	48 (19.8%)	11 (4.5%)	59 (24.3%)
Total		203 (83.5%)	40 (16.5%)	243 (100%)

Of the 243 founders, 59 are subsequent founders and 40 are subsequent angels. The variable Entrepreneur covers both, subsequent founder and as subsequent angels. Numbers do not add up to 100% as a founder can at the same time be an angel investor in another startup (11 observations).

**Table 7**  
**Correlation coefficients and significance levels (p-values)**

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. (Subs.) Entrepreneur													
2. Subsequent founder	0.752												
3. Subsequent angel	0.589	0.033											
4. Management studies	0.175	0.122	0.203										
5. Startup employment	0.169	0.140	0.095	-0.035									
6. Nr. prior employers	-0.062	-0.076	-0.019	0.074	0.269								
7. Nr. prior startups	0.203	0.162	0.095	0.172	0.110	0.021							
8. IPO	0.245	0.060	0.256	0.095	0.029	-0.074	0.064						
9. No exit	0.053	0.109	-0.011	0.024	0.144	0.160	-0.016	-0.146					
10. Successful exit	0.019	-0.021	0.058	0.068	-0.118	-0.090	0.035	0.277	-0.486				
11. Silicon valley	0.122	0.088	0.098	-0.145	0.029	0.008	-0.060	0.177	-0.116	0.072			
12. B2B	-0.159	-0.143	-0.089	-0.054	-0.159	-0.045	-0.037	-0.218	0.022	-0.036	-0.086		
13. Female	0.049	0.121	-0.007	0.008	-0.045	0.080	-0.100	-0.067	0.237	-0.170	-0.002	-0.015	



**Table 8**  
**Mean comparison tests**

	(Subseq.) Entrepreneurship			(Subseq.) Founder		
	0	1	Diff.	0	1	Diff.
Prior employers	2.316	2.114	-0.202	2.310	2.549	0.239
Prior ventures	0.503	0.932	0.429 ***	0.565	0.949	0.384**
Management studies	0.232	0.398	0.165 ***	0.261	0.390	0.129*
Startup employment	0.204	0.403	0.198 ***	0.231	0.408	0.177**
Female	0.045	0.078	0.023	0.038	0.102	0.064*
Years since college	13.511	11.787	-1.724	13.190	11.939	-1.251
IPO	0.026	0.159	0.133***	0.065	0.101	0.036
No exit	0.194	0.239	0.045	0.185	0.288	0.103*
Successful exit	0.503	0.523	0.020	0.516	0.491	-0.025
Exit multiple	4.223	9.416	5.194***	5.264	1.716	3.448***
Silicon valley	0.419	0.545	0.126*	0.440	0.542	0.102
B2B	0.703	0.545	-0.158**	0.685	0.526	-0.159**

The columns state the mean for the respective combination of variables as well as the difference between these means. Significance levels are: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The (subseq) entrepreneurship dummy is one in 88 (of 243) cases, the (subseq.) founder dummy in 59 cases.

**Table 9**  
**Regressions on subsequent entrepreneurship and IPO**

	Model 1	Model 2	Model 3	Model 4
Management studies	0.1966** (.019)	0.1954** (.020)	0.2048** (.016)	0.2024** (.020)
Startup employment	0.290*** (.001)	0.2828*** (.002)	0.2843*** (.002)	0.2818*** (.002)
Prior employers	-0.0612** (.015)	-0.0621** (.014)	-0.0630** (.013)	-0.0630** (.013)
Prior ventures	0.0868** (.015)	0.0871** (.015)	0.0862** (.016)	0.0865** (.016)
IPO	0.3509** (.015)	0.3584** (.013)	0.3745*** (.009)	0.3731*** (.010)
No exit	---	0.0523 (.569)		0.0268 (.799)
Successful exit	---		-0.0538 (.489)	-0.0425 (.647)
Silicon Valley	0.1255* (.095)	0.1269* (.091)	0.1249* (.096)	0.1258* (.094)
B2B	-0.1065 (.173)	-0.1077 (.168)	-0.1013 (.196)	-0.1030 (.190)
Female	0.1939 (.206)	0.1719 (.277)	0.1745 (.263)	0.1269 (.344)
Year FE	Yes	Yes	Yes	Yes
# Obs	243	243	243	243
Pseudo R <sup>2</sup>	19.59%	19.70%	19.74%	19.76%

The table shows the estimated marginal effects of probit regressions with subsequent entrepreneurship as dependent variable.

