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Determinants of Novice, Portfolio and Serial Entrepreneurship: An Occupational Choice Approach*

by

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Abstract: *In this paper we first develop an original theory in which, based on their individual skills and the quality of their business, entrepreneurs can keep their original business (and thus remain novice entrepreneurs), start and keep a new business in the same or another sector along their current business (therefore becoming portfolio entrepreneurs), transfer or shut their original business down to either start a new one (turning themselves into serial entrepreneurs), or enter the labor market as wage workers. We then use the insights from our theory to develop three main hypotheses that are finally tested for a 10-year panel dataset (2001 to 2010) of more than 4,000 Vietnamese manufacturing firms. We estimate an occupational choice model and a survival model and find that: (i) a greater endowment of human capital is associated with a higher likelihood of a business owner to become a serial or a portfolio entrepreneur; (ii) a higher quality of the new business is associated to a higher likelihood that it is run by any type of habitual entrepreneur. Particularly, high entrepreneurial skills together with a high-quality business positively influence the likelihood of an individual to be serial or portfolio entrepreneur; (iii) ceteris paribus, firms run by serial or portfolio entrepreneurs tend to stay in business longer, although high-quality ones run by novice entrepreneurs endowed with high entrepreneurial skills are those with the lowest probability to leave the market.*

Keywords: Portfolio entrepreneurship, serial entrepreneurship, occupational choice, industrial policy.
JEL codes: F02; L26; L53.

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1 - Introduction

We present, and test for the case of Vietnam, an original theory of what may lead *first-time* (*novice*) entrepreneurs to continue to run the original business that they have launched, or to become *habitual* entrepreneurs who run multiple businesses, either sequentially (*serial* entrepreneurs) or in parallel (*portfolio* entrepreneurs).[1]

It is our opinion that the study of portfolio and serial entrepreneurship is relatively under-developed in the extant literature (Carter and Ram, 2003), and therefore scope exists for strengthening both the theoretical framework and the empirical evidence *upon* which it relies and *by* which it is supported.[2]

Theoretical research on habitual entrepreneurship and occupational choices amounts to very few papers (Holmes and Schmitz, 1990, Plehn-Dujowich, 2010, and Parker, 2014). Of these papers, Holmes and Schmitz (1990) and Plehn-Dujowich (2010) focus only on novice and serial entrepreneurs, neglecting portfolio entrepreneurship. Plehn-Dujowich (2010) pays particular attention to the individual's occupational choice, rather than to the equilibrium dynamics of firm transfers. However, the linear structure of the production technology in his model makes it impossible to study portfolio entrepreneurship: in the equilibrium, all available capital is invested in a unique enterprise (the one with the highest expected profitability) and no scenario in which an entrepreneur runs multiple businesses simultaneously can arise endogenously.

Parker (2014) models portfolio entrepreneurship explicitly. His main focus is on the role that recognition and exploitation abilities play in the occupational choice of individuals. In his model, owning a portfolio of firms is valuable for risk-averse entrepreneurs, as it helps them diversify their entrepreneurial risk and mitigates income variance. Thus, risk aversion

[1] For these three types of entrepreneurship we follow the definitions earlier adopted, among others, by Ucbasaran et al. (2006, 2008).

[2] Scholars have mostly explored either the choice between entering entrepreneurship for the first time and engaging in paid employment (Evans and Leighton, 1989; Parker, 2009; Santarelli et al., 2009) or habitual entrepreneurship in general without distinguishing between serial and portfolio (Lafontaine and Shaw, 2016).

and diversification are the only motivations for portfolio entrepreneurship and issues related to firm quality and production technology are neglected.

All these papers are therefore somehow limited in scope and do not allow us to formulate testable predictions able to exploit the unique characteristics and richness of our dataset.

Albeit more abundant, empirical research suffers from the lack of suitable data and from the inadequate analysis of some important features of the determinants of the entrepreneurial choice (Parker, 2012; Sarasvathy et al., 2013; Rocha et al., 2015; Lafontaine and Shaw, 2016). Most studies, in fact, compare the choice and economic outcomes of remaining a novice with that of becoming a habitual entrepreneur, neglecting the choice between portfolio and serial entrepreneurship.[3]

When studying the occupational choices between portfolio and serial entrepreneurship, not only it is important to understand what transforms a novice entrepreneur into a habitual entrepreneur but also what makes her/him choose portfolio entrepreneurship over serial and vice-versa. Theory-driven findings might prove useful for both individuals facing the decision of choosing among novice, portfolio, serial entrepreneurship, and policy-makers interested in designing and implementing entrepreneurship policies. Placing the occupational choice of the entrepreneur within the entrepreneurial opportunity research, the phenomenon of multi-business entrepreneurship has been a special interest for policy makers and practitioners, not only because habitual entrepreneurs possess unique characteristics, but also because, given their experience and expertise, they can identify more entrepreneurial opportunities and hold more promise for success and growth as future business owners (Westhead et al., 2005, 2009; Lafontaine and Shaw, 2016; Wang et al., 2017).

[3] Among those finding a superior performance of habitual entrepreneurship there are Blanchflower and Oswald, 1998; Wright et al., 1998; Åstebro and Bernhardt, 2003; Chen, 2013; Rocha et al., 2015. Among those providing opposite evidence we find Rerup, 2005; Gottschalk et al., 2017).

To add to the body of existent literature, we first present an original theoretical model that sheds new light on the phenomena of interest. It shows that, based on the quality of their current business, on the expected quality of their prospective new business, on their entrepreneurial skills and the size of their initial investment, first-time entrepreneurs can alternatively become habitual entrepreneurs (either portfolio or serial), or remain novice.

The main contribution of this model for advancement of our understanding of entrepreneurship is in considering portfolio and serial entrepreneurship as two separate occupational choices, rather than putting them together as habitual entrepreneurship. It also looks at the dynamics of the entrepreneur's investment decisions, while other studies normally give a one-shot or static comparative analysis of the various occupational choices.[4] Besides, it is the first model explaining the occupational choice between novice, serial and portfolio entrepreneurship in terms of productive ability, capital investment and the relative quality of both the current and the new business. Although entrepreneurs are in general very heterogeneous, comprising both 'stars' (high human capital) and 'misfits' (low human capital) (Åstebro et al., 2011; see also Santarelli and Vivarelli, 2007), we are able to prove that, while serial entrepreneurs are highly skilled individuals facing a new opportunity with a very good expected quality, portfolio ones are generally medium-to-low skilled subjects that invest part of their capital in a new venture to mitigate a problem of decreasing productivity in their current business. Novice entrepreneurs, on the other hand, are successful, skilled business owners, running a high-quality activity.

We test the predictions obtained from our model using a novel dataset from Vietnam. Two main advantages are associated with the use of this database. First, it enables us to construct various measures for entrepreneurial skills (personal characteristics of the entrepreneur: education, industry experience, managerial experience) and business quality (features of the business: innovation intensity, share of technical and managerial employees)

[4] With the exception of Plehn-Dujowich (2010), who, however, does not consider portfolio entrepreneurship.

which inherently provide more comprehensive insights. Second, while the majority of the extant research on the topic deals with developed countries, it enables us to address an important research gap by considering the case of a fast-growing transition economy. Coherently with our theoretical model, we prove that more human capital is associated to a higher likelihood to be a habitual entrepreneur. Moreover, a higher quality of the new business is associated with a higher likelihood of being habitual entrepreneurs, which implies that the higher entrepreneurial skills, the larger the impact of an increase in the quality of the new business on the likelihood to be serial or portfolio. Finally, habitual entrepreneurs tend to stay in business longer, while novice entrepreneurs, when endowed with high entrepreneurial skills and a high-quality business, are the category with the lowest probability to leave the market.

The paper is organized as follows. Section 2 presents a concise overview of the literature on the occupational choices of entrepreneurs. In Section 3 we set up a model of occupational choice and survival that allows to single out the main drivers of serial and portfolio entrepreneurship. Section 4 introduces the hypotheses, based on our model which are tested in the empirical analysis. Section 5 describes the distinctive features of the entrepreneurial eco-system in Vietnam, and Section 6 introduces the dataset. The econometric strategy is presented in Section 7, whereas Section 8 discusses the results of the empirical analysis. Finally, Section 9 concludes and illustrates possible directions for future research.

2 - Literature review

The literature analyzing the occupational choices of entrepreneurs is extensive: many scholars study the choice between entrepreneurship and paid employment, several investigate the choice between novice and habitual entrepreneurship. However, within this line of research, only a few studies focus explicitly on both serial and portfolio entrepreneurship.

2.1 – Entrepreneurship or paid employment?

Two different lines of investigation have studied the choice between entrepreneurship and paid employment: *i)* the first one explains entrepreneurial intentions and the tendency to be an entrepreneur from her/his psychological, sociological and cognitive activities (Katz, 1992; Kolvereid, 1996; Lazear, 2005; Carbonara et al., 2018) which can be genetically inherited (Zhang et al., 2009; Nicolaou and Shane, 2010) and are reflected mainly in the willingness to take risk. This approach can be traced back, among others, to Lucas (1978), Kihlstrom and Laffont (1979), Cramer et al. (2002); *ii)* the second one, developed by Kirzner (1979), Schultz (1980), Blanchflower and Oswald (1998), and Baumol (1990) assumes the entrepreneur to be an individual able to capture opportunities and turn them into new products.

Subsequent literature has tried to apply these two approaches to other types of occupational choices besides the fundamental choice between entrepreneurship and paid employment. Contributing to the latter approach, Holmes and Schmitz (1990) build a theoretical model based on the idea that business transfers represent very common resource reallocations serving the purpose of facilitating the division of labor among entrepreneurs. According to their view, serial entrepreneurs are individuals who decide to sell (or shut down) their business if they find that someone else is endowed with a greater ability to pursue the opportunities that business is meant for. Their model is supported by empirical evidence drawn mostly from Pakes and Ericson (1988). On the same line of research, Plehn-Dujowich (2010) finds that, in equilibrium, a highly-skilled entrepreneur shuts down a business of low quality to become a serial entrepreneur whereas a low-skilled entrepreneur shuts down a business of low quality to enter the labor market.

Contributing to the first approach, Åstebro et al. (2011) present and test, using data for Korea a model in which individuals switching from wage-employment to self-employment are more often the most able individuals, who find self-employment more attractive whenever employment with a mismatched firm leads them to earn a poor wage. This occurs since the

consequences of such mismatches for wages tend to persist over time, pushing skilled workers to enter self-employment.

Parker (2014) offers an important contribution to the relevant literature by presenting one of the very few theoretical studies on the decision between serial and portfolio entrepreneurship. In particular, the latter is justified by the entrepreneur's risk aversion, which, in special circumstances, require portfolio diversification across multiple opportunities.[5]

Turning to the empirical literature, we can find several contributions testing the validity of the two approaches we describe above. Again, very few empirical studies focus on portfolio entrepreneurs explicitly.

2.2 – The psychological traits of entrepreneurs

Within the psychological and personal characteristics approach, the existing empirical literature identifies significant differences between novice and habitual entrepreneurs. Specifically, two main factors influence an entrepreneur's occupational choice: i) impetus factors (related to personal characteristics and relevant life events); ii) situational factors that become relevant once impetus factors have been activated (such as environmental and market changes or organizational performance), affecting her/his perceptions of desirability and feasibility (Dollinger, 2008). Such situational factors can be narrowed down to the entrepreneur's personal background and the quality of the business at the organizational level. Regarding personal background, habitual entrepreneurship is often a byproduct of a personal learning and development process, in which habitual entrepreneurs exploit experiences and expertise from the first business and apply them to future businesses.

[5] In particular, Parker (2014) analyzes how an entrepreneur's recognition and exploitation abilities impact on the variance and the mean of the payoffs generated by their entrepreneurial activity. He finds that: *i)* higher opportunity-exploitation ability is associated with portfolio entrepreneurship rather than with serial and novice entrepreneurship (see also Parker and van Praag, 2010); *ii)* a sequence of opportunities whose returns covary negatively (diversifying opportunities) promotes portfolio entrepreneurship at the expense of both novice and serial entrepreneurship; *iii)* synergies between successive opportunities promote portfolio entrepreneurship over novice entrepreneurship, unless the initial opportunity is sufficiently valuable; and *iv)* individuals with low (moderate) (high) risk aversion are more likely to be serial (portfolio) (novice) entrepreneurs, respectively (for experimental evidences, see Koudstaal et al., 2016).

Starting a second venture indicates the existence not only of professional abilities or entrepreneurial skills, but also "an appropriate psychological mindset, and a belief that entrepreneurship is indeed a preferred career choice" (Barnir, 2014: 3). Therefore, habitual entrepreneurs are found to be younger when they started their first business (Westhead and Wright, 1998), hold a greater amount of human and social capital (Wiklund and Shepherd, 2008; Li et al., 2009; Sieger et al., 2011), and have a more diverse experience and more resources (Westhead et al., 2005, Amaral et al. 2011). Focusing on the role of innate ability in serial entrepreneurship, learning by doing is less important than selection on innate ability in explaining both the formation and the early performance of serial businesses. This result is proven by Chen (2013) for a young cohort of U.S. firms between 1979 and 1994 and by Rocha et al. (2015) for a sample of Portuguese firms between 1997 and 2003. Moreover, Chen (2013) finds that the only exception to this empirical regularity occurs when an entrepreneur creates a new firm in an industry closely related to her/his past business experience.

Turning to portfolio entrepreneurship specifically, the existing literature has analyzed the skills developed by serial entrepreneurs, as compared to portfolio ones. Under the framework of the resource-based view of the firm (Penrose, 1959), two broad inputs measure business quality: hard inputs (such as financial capital, investments) and soft inputs (such as technological capabilities or technical skills) (Bridge et al., 1998; Westhead et al., 2003). Such inputs are significantly crucial to exploit entrepreneurial opportunities. With respect to soft inputs, while owning multiple businesses simultaneously enables portfolio entrepreneurs to access wider sources of finance and internalize different kinds of technological skills (Wright et al., 1998), owning multiple businesses sequentially allows serial entrepreneurs to enrich their entrepreneurial experience and sharpen their technical expertise. Thus, as a result of prior business ownership experience gained by serial entrepreneurs, and accumulated diverse skills and expertise gained by experienced portfolio ones, habitual entrepreneurs are more able to select the best organizational routines and capabilities oriented towards innovation and

business growth (Westhead et al., 2003). Habitual entrepreneurs are then more likely to undertake several innovation activities than to pursue new ventures as a one-time career change (Robson et al., 2012). With respect to hard inputs, portfolio entrepreneurs are able to utilize and leverage the internal financial resources from their existing business(es) to fund their subsequent venture, whereas serial entrepreneurs with a track entrepreneurial record and collateral from the previous business can secure external finance to partly fund a subsequent venture (Westhead et al., 2003). Thus, consistent with Blanchflower and Oswald (1998), it is expected that successful habitual entrepreneurs have larger amounts of investment capital than novice ones who due to the lack of an established track record rely mainly on internal sources of capital (personal savings or loans from family and friends).

One of the main difficulties with empirical studies of portfolio entrepreneurship based on the psychological approach is that the level of analysis needs to be shifted from the firm to the individual whereas the majority of the data are at the firm level. Sieger et al (2011) suggest that using the firm as the unit of analysis might lead to underestimating the prevalence of portfolio entrepreneurship, since owning and managing multiple businesses could be considered a normal diversification strategy at the firm level. While the goal of strategic diversification is to maximize managerial efficiency or risk management, reasons for engaging in portfolio entrepreneurship may include growth aspirations, wealth, value maximization, and providing career opportunities for family members (Mulholland, 1997). Using an interesting approach based on in-depth exploration of a single-case study, Baert et al. (2016) identify three groups of a total of eight resource orchestration subprocesses[6] that allow potentially portfolio entrepreneurs to explore simultaneously numerous market opportunities from which extract those that is worthwhile exploiting.

[66] These are: "Accessing, multiplying, redeploying, incubating, decoupling, aligning, complementing, and coupling" (Baert et al. 2016, p. 354).

2-3 – Entrepreneurship and the exploitation of opportunities

We focus now on the second approach, that studies the entrepreneurs' ability to identify and exploit new opportunities and review the empirical literature within that specific approach. Consistent with Holmes and Schmitz (1990), one might wonder whether the process of division of labor among entrepreneurs produces a different business quality for habitual and novice entrepreneurs. Indeed, these strategic occupational choices with associated subsequent hard and soft resources significantly differentiate the business quality of habitual entrepreneurs from that of novice entrepreneurs: businesses owned by habitual entrepreneurs are better in overcoming growing barriers and seeking a long-term competitive advantage. As a matter of fact, indication that habitual entrepreneurs are a high-quality fraction of novice entrepreneurs arises from a conspicuous body of research suggesting the economic outperformance of habitual entrepreneurs (Wright et al., 1998; Westhead and Wright, 1999; Klepper and Simons, 2000; Åstebro and Bernhardt, 2003; Agarwal et al., 2004; Hyytinen and Ilmakunnas, 2007; Wiklund and Shepherd, 2008; Chen, 2013). Comparing the business quality of a portfolio with that of a serial, Westhead et al. (2005) observe, for a sample of 354 firms in Scotland, that portfolio entrepreneurs have more resources and organizational capabilities (skills, knowledge, etc.) than the serial. Besides, on average, they seem to offer more attractive growth prospects. Tihula and Huovinen (2010), focusing their analysis on a sample of 245 Finnish firms with 20-49 employees, provide empirical evidence about the presence of managerial teams in small firms. They distinguish *solo* entrepreneurs (i.e. entrepreneurs who themselves run the firm that they own) from entrepreneurs who share responsibility with small groups of managers from different functional areas and other key persons (managerial team). Their findings show that *solo* entrepreneurship is more common among novice entrepreneurs, and there are more management teams in firms owned by portfolio entrepreneurs than in firms owned by serial entrepreneurs.

2.4 – The exit decision

Finally, we turn to the reasons that explain the exit of a firm from the market. The huge literature on firm exit (cf., for example, Harhoff et al., 1998; Maertz and Campion, 2004; Mason and Harrison, 2006; Cumming, 2008; DeTienne, 2010; Cefis and Marsili, 2012; Elfenbein and Knott, 2015) has produced a wide range of results some of which are of particular interest for our purposes. Entrepreneurial exit, as defined by DeTienne (2010: 213), is "the process by which the founders of privately held firms leave the firm they helped to create; thereby removing themselves, in varying degree, from the primary ownership and decision-making structure of the firm". As a multilevel phenomenon, entrepreneurial exit can occur in three distinct scenarios: firm exit, founder exit, or exit of both firm and founder (Wennberg, 2009; DeTienne, 2012). DeTienne (2015: 1) name these three exit categories as entrepreneurial recycling, entrepreneurial departure, and entrepreneurial culmination respectively. In this sense, entrepreneurial exit can be the result of both poor and strong performance depending on entrepreneurs' exit reasons, from poor economic performance to deliberate exit decisions.

DeTienne (2010: 209) suggests that three forces explain the termination of the current business: alternative, calculative, or normative. Alternative forces refer to "alternative opportunities" (Maertz and Campion, 2004: 570) that could be a well-paid job opportunity (become a wage employee) or a new business opportunity (become a serial entrepreneur). Calculative forces refer to the ability of achieving their "goals and values in the future at their current organization" (ibid, p. 570). Entrepreneurs consider exit evaluating their current venture's viability and quality. In case of low market demand, weak technological capabilities, or strong competitive environment, exit might be preferable. Normative forces, on the other hand, refer to the individual's perception of family or friends' expectations regarding their business. Entrepreneurs are less likely to close down their business if their relatives and friends have confidence or financial investments in the business. DeTienne et al. (2014: 6) construct a typology of exit strategies. They suggest that less educated entrepreneurs with a weak

psychological commitment and an insignificant amount of invested resources may recognize that a career in entrepreneurship is demanding and adopt a "voluntary cessation strategy" such as liquidation and discontinuance (Harhoff et al., 1998). On the other hand, those possessing high education and high levels of innovation would apply a "financial harvest exit strategy", such as selling the business if substantial value accrued to the entrepreneur (Cumming, 2008; Cefis and Marsili, 2012). DeTienne and Cardon (2012) also find that entrepreneurial education and experience are positively associated with exit through external acquisition, i.e. selling off the business for financial surplus. In summary, although various reasons could explain firm exit, the general consensus is that entrepreneurs possessing lower education and business innovativeness would easily close down their businesses by liquidation (i.e. bankruptcy) while those with higher education and innovativeness would take the same decision if they could sell off their business for financial rewards. The probability of entrepreneurial reengagement after exit is also found to be higher for the latter case (Hessels et al., 2011; Amaral et al., 2011).

3 - A model of occupational choice and survival

In this section, we set up the model that we are going to test empirically in the remainder of the paper. Extending the tradition initiated, among others, by Schultz (1980), and Holmes and Schmitz (1990), we develop significant insights for how idiosyncratic individual attitudes and business characteristics may lead entrepreneurs to make occupational choices in the course of their working life. Such insights will then be used to develop testable hypotheses about the qualities and the behavior of novice, serial, and portfolio entrepreneurs.

Each period, entrepreneurs are endowed with a fixed amount K of capital (of at least one unit: $K \geq 1$) and produce using a Cobb-Douglas technology. An entrepreneur's profits are $\pi(q, s) = qK^s$, where q is the quality of the firm and s is the entrepreneur's skill. Thus, $\pi_s > 0$

(higher skills increase profitability) and $\pi_q > 0$ (higher quality businesses are more profitable). Also, $\pi_{qs} > 0$, i.e., entrepreneurial skills and business qualities are complements. Skill affects the marginal productivity of capital and the returns to scale of the entrepreneur's business. We assume $s \leq 1$.[7]

Quality q is distributed according to the distribution function $Q(\cdot)$ over the interval $[0, \infty)$, whereas ability s is distributed according to the function $S(\cdot)$ over the interval $[0,1]$. Time is discrete and infinite. An entrepreneur maximizes the expected value of the future flow of profits V, where

$$V = E\left[\sum_{t=0}^{\infty} \beta^t \pi_t\right] \tag{1}$$

and $0 < \beta < 1$ is the discount factor.

Suppose that, at time t, an entrepreneur owns a business characterized by quality q. She/he has then four possible options: 1) keep her/his current business (remaining *novice*); 2) sell or close her/his current business and invest in a new one with expected quality $\hat{q}$ (becoming a *serial* entrepreneur); 3) invest in a new business of quality $\hat{q}$ while keeping her/his original one (thus becoming a *portfolio* entrepreneur); 4) sell or close her/his current business and leave entrepreneurship, becoming a paid worker.[8]

Define $V(q, s)$ the present value of the future flow of profits for an entrepreneur with skill s, currently owning a firm of quality q who, at time t, decides to keep it (*novice*)

[7] Cases with $s > 1$ have been left out because they imply increasing returns to capital. While it may be interesting to study economies in which tensions towards market concentration exist, entrepreneurship in Vietnam is mostly characterized by SMEs. Hence limiting our theoretical analysis to $s \leq 1$ seems more consistent with the data we use to validate our theory.

[8] We assume that, once made, the entrepreneur's occupational choice is not reversible. This assumption is common in occupational choice models (see Plehn-Dujowich, 2010) and is also suitable for our dataset, which registers whether, at a given date, an entrepreneur is novice (still owns her/his original business), serial or portfolio but does not give account for her/his future decisions.

$$V^N(q,s) = \sum_{t=0}^{\infty} \beta^t \pi(q,s) = \sum_{t=0}^{\infty} \beta^t q K^s = \frac{qK^s}{1-\beta}$$

(2)

Similarly, an entrepreneur deciding to start a new business with expected quality $\hat{q}$ and leave the current one (*serial*) gets a present expected value equal to

$$V^S(q,s,\hat{q}) = qK^s + \beta \frac{[(1-\tau)K]^s}{1-\beta}\hat{q}$$

(3)

where τ is the portion of capital the entrepreneur loses when setting up the new firm[9] and $\hat{q} = \int_0^{\infty} qdQ(q) = Eq$, the expected quality of the new business.[10]

Assume now that the entrepreneur is willing to start a new business, but she/he does not want to shut down her/his current one (*portfolio entrepreneurship*). She/he therefore invests a fraction γ of her/his resources in the current business and the remaining $1-\gamma$ in the new one, running two businesses at the same time. The present expected value from this occupational choice is $V^P(q,s,\hat{q},\gamma) = qK^s + \beta \frac{q(\gamma K)^s}{1-\beta} + \beta \int_0^{\infty} \frac{q[(1-\gamma)[1-\tau)]K]^s}{1-\beta} dQ(q)$, which can be rewritten as

$$V^P(q,s,\hat{q},\gamma) = qK^s + \beta \frac{q(\gamma K)^s}{1-\beta} + \beta \frac{[(1-\gamma)(1-\tau)K]^s}{1-\beta}\hat{q}$$

(4)

In practice, at time t, an entrepreneur choosing to become portfolio maximizes the present value $V^P(q,s,\hat{q},\gamma)$ dividing her/his available capital between her/his current business

[9] The parameter τ can be interpreted as the "start-up cost" (see Plehn-Dujowich, 2010 and Holmes and Schmitz, 1990).

[10] In fact, $V^S(q,s,\hat{q}) = qK^s + \beta \int_0^{\infty} \frac{q[(1-\tau)K]^s}{1-\beta} dQ(q)$, where the last integral can be rewritten as $\frac{[(1-\tau)K]^s}{1-\beta} \int_0^{\infty} qdQ(q) = \frac{[(1-\tau)K]^s}{1-\beta} Eq$.

and a new one of expected quality $\hat{q}$ in order to maximize the present value from this occupational choice, $V^P(q, s, \hat{q}, \gamma)$.

Define γ^* the value of γ that maximizes (4), with $0 \leq \gamma^* \leq 1$. Notice that, with the exception of leaving entrepreneurship (option 4 above), all occupational choices descend, as special cases, from the maximization of the function in equation (4). In particular, $V^P(q, s, \hat{q}, 0) = V^S(q, s, \hat{q})$: the present expected value of the profits from portfolio entrepreneurship when no capital is invested in the current business ($\gamma = 0$) is equal to the present expected value from serial entrepreneurship. Similarly, $V^P(q, s, \hat{q}, 1) = V^N(q, s)$: the present expected value of the profits from portfolio entrepreneurship when all capital is invested in the current business ($\gamma = 1$) is equal to the present expected value from novice entrepreneurship. Since γ^* maximizes $V^P(q, s, \hat{q}, \gamma)$, it also selects the alternative that yields the highest profit. Thus, the entrepreneur chooses to become a portfolio entrepreneur if $0 < \gamma^* < 1$, so that she/he will operate both firms. She/he will be a serial entrepreneur if $\gamma^* = 0$, so that she/he exchanges her/his old business for the new one and a novice entrepreneur if $\gamma^* = 1$, in which case she/he stays with her/his current business solely.

The present expected value from the three different occupational choices (novice, serial and portfolio) can therefore be summarized by a unique equation

$$V^e(q, s, \hat{q}, \gamma) = \begin{cases} V^S(q, s, \hat{q}) \; if \; \gamma = 0 \\ V^P(q, s, \hat{q}, \gamma) \; if \; 0 < \gamma < 1 \\ V^N(q, s) \; if \; \gamma = 1 \end{cases} \tag{5}$$

where the superscript *e* stands for "entrepreneurship".

Finally, defining w the wage the individual earns in each period in paid occupation, the present expected value of leaving entrepreneurship is

$$V^w(q, s, w) = qK^s + \frac{\beta}{1 - \beta} w \tag{6}$$

Consider now an individual that, at time t, is running a business (this individual could be a *novice* entrepreneur with her/his first business or a *serial* who has founded a new business). The timing is as follows: the entrepreneur, who knows her/his skill s and the quality q of her/his current business, decides the optimal share of capital γ^* to invest in the business (or businesses) she/he will run in the following period. This determines the maximum amount of profits she/he could obtain from her/his entrepreneurial activity. Then, she/he makes her/his occupational choice decision, comparing the best expected outcome as an entrepreneur with employment.

Define $V(q, s, \hat{q})$ the optimal value of the occupational choice problem for an entrepreneur running a business of quality q with skill s, who has found a new entrepreneurial opportunity with an expected quality $\hat{q}$ and has to decide whether to remain novice, launch a new business or leave entrepreneurship.

The Bellman equation is

$$V(q, s, \hat{q}) = max\{V^e(q, s, \hat{q}, \gamma), V^w(q, s, w)\} \tag{7}$$

To determine the value of the function $V^e(q, s, \hat{q}, \gamma)$ we need to compute the optimal γ^*, which then defines the type of entrepreneur the individual will be in equilibrium, according to expression (5). The maximization of the value function is then over two occupational choices: entrepreneurship as defined by the optimal γ^* and paid work. It is therefore a dynamic programming problem that considers the choice between discrete actions.[11]

3.1 - The entrepreneur's choice: novice, serial or portfolio

Before dealing with the maximization of the value function $V(q, s, \hat{q})$, we need to characterize the optimal γ^*. To do so, we maximize the present expected value in expression (4) with respect to γ. The following Propositions contain our results.[12]

[11] See Ljungqvist and Sargent (2004, chapter 6).
[12] Proofs are in Appendix 1.

Proposition 1. *If* $s < 1$*, the entrepreneur keeps a share* $0 < \gamma^* < 1$ *of the available capital in the old business but invests the remaining share* $1 - \gamma^*$ *in the new one, becoming a portfolio entrepreneur. The optimal share* γ^* *is increasing in* q *and* τ*, decreasing in* $\hat{q}$*. It is also increasing in* s *when* $\frac{\hat{q}}{q}$ *is large and* τ *small.*

Notice that the entrepreneur chooses to invest in a portfolio of enterprises irrespective of the qualities of the old and the new enterprise, q and $\hat{q}$. When $s < 1$, capital is not very productive: its marginal productivity is small and decreasing. Transferring some capital from the old to the new business increases productivity, both for the units remaining in the old business and for those in the new one. Intuitively, the optimal share γ^* is larger when q is large: the higher the quality of the current business, the larger the investment the entrepreneur is willing to maintain in that activity. Similarly, the larger the expected quality of the new business $\hat{q}$, the bigger the desired investment in it.

The results in Proposition 1 imply also that the higher $\frac{\hat{q}}{q}$ and the greater the entrepreneur's ability s, the bigger the share of capital invested in a new business. In fact, as s increases, the less important is the role of the marginal productivity of capital in the entrepreneur's decision and the more she/he tends to invest in the best business opportunity (in this case, the new enterprise), being the need to diversify less compelling. Vice-versa, when $\frac{\hat{q}}{q}$ is small, γ^* tends to increase with s, thus the share of capital left in the current business is larger, since, in this case, that is the best opportunity.

Proposition 2. If $s = 1$, *the entrepreneur chooses to dispose of her/his original business and to invest all her/his capital in a new enterprise if and only if* $\hat{q} > \frac{q}{1-\tau}$*, becoming a serial entrepreneur.*

The intuition is straightforward: being $s = 1$, this case presents a constant marginal productivity of capital on either activity. The entrepreneur's occupational choice is therefore driven only by relative business quality and by the cost of setting up the new business.[13]

3.2 – Entrepreneurial exit

We can now proceed to the maximization of the value function in (7) over the two occupational choices: entrepreneurship as defined by the optimal γ^* and paid work. In order to decide whether to remain entrepreneurs or to take a paid job, individuals compare their equilibrium choice as entrepreneurs (novice, serial and portfolio), with the present value of their outside option (e.g., earnings as a paid employee).

Our goal in this section is to study entrepreneurial exit (or survival). In this paper we follow the definition provided by DeTienne (2010) and reported in section 2.4 above. Thus, entrepreneurial exit, in our model, is determined both by entrepreneurs leaving entrepreneurship and taking a paid job and by serial ones, who "leave the firm they helped to create" to start a new one.[14]

Propositions 1 and 2 above have proven that the entrepreneur chooses to run a portfolio of businesses if $s < 1$ and chooses to be either novice or serial if $s = 1$, depending on the relative quality of her/his current and prospective businesses.

Consider first the case in which $s < 1$. In this case, serial entrepreneurship is ruled out. We focus therefore on the choice of leaving entrepreneurship. Figure 1 graphs the value function (7) and shows that the entrepreneur "survives" (i.e., she/he maintains her/his job as an entrepreneur) if $\hat{q} \geq \hat{q}^P$ and exits (going back to paid work) if $\hat{q} < \hat{q}^P$, where $\hat{q}^P$ is the value

[13] As clarified above, we do not consider cases in which $s > 1$. Results would be qualitatively similar to those in Proposition 2. In fact, with $s > 1$, the value $V^P(q, s, \hat{q}, \gamma)$ in expression (4) would be convex in γ. $V^P(q, s, \hat{q}, \gamma)$ would then be maximized at either $\gamma = 0$ or $\gamma = 1$, according to the relative values of $q, \hat{q}$ and τ, exactly as in Proposition 2.

[14] This is in line with the data we use in our empirical analysis, according to which entrepreneurial exit encompasses both entrepreneurs closing their business and those transferring it. Transfer and closing down can be justified by either leaving entrepreneurship or starting a new firm (serial entrepreneurship).

of $\hat{q}$ (the quality of the new business) at which the individual is indifferent between being an entrepreneur and getting a paid job.[15] Looking at Figure 1, one should notice that $\hat{q}^P$ increases with w and decreases with q (the quality of the original firm). In fact, an increase in w shifts $V^P(q,s,\hat{q},\gamma)$ up, moving the intersection point to the right, whereas an increase in q moves up both $V^P(q,s,\hat{q},\gamma)$ and $V^w(q,s,w)$, but $V^P(q,s,\hat{q},\gamma)$ moves to a greater extent. If we define $\psi^P = \int_0^{\hat{q}^P} dF(\hat{q})$ the probability that the portfolio entrepreneur leaves entrepreneurship, the greater $\hat{q}^P$, the higher ψ^P. Intuitively, the mean survival time of a business is negatively related to the probability of exit. Thus, unsurprisingly, a portfolio entrepreneur tends to "survive" longer the better the quality of the firms in her/his portfolio and the lower the value of the outside option, w.

Consider then the case with $s = 1$. In this case entrepreneurial exit can be determined by both leaving entrepreneurship and transferring a firm to start a new one. We concentrate first on the choice to leave entrepreneurship. From Proposition 2, if $q \geq \hat{q}(1-\tau)$ the entrepreneur would be novice. Comparing $V^N(q,s)$ with $V^w(q,s,w)$, we can see that the entrepreneur exits if $q \leq q^N = \frac{w}{K}$. Defining $\psi^N = \int_0^{q^N} dF(q)$ the probability that the novice entrepreneur exits, we can conclude that the mean survival time of a business run by a novice entrepreneur depends negatively on w and positively on its size K. Similarly, if $\hat{q} \geq \frac{q}{1-\tau}$, the entrepreneur would be serial. Comparing $V^S(q,s,\hat{q})$ with $V^w(q,s,w)$, we can see that the entrepreneur exits if $\hat{q} \leq \hat{q}^S = \frac{w}{(1-\tau)^s K}$. Their exit probability is $\psi^S = \int_0^{\hat{q}^S} dF(\hat{q})$. Once again,

[15] The function $V^P(q,s,\hat{q},\gamma)$ is increasing in $\hat{q}$ and linear and is therefore the upward sloping line in Figure 1. In fact, applying the envelope theorem, $\frac{\partial V^P}{\partial \hat{q}} = \frac{\beta}{1-\beta}[(1-\gamma)(1-\tau)K]^s > 0$. The function $V^w(q,s,w)$ is invariant with respect to $\hat{q}$. In Figure 1, we have neglected the case in which $V^w(q,s,w)$ (hence w) is so low that there is no $\hat{q}^P > 0$ such that the entrepreneur is willing to exit if $\hat{q} < \hat{q}^P$ (this case would occur if $V^w(q,s,w)$ lies below the vertical intercept of $V^P(q,s,\hat{q},\gamma)$ at $\hat{q} = 0$).

the mean survival time of a business run by a novice entrepreneur depends negatively on the value of their outside option and on τ, and positively on capital.

Following DeTienne (2010), we need to include in survival also firm transfers of entrepreneurs that continue in their entrepreneurial role. In our model, entrepreneurs that can transfer or shut down their businesses (not leaving entrepreneurship) are novice starting a new business and becoming serials. This happens when $V^N(q,s) < V^S(q,s,\hat{q})$, i.e., when $q \leq q' = \hat{q}(1-\tau)$. In order for a novice to survive (in the sense that she/he keeps her/his original business) it must be $q > \max\{q', q^N\}$: the quality q of her/his current enterprise must be high enough to render keeping it more attractive than both starting a new firm and leaving entrepreneurship.

If $q' < q^N$, the probability that a novice "survives" is $1-\psi^N$. If $q' > q^N$, the probability of survival is $\mu^N = \int_0^{q'} dF(q)$, which is positively influenced by q and by τ.

We are now going to address the following questions: 1) Which type of entrepreneur has the highest probability to stay in entrepreneurship? 2) Which type of entrepreneur (novice, serial, portfolio) survives longer?

In dealing with question 1, we keep our assumption $s \leq 1$. In this range, we know from Propositions 1 and 2, that, at γ^*, $V^P(q,s,\hat{q},\gamma^*) \geq \max\{V^N(q,s), V^S(q,s,\hat{q})\}$. Figure 2(a) plots the present values of the profits for portfolio and serial entrepreneurs and for paid work against the quality of the future business $\hat{q}$ (the value for novice entrepreneurs does not depend on $\hat{q}$ and will be compared separately). Portfolio entrepreneurs exit if $\hat{q} \leq \hat{q}^P$, whereas the serial exit if $\hat{q} \leq \hat{q}^S$. Figure 2.a shows that $\hat{q}^P < \hat{q}^S$, which implies, by definition, that $\psi^P < \psi^S$. In general, the probability that portfolio leave entrepreneurship cannot be higher than the probability that serial exit. Therefore, the expected "survival" time (which, in this case, means time in the entrepreneurial role) is higher for portfolio entrepreneurs than for serial ones. Similarly, Figure 2.b compares the expected values of profits of portfolio and novice

entrepreneurs and for paid work (this time plotted against the quality of the current business q). All functions are now increasing in q. Figure 2.b shows clearly that the exit threshold for portfolio entrepreneurs is lower, so that their expected "survival" time is again longer.

Consider now serial and novice entrepreneurs. Comparing q^N and $\hat{q}^S$ (i.e., the quality thresholds that determine exit and survival of firms led by novice and serial entrepreneurs respectively), it is immediate to see that $q^N < \hat{q}^S$, so that, being q and $\hat{q}$ drawn from the same distribution, novice face a smaller probability of leaving entrepreneurship than serial. However, this is not enough to conclude that the survival time is longer for novice, since novices can "exit" also by becoming serial. In particular, if $q' > q^N$, it may well be then that $q' > \hat{q}^S$, in which case the survival time would be longer for serial entrepreneurs. This is all the more likely if τ is small, if serial entrepreneurs have a larger endowment of capital K or a very good prospective profitability of the new enterprise, $\hat{q}$.

As for the impact of skill s on survival time, from our model it follows that a novice is a highly skilled entrepreneur owning a very good business, while a serial is a highly skilled entrepreneur facing an extremely good new opportunity, so that she/he can face the cost τ of setting up a new business. A portfolio entrepreneur is a low-to-averagely skilled individual mitigating a problem of scarce productivity in her/his original enterprise through diversification.

Therefore, as long as good quality and high skill induce a high probability of survival, novice entrepreneurs have the highest chances to survive, i.e. to continue as entrepreneurs.

4 - Hypotheses

Given our results on the impact of the characteristics and the behavior of novice, portfolio, and serial entrepreneurs, we are now able to formulate the hypotheses that we are going to test in the empirical part of the paper. From our theoretical model, we infer that, *ceteris paribus*:

1. Entrepreneurs tend to remain novice (i.e., continue to run their current businesses) when they are highly skilled ($s = 1$), and the quality of their current businesses is high ($q \geq (1 - \tau)\, \hat{q}$). Taking into account that divesting capital from a business and reinvesting it in a new one is costly (τ), it might happen that $q < \hat{q}$ and still the entrepreneurs prefers to retain her/his original firm.
2. Serial entrepreneurs are highly skilled entrepreneurs ($s = 1$) who get a new opportunity of higher quality than their current business, so that it is convenient for them to seize the new opportunity notwithstanding the set-up cost ($\hat{q} \geq \frac{q}{(1-\tau)}$).
3. Portfolio entrepreneurs are low-to-medium skilled entrepreneurs ($s < 1$), running businesses of both high and low quality.
4. A higher quality of the new business ($\hat{q}$) increases the likelihood that the entrepreneur is habitual (either serial or portfolio).
5. The higher the entrepreneurial skills, the larger the positive impact of an increase in the quality of the new business on the likelihood to be a serial entrepreneur.
6. For given skill, a portfolio entrepreneur faces a longer "survival" time than her/his serial and novice counterparts.
7. A highly-skilled novice entrepreneur with a high-quality business is more likely to keep her/his current business than a habitual one.

Based on the results above, we can formulate the following hypotheses, which we are going to test in our empirical analysis.

From results 1. and 2. we get our first hypothesis.

H1: High entrepreneurial skills and high quality of new business opportunity are more likely to be associated to habitual entrepreneurship (serial and portfolio).

Results 3, 4 and 5 yield our second hypothesis.

H2: A higher quality of the new business is associated to a higher likelihood of being habitual entrepreneurs (serial and portfolio).

Particularly, the higher the entrepreneurial skills, the larger the positive impact of an increase in the quality of the new business on the likelihood to be a habitual entrepreneur.

Finally, result 6 and 7 yield our third and last hypothesis.

H3: Firms run by portfolio entrepreneurs face the longest survival time and those run by serial survive longer than those run by novice. The combined effect of high entrepreneurial skills and good-quality business make firms run by novice entrepreneurs those with the lowest likelihood to exit.

5 - An overview of the empirical setting – Vietnam

The transition of Vietnam to a market economy has been characterized by the emergence of a strong entrepreneurial ecosystem. Accordingly, this highly entrepreneurial country represents an ideal laboratory for testing the predictions of our model.

Vietnam formally started its successful transition to a market economy at the end of 1986 with the adoption of a 'reform and open-door policy'. During the transition, its GDP grew constantly, with a growth rate that was 3.4% in 1986 and reached a peak of 9.5% in 1995. After a sudden decline in 1999 (5%), the economy regained its growing momentum (back to 8.4% in 2005) and has been keeping an average growth rate of around 8% per year since. After joining the Association of Southeast Asian Nations (ASEAN) in 1995, liberalizing trade with the United States in 2001, and becoming a member of the World Trade Organization (WTO) in 2007, Vietnam is nowadays a fully integrated member of the international business community.

Throughout the entire transition process, the development of entrepreneurship was supported by significant institutional changes, including the creation of a pro-entrepreneurship legal framework and the promotion of market-oriented productive capabilities (Nguyen et al.,

2008; Nguyen and Mort, 2016; World Bank, 2009). Initially, Vietnam maintained state entrepreneurship while developing private entrepreneurship. Privately-owned enterprises (POEs) were first created to perform simple economic activities and then spread into the complex production processes previously dominated by SOE.[16] Immediately after the enactment of the Law on Foreign Investment in 1988, foreign entrepreneurship started to emerge and took off during the 'foreign investment boom' period in 1991-1995. These processes led to changes in the quantity and qualities of entrepreneurship of each type.

The result of the process described above is that Vietnam is characterized by a multifarious and rich entrepreneurial ecosystem, comprising firms of all sizes in many different sectors. Entrepreneurs have the most diverse background (coming from the management of previous SOEs or being self-employed start-uppers of micro firms) and possess a wide range of skill, experience and human capital (Nguyen et al., 2008; Nguyen and Mort, 2016; Santarelli and Tran, 2013; Tran and Santarelli, 2014). Therefore, Vietnam provides an excellent domain to explore the occupational choices of such a diverse and varied group of entrepreneurs and allows us to conduct our empirical analysis controlling for a wide set of characteristics, both at the individual and at the firm level.

6 - Data description

Our analysis uses data from five waves of the Danish International Development Agency (DANIDA) surveys (carried out in 2002, 2005, 2007, 2009, and 2011), providing detailed information on various aspects of entrepreneurs and their firms. These surveys stemmed from the collaboration of the Central Institute for Economic Management (CIEM) in Hanoi, Vietnam and the Ministry of Labor, Invalids and Social Affairs of Vietnam, the Department of Economics of the University of Copenhagen and the Royal Embassy of

[16] Private ownership was experimentally permitted to operate in 1987-1988 in small-scale industries. By the promulgation of the Law on Foreign Investment in Vietnam 1987, the Company Law in 1990 and the Law on Private Enterprises in 1991, there has been a sharp increase in the number of private enterprises.

Denmark in Vietnam. The surveys are designed with the objective of collecting and analyzing data representing the entire private sector in Vietnam. This means that not only large or formally registered enterprises are interviewed, but also a substantial number of non-registered household / family businesses are studied in order to gain a comprehensive understanding of firm dynamics in Vietnam.

Despite being carried out at different points in time, all the surveys use the same questionnaire. Further, the analysis of the development of the studied enterprises is possible when they are traced and followed up over time. The 2011 study made use of the sample collected from the 2009 survey which in turn was a follow-up of the 2007 one, and so on. Each survey round provides financial information and economic data from the two most recent years. Thus, in aggregate, this yields an unbalanced 10-year panel dataset, registering also the entry of new firms and the exit of existing ones. The dataset contains a wide range of variables on the demographic characteristics of entrepreneurs, their technological and organizational capabilities, and the economic performance of their firms (for a comprehensive understanding of the surveys, see Rand and Tarp, 2007).

Although the surveys are conducted at the firm-level, they provide information about current entrepreneurs/owners and their past occupational choices. Since we concentrate precisely on the occupational choices of entrepreneurs, we focus on individuals rather than firms. In particular, we study the owners, rather than the managers of the firms, since it is the owner who is fully responsible for the decisions of maintaining, closing or expanding the businesses. Our extracted sample consists of 18,850 observations covering 4508 entrepreneurs. Table 1 documents the survival rate of entrepreneurs to link the five surveys in our sample.

[Table 1 about here]

The sample includes 3156 novice entrepreneurs (70%), 225 portfolio entrepreneurs (5%), and 1127 serial entrepreneurs (25%). Appendix 2 (Table A2) presents and interprets some descriptive statistics and statistical tests for the difference in age, education, firm age,

and legal ownership for the novice, serial and portfolio entrepreneurs in the sample. No statistically significant differences were found among the three groups with respect to their main industrial activity. Regarding geographical location, habitual entrepreneurs mainly locate in urban cities with an abundance of business opportunities, whereas novice entrepreneurs are evenly distributed across provinces.

Information on entrepreneurial exit is obtained by tracing a firm across different survey waves. We can observe when a firm shuts down (entrepreneurial culmination) or changes ownership (entrepreneurial departure). But since we are not able to tell what happens to the exiting entrepreneur (whether she/he moves to paid employment, starts another business or retires), we cannot observe entrepreneurial recycling. Thus, an entrepreneurial exit is noted when the entrepreneur declares in the survey that either the business had been shut down or there is a change in ownership. [17]

7 - Econometric strategy

To test the hypotheses listed in the 'Hypotheses' Section empirically we make use of two different equations. In particular, we test hypotheses H1 and H2 (i.e. what leads the entrepreneur to become a serial or a portfolio entrepreneur given her/his entrepreneurial skills, the quality of her/his current business and its financial conditions) using a multinomial logit. We include the interaction of skill and quality in the model, to analyze their interplay.

To test hypothesis H3 (survival), we employ a survival equation, by means of which we investigate what leads a novice entrepreneur to close her/his business given her/his entrepreneurial skills, the quality and the financial conditions of her/his current business. Particularly, looking at the three-way interaction term between 'being a novice',

[17] The surveys were designed in the way that all firms are surely traced over time. Firms exit the surveys for a definite reported reason. This keeps the number of enterprises being lost during the sampling to the minimal. Indeed, given an average annual exit rate of around 10% across the five surveys, only about 20% of these exits are justified with the sentence 'no specific reason', which means that the enterprise could not be found, or the owner declined to answer the questionnaire.

'entrepreneurial skills' and 'current business quality', we can determine whether a low or averagely-skilled novice entrepreneur facing a low-quality business will close down her/his business, while one facing a high-quality business will keep it alive.

7.1 - Methodology

Testing H1 and H2: the occupational choice equation of novice entrepreneurs

Given that we look at the choice of leaving entrepreneurship with the survival equation, here the occupational outcome y_i for a novice entrepreneur *i*, is one of *three* occupational alternatives (continue to be a novice entrepreneur, become a serial entrepreneur, or become a portfolio entrepreneur). We set $y_i = j$ if the outcome is the *j*th alternative, *j=1, 2,…,3*. The probability that the outcome for entrepreneur *i* is alternative *j*, conditional on her/his entrepreneurial skills (s_i), on the business quality (q_i) and the initial capital investment (K_i) of her/his current business is

$$p_{ij} = \Pr(y_i = j) = F_j(s_i\ q_i\ K_i, \theta), \quad j = 1, \dots, 3; i = 1, \dots, N \qquad (8)$$

where different functional forms of $F_j(.)$ correspond to different multinomial models. In line with a great deal of papers addressing similar issues, we apply the multinomial logit model.

Testing H3: the survival of novice entrepreneurs

We define a variable *time*, measuring the time from the first year in which the entrepreneur is surveyed until "death" (i.e., when entrepreneurs exit entrepreneurship, closing down the business or transferring the ownership to another entrepreneur). Obviously, our 10 - year study is not a time span long enough to observe the death of all the entrepreneurs in the sample; and thus, our data are right censored. The variable *exit* is an indicator of whether *time* refers to business close-down or ownership change (value 1) or end of study (value 0). The survival time *T* may be regarded as a random variable with a probability function *U(t)* and probability density function *u(t)*. The survival function or survival curve *S(t)* is given by:

$$S(t) = P(T \geq t) = 1 - U(t) \quad (9)$$

A further function of interest for survival data is the hazard function. It represents the instantaneous failure rate, i.e., the probability that an entrepreneur experiences the event of interest (*exit*) at a particular point in time, given that the event has not yet occurred. The hazard function is given by $h(t) = \frac{f(t)}{S(t)}$. Combining it with (9), we have $-\frac{dlog(S(t))}{dt} = h(t)$, so that $S(t) = \exp(-H(t))$, where *H(t)* is the integrated hazard function, or cumulative hazard function.

We deploy four different estimation models: [18] the nonparametric Kaplan-Meier estimator, the semi-parametric Cox proportional hazards regression, the parametric Weibull model, and the discrete-time survival model (logit model).[19] We use observations on all the 4,508 entrepreneurs in the sample, singling out novice entrepreneurs by means of the dummy variable *Novice* (taking value 1 when the entrepreneur is a novice and 0 otherwise).

7.2 - Variables

Independent variables:

Categories of entrepreneurs: A categorical variable presenting different, mutually exclusive occupational choices for an entrepreneur. The variable attains value 0 if the entrepreneur is a novice, 1 if she/he is a serial entrepreneur and 2 if she/he is a portfolio. Serial entrepreneurs are those who answered 'yes' to the question "before establishing the present enterprise, did you own any other enterprise?". Portfolio entrepreneurs are those who answered 'yes' to the question "does the owner currently have more than one enterprise?"[20]

[18] Appendix 3 contains a formal description of the three models employed and of their differences.
[19] Given that our duration data are right censored, we cannot analyze them by means of conventional methods such as a linear regression. Survival times tend to have a positively skewed distribution, which violates the normal distribution assumption of the conventional linear regression.
[20] These multiple enterprises could be either in the same or different industries. Thus, portfolio entrepreneurs are those running at least two different businesses at the same time, whatever their sector.

Serial entrepreneur / Portfolio entrepreneur: Dummy variables respectively attaining value 1 if the individual is either a serial or a portfolio entrepreneur, and 0 otherwise.

The following two variables enable us to set the survival time.

Entrepreneurial exit is an event variable. It is a dummy variable that attains value 1 if either the entrepreneur shuts down the business or leaves the business (change in ownership), and 0 otherwise.

Time is the duration variable. It measures the duration in years from the starting year of the firm (when the firm was established) until she/he closed it down or transferred ownership (if that is the case during our observation period).

Explanatory variables:

Based on the model presented above, we introduce three groups of explanatory variables:

(1) *Entrepreneurial skills* s_{it}, proxied by the following four variables, measuring human capital characteristics: (i) *education* is the number of schooling years for each entrepreneur. (ii) *Industry experience* is a dummy taking value 1 if the entrepreneur has previously worked in the industry and has prior knowledge of buyers and suppliers, and 0 otherwise. (iii) *Management experience* is a dummy taking value 1 if the entrepreneur has worked in a managerial position previously, and 0 otherwise. (iv) *Labor force experience* is a dummy taking value 1 if the entrepreneur has previously worked as a paid employee, and 0 otherwise. The rationale for adopting these proxies to reflect entrepreneurial skills results from extensive studies supporting the importance of human capital factors in boosting entrepreneurial alertness and performance (among others, Gimeno et al., 1997; Westhead et al., 2005; Bosma et al., 2004; Poschke, 2013; Santarelli and Tran, 2013; Sorgner et al., 2017).

(2) *the quality of the firm* q_{it}, proxied by its technological and organizational capabilities and measured by the following three variables: (i) *innovation intensity* is the ratio of the investment on innovation activities to the total annual revenue of the firm. (ii) *Share of technical employees in the total labor force* is the ratio of the number of technical and R&D employees to the total number of employees of the firm. (iii) S*hare of managers in the total labor force* is the ratio of the number of employees in managerial positions to the total number of employees of the firm. [21] The rationale for adopting these three proxies could be originally traced back to the resource-based view of the firm (Penrose, 1959) suggesting that the quality of a firm results from unique attributes of its competitive resources. Following Bridge et al. (1998) and Westhead et al. (2003), we value business quality from two broad inputs: hard inputs, i.e. investment into innovation activities, and soft inputs, i.e. technological and managerial knowledge and expertise.

(3) *total capital* K_{it} in each year, proxied by the logarithm of the total assets of the firm. Three variables will be adopted to measure the capital investment of the entrepreneur: (i) *firm size* is the economic size of the firm, measured by the logarithm of the total assets of the firm. (ii) *debt ratio*, measure by the ratio of total debt to total assets and isolates the effect of a firm's leverage capacity on its performance; [22] and (iii) *land ownership* is a dummy taking value 1 if the entrepreneur owns the land housing the firm's main production facility, and 0 otherwise.[23]

[21] Given the structure of our dataset, we can observe only the quality of the current business which is the new business for serial entrepreneurs, the main business for portfolio entrepreneurs, and the old business for novice entrepreneurs in case they decide to exit entrepreneurship during the observation years.

[22] While Opler and Titman (1994) find that highly leveraged firms lose a substantial market value and impose greater risks to owners and creditors than their more conservatively financed competitors. Teece (1982) finds that debts reduce the chances of bankruptcy through flexible asset deployment.

[23] Since skill affects productivity and productivity is an aspect of the firm (technological) quality, there might be a positive correlation between skill and firm quality.

To study the interaction effect of entrepreneurial skills and business quality, we construct two composite indices measuring entrepreneurial skills and business quality respectively. For entrepreneurial skills, the composite 'skill' index is the sum of four dummies: an 'education' dummy attaining 1 if the entrepreneur has high education (technical college, undergraduate or graduate degrees), 0 if she/he has low education (no education, secondary/high school education); the 'industry experience' dummy, the 'managerial experience' dummy, and the 'labor force experience' dummy described above. This 'skill' index ranges from 0 (low education, no experience of any type) to 4 (high education, possessing all industry, managerial and labor force experience).

The composite 'quality' index is the sum of three dummies: 'innovation intensity', 'technical share', and 'managerial share' dummies. These dummies attain value 1 if the firm's respective measure is higher than the third quartile of the sample and 0 otherwise. The 'quality' index ranges from 0 (the firm's innovation intensity, technical share and managerial share are all below the sample median values) to 3 (all innovation intensity, technical share and managerial share are all above the third quartile values). Interaction terms are created using these two composite indices.

Control variables:

Besides *age*, *gender* and *tenure*[24] of the entrepreneur, we include *firm age*, the age of the current firm. We then isolate the ownership type of the current firm, creating dummies *private firms, partnership/cooperatives, limited liability* (all taking value 1 when the firm takes the corresponding ownership type and 0 otherwise). Finally, a dummy is added to take any divergence or mismatch arising from different surveys into account.

8 - Estimation results

[24] Duration, in terms of number of years, of the period that an individual stays in the current business or in entrepreneurship.

Appendix 3 (Table A3) presents the descriptive statistics and pair-wise correlation matrix of all the adopted variables. The average exit rate of firms is about 15%, which is relatively low compared to other studies about Vietnam (e.g., Vijverberg and Haughton, 2002). On average, our sampled entrepreneurs are 45 years old and have spent more than 11 years in education.[25] We can see from the pair-wise correlation matrix, out of 136 pair-wise correlations, 80 are statistically significant at 1% significance level. However, most of them are very small with correlation coefficients below 0.3. The only two pair-wise correlations that are greater than 0.3 are: (i) the one between debt ratio and investment capital (0.43), which indicates that external loans are an important source of finance for our entrepreneurs' investments, (ii) the correlation between education and firm size (0.318), which suggests that highly educated entrepreneurs are better in attracting financial resources.

8.1 - The occupational choice equation

Table 2 presents the results of the occupational choice model when 'novice entrepreneur' is used as the base category. Regressors are jointly statistically significant at 1% level across the two treatments we estimate. Particularly, the second model (presented in the last two columns) includes the interaction term between the entrepreneur's skills and her/his current business quality.

In general, entrepreneurial skills have a significantly positive effect on the propensity to engage in habitual entrepreneurship. Education, industry experience, and managerial experience all increase the propensity of an occupational transition to habitual entrepreneurship and this effect is consistent for both serial and portfolio entrepreneurs. They are more likely to spend longer years in education, possess richer experience from the industry and have worked

[25] Ronnas and Ramamurthy (2001: 328) describe a typical urban entrepreneur in Vietnam as "a middle-aged male with at least 10 years of education and prior experience in similar fields in a position of responsibility".

previously as managers.[26] For instance, if the entrepreneur were to increase her/his schooling years by one year while holding all other variables in the model constant, the multinomial log-odds for serial entrepreneurs relative to novice would increase by 0.052 units, whereas those for portfolio relative to novice would increase by 0.084 units. This result seems to be quantitatively similar for serial and portfolio individuals. Maybe, qualitatively, we can see a better significance for serial (all three indicators are significant at the 1% level, whereas only two are significant at the 1% level for portfolio, while managerial experience is significant at 5% only). Overall, however, our hypothesis H1, according to which *high entrepreneurial skills are more likely to be associated to habitual entrepreneurship (serial and portfolio)*, is strongly supported.

Previous experience as a paid employee has a negative impact on the entrepreneur's motivation to take further entrepreneurial risks rebuilding a failed business or expanding their current one.

With respect to the effect of organizational quality on the likelihood of engaging in habitual entrepreneurship, the impact of innovation intensity is not statistically significant. We also allowed for a non-linear relationship by including its squared value in the regression, but this did not affect the result. The share of technical employees in the total firm labor force exerts a significant and positive impact for both serial and portfolio entrepreneurs. However, the share of managerial employees exerts opposite influences on serial and portfolio entrepreneurship: an increase in managerial employees has a positive impact on portfolio, but a negative impact on serial entrepreneurship. An increase in managerial expertise, while enabling portfolio entrepreneurs to manage and allocate resources efficiently among old and new businesses, seems to be an impediment to serial entrepreneurs' agility in exploiting new business opportunities. Thus, the first part of hypothesis H2, stating that *a higher quality of the*

[26] The two-tailed t-test for the comparison of mean 'education' between novice and habitual entrepreneurs significantly rejects the equality and supports the superiority of habitual entrepreneurs. Results are reported in Appendix 2.

new business is associated to a higher likelihood of being habitual, is confirmed. The effect seems to be stronger for portfolio. In fact, three out of three proxies for business quality exert a positive impact on the likelihood to be portfolio, whereas only two proxies (innovation intensity and technical resources) exert a positive effect on the likelihood to be serial.

Unsurprisingly, the interaction between entrepreneurial skills and business quality in column 3 and 4 is positive and statistically significant for both serial and portfolio entrepreneurship. Holding other factors in the model constant, a high-skill combined with a high-quality business increases the multinomial log-odds to be a serial entrepreneur by 0.065 units, and to be a portfolio by 0.113 units. These findings support the second part of hypothesis H2, proposing that *high entrepreneurial skills combined with high business quality are positively associated with the likelihood of being a habitual entrepreneur.*

Regarding the impact of investment capital K, we consistently find a positive but almost zero effect on the probability to be habitual. This is consistent with our model, where capital does not play a direct role in the entrepreneur's occupational choice. Land ownership has a negative effect on the likelihood of being serial but a positive effect on the likelihood of being portfolio. Owning the land housing the main production facility would deter the motivation to re-launch a new venture to reap short-term profit opportunities, since owners can rent out the land they own to substitute for their entrepreneurial income. However, land ownership is favorable to business expansion for portfolio entrepreneurs. They can exploit different entrepreneurial opportunities on the land they own without any concerns for the rent or leasing-related risks. The statistically significant and positive parameters of the debt ratio in the portfolio equations indicate that indebted entrepreneurs are more likely to become portfolio since they can use their leverage conditions to undertake other profitable but risky investments.

With respect to control variables, while the current firm of serial entrepreneurs is larger in terms of the size of firm labor force than the one of novice counterparts, portfolio entrepreneurs have relatively smaller-sized firms, possibly because they own and run multiple

businesses. The effect of firm size is however non-linear. There is a consistent finding that younger firms and younger entrepreneurs are more likely to be habitual (but the effect is insignificant for serial entrepreneurs). Male entrepreneurs are more likely to take risks in expanding the current business (and thus become portfolio entrepreneurs), whereas female are more flexible and adaptive in learning from past failures to relaunch a new business (and thus become serial entrepreneurs). Serial entrepreneurs tend to have shorter tenure and portfolio ones have longer tenure in running their current businesses. Finally, the businesses of serial entrepreneurs are more likely to be private or limited liability companies, whereas portfolio entrepreneurs do not seem to favor any specific ownership type.

[Table 2 about here]

8.2 - The survival equation

We acknowledge the limitation that we cannot fully confirm the exit of individual entrepreneurs, since the code to trace the survival of observations is at firm-level. Thus, the survival of entrepreneurs is mainly reflected by the survival of their firms. Nevertheless, the survey has a question on the likelihood of a change in ownership, so we can also observe owner exit even if his firm is still operation. In other words, an entrepreneurial exit in our study means (i) the entrepreneur shuts down the business or (ii) he / she transfers the business (e.g., selling or retiring). This is in line with the definition of entrepreneurial exit by DeTienne (2010).

Figure 3 presents different graphs for the nonparametric estimation of firm survival in the sample. In Figure 3.a, the exit rate increases sharply for the first 4 years in business, then it is steadily flat around 4 years before falling sharply after 4 years. In other words, after 4 years remaining in their business, entrepreneurs are significantly less likely to close down their business. The Nelson-Aalen estimator in Figure 3.b serves to obtain the cumulative hazard function by summing up the values of the hazard functions over time. The Kaplan-Meier survival curve (Figure 3.c) presents the survival duration of the sample. It starts from 1 because

we have the full sample of firms at the beginning. Over time, they gradually exit the market, thus the curve steps downwards. There are around 75% of firms which are still in business after 2.5 years. After 6 years, this figure reduces to 25%. These findings confirming an empirical regularity largely supported in the relevant literature (cf., among others, Audretsch et al., 1999).

Figure 3.d presents the survival curves for businesses of novice, serial and portfolio entrepreneurs respectively. A test for the equality of the survival functions for the 3 groups of businesses rejects the null hypothesis of equality at 1% significance level.[27] The survival estimates for businesses of serial entrepreneurs are slightly longer than those of novice ones. Portfolio entrepreneurs, on the other hand, remain in their businesses much longer than their counterparts do. Nearly 75% of the portfolio entrepreneurs are still in business after 6 years. These findings confirm the first part of our hypothesis H3 (*portfolio entrepreneurs face longer survival time*). Moreover, the difference between serial and novice is small and serial tend to survive longer. The longer survival time of serial entrepreneurs could be due to the very high quality of the firm run by a serial entrepreneur or by her/his larger endowment of capital, in line with our Hypothesis H3. Estimates in section 8.1 have shown that habitual entrepreneurs tend to be associated to high business quality, although they do not seem to be systematically associated to higher capital investment than novice.

[Figure 3 about here]

Table 3 presents the estimation results of the semiparametric Cox model, the parametric Weibull model, and the discrete-time survival model. We present the results of the first 2 models in two specifications: coefficients (log hazard ratios) and exponentiated coefficients (hazard ratios). Results are generally quite consistent across models.

Ceteris paribus, habitual entrepreneurs remain in their business longer than novice ones do. Regarding entrepreneurial skills, while the length of education is significantly and negatively associated with an entrepreneur's propensity to shut down their business, industry

[27] chi2(2) = 165.14; Pr>chi2 = 0.0000

experience and management experience are surprisingly found to stimulate entrepreneurs to close their business sooner than their unexperienced peers. In particular, from the Cox model, compared to inexperienced entrepreneurs, those having industry experience may exit entrepreneurship at twice the hazard rate per unit time, or those with managerial experience will have higher hazard rate about 1.2 times.

To test the last part of hypothesis H3, we consider the three-way interaction among entrepreneurial skills, firm-level business quality, and the likelihood of being novice entrepreneurs. The statistically significant and negative parameters of the interaction across all methodological treatments indicate that, *ceteris paribus,* novice entrepreneurs have a stronger motivation to remain in their business if they have both high entrepreneurial skills and high business quality. However, considering the two-way interactions among our three interested variables, we find some influential results: (i) novice entrepreneurs being endowed with higher skills can maintain their business longer; but (ii) novice entrepreneurs owning high-quality business are more likely to exit the market; and (iii) highly-skilled entrepreneurs unsurprisingly have no reasons to exit entrepreneurship if they own a high-quality business. In order to find statistical evidences to either support or reject our hypothesis H3, we analyze marginal effects of a novice entrepreneur exiting entrepreneurship at two specific values of entrepreneurial skills and business quality that are one standard deviation above the mean and one standard deviation below the mean. We consistently find the negative and statistically significant relationship between being novice entrepreneurs with high skills and high business quality (one standard deviation above the mean) and exit rate. Therefore, *when owning a good-quality business, novice entrepreneurs with high entrepreneurial skills are less likely to exit entrepreneurship*, which is exactly our hypothesis H3.

Our survival analysis yields other interesting results. The technological quality of the firm plays a negative role in sustaining its survival. The hazard rate is almost 2.1 times higher for entrepreneurs with larger technological resources (Cox model). The relationship between

innovation intensity and the likelihood of survival is not necessarily positive, given that innovative firms tend to incur high sunk costs from large R&D investments, and operate in a very competitive market portions where the innovativeness of rivals might be even greater than theirs.

Another noteworthy finding is the consistent, negative and nonlinear effect of capital investment on firm exit (although not economically strong). Other things kept constant, more initial investment capital leads to higher survival propensity; but once an optimal level of investment capital is reached, a further increase in investment does not lead to a proportional increase in entrepreneurial survival.

[Table 3 about here]

Finally, heavily indebted entrepreneurs have a lower propensity of survival and larger (in terms of labor force) and younger firms are more vulnerable to bankruptcy, while older entrepreneurs seem to survive longer.[28]

9 - Conclusions

We studied why some entrepreneurs become serial or portfolio while others remain novice. We propose a theoretical model illustrating the occupational choice of a novice entrepreneur, given her/his entrepreneurial skills, the quality of the current business and the expected quality of the prospective future business. In equilibrium, an entrepreneur maintains her/his business if she/he is highly skilled and the business is sufficiently profitable. High – skill individuals tend to become serial entrepreneurs when they encounter a very profitable new

[28] We have also performed two robustness checks: one for the occupational choice equation and one for the survival equation. In the first one we have tried to separate the effects of different skills: education and managerial experience. We have distinguished serial entrepreneurs between those who launched a new business after closing their previous one and those who acquired an existing one. Literature (Parker and Van Praag, 2010) claimed that the first ones require education, whereas the second require managerial experience. We have then excluded those who acquired an existing enterprise and rerun the multinomial logit regression. In the second robustness check, we sort entrepreneurs according to their exit modality: some went bankrupt and some others sold their enterprise. While bankruptcy is typically attributed to skill and financial resources (or lack thereof), ownership transfer may not. We exclude those who sold their firm from the sample and rerun the survival analysis. The results of the two robustness checks (available upon request), are consistent with our main results.

opportunity. If skill is either low or medium, they tend to become portfolio entrepreneurs to mitigate the scarce productivity of their first business. While novice and serial entrepreneurs generally own good-quality firms, portfolio entrepreneurs can run both high and low-quality businesses.

We also analyzed the interaction between entrepreneurial skills and the quality of the new business of a habitual entrepreneur. We prove that a high quality of the new business (measured in terms of innovation intensity and share of technical and managerial employees in total employment) increases the likelihood that the entrepreneur becomes habitual, and that such a positive impact tends to be larger for portfolio entrepreneurs. Moreover, due to the complementarity between skills and firm quality in the profit function, the higher the entrepreneurial skills are, the larger is the positive impact of an increase in the quality of the new business on the likelihood to be a habitual entrepreneur. Finally, a highly-skilled novice entrepreneur facing a good-quality business tends to keep it.

Testing the relevance of our theoretical setting for Vietnam, we obtain some noteworthy findings that support our model propositions. First, there is a significant effect of entrepreneurial skills (proxied by education, industry experience, and managerial experience) in increasing the propensity of an occupational transition to habitual entrepreneurship. In addition, both serial and portfolio entrepreneurs are endowed with stronger human capital than their novice counterparts, and an increase in the quality of the new business increases the likelihood that it is run by a habitual entrepreneur, with a stronger incidence on portfolio entrepreneurs. Second, the interaction between entrepreneurial skills and business quality supports our theory that high skills and business quality are generally associated to a habitual entrepreneur. Third, novice entrepreneurs' motivation to remain in their business is stronger if they have both high entrepreneurial skills and rich technical and managerial resources.

Our empirical analysis unveils other interesting results. While the businesses of both serial and portfolio entrepreneurs are endowed with significant technological resources, only

portfolio entrepreneurs are more motivated to invest heavily in managerial resources for greater adaptability and to absorb knowledge spillovers in new industries / businesses. Investment capital does not seem to impact on the likelihood of habitual entrepreneurship. Land ownership and leveraging debts are favorable to business expansion activities of portfolio entrepreneurs only. Regarding survival, in general firms run by habitual entrepreneurs have a longer duration than those run by novice ones. Technological quality is negatively associated with firm survival, which is consistent with many studies supporting the low survival chance of young innovative companies or New Technology Based firms (e.g. Santarelli and Tran, 2016). Although these capabilities enable entrepreneurs to be responsive to dynamic changes in the market and thus transform their entrepreneurial efforts into observable material outcomes, they are quite costly and challenging to develop and manage, especially for inexperienced novice entrepreneurs. However, managerial expertise from the firm management team does help entrepreneurs lengthen their survival duration.

As in other Western advanced