P-values are denoted in parentheses. Significance levels are: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

**Table 10**  
**Subsequent entrepreneurship/founder/angel and successful exit**

	Model 1 Subsequent Entrepreneurship	Model 2 Subsequent Founder	Model 3 Subsequent Angel
Management studies	0.2867** (.041)	0.2887** (.019)	0.1362 (.188)
Startup employment	0.5351*** (.005)	0.4208* (.070)	0.1106 (.476)
Prior employers	-0.0072 (.875)	-0.0515* (.092)	0.0297 (.352)
Prior ventures	0.1389** (.018)	0.0319 (.366)	0.0769** (.040)
Silicon Valley	0.0296 (.837)	0.0165 (.843)	0.0241 (.813)
B2B	-0.0998 (.429)	0.0471 (.480)	-0.1798 (.128)
Female	0.2370 (.584)	0.1909 (.575)	0.4465 (.267)
Exit multiple	0.0205** (.021)	0.00315 (.384)	0.00890* (.052)
Year FE	Yes	Yes	Yes
Number of observations	100	100	100
Pseudo R <sup>2</sup>	35.70%	27.91%	33.48%

The table shows the estimated marginal effects of probit regressions with subsequent entrepreneurship (model 1), founder (model 2) and angel (model 3) as dependent variables. P-values are denoted in parentheses. Significance levels are: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

## Recent Issues

No. 121	Elia Berdin, Matteo Sottocornola	<b>Insurance Activities and Systemic Risk</b>
No. 120	Matthias Heinz, Heiner Schumacher	<b>Signaling Cooperation</b>
No. 119	Michael Brennan, Holger Kraft	<b>Leaning Against the Wind: Debt Financing in the Face of Adversity</b>
No. 118	Michael Donadelli, Antonio Paradiso, Max Riedel	<b>A Quasi Real-Time Leading Indicator for the EU Industrial Production</b>
No. 117	Marcel Bluhm	<b>Interbank Funding as Insurance Mechanism for (Persistent) Liquidity Shocks</b>
No. 116	Charles Gottlieb	<b>On the Distributive Effects of Inflation</b>
No. 115	Andreas Fagereng, Charles Gottlieb, Luigi Guiso	<b>Asset Market Participation and Portfolio Choice over the Life-Cycle</b>
No. 114	Nicole Branger, Christian Schlag, Lue Wu	<b>'Nobody is Perfect': Asset Pricing and Long-Run Survival When Heterogeneous Investors Exhibit Different Kinds of Filtering Errors</b>
No. 113	Bettina Brüggemann, Jinhyuk Yoo	<b>Aggregate and Distributional Effects of Increasing Taxes on Top Income Earners</b>
No. 112	Shafik Hebous, Alfons J. Weichenrieder	<b>On Deficits and Symmetries in a Fiscal Capacity</b>
No. 111	Alfons J. Weichenrieder, Fangying Xu	<b>Are Tax Havens Good? Implications of the Crackdown on Secrecy</b>
No. 110	Dirk Krueger, Alexander Ludwig	<b>On the Optimal Provision of Social Insurance</b>
No. 109	Tobias Tröger	<b>Regulatory Influence on Market Conditions in the Banking Union</b>
No. 108	Sascha Baghestanian, Paul Gortner, Baptiste Massenet	<b>Compensation Schemes, Liquidity Provision, and Asset Prices: An Experimental Analysis</b>
No. 107	Daniel Powell, Marc Steffen Rapp	<b>Non-Mandatory Say on Pay Votes and AGM Participation: Evidence from Germany</b>
No. 106	Baptiste Massenet, Stéphane Straub	<b>Informal Sector and Economic Development: The Credit Supply Channel</b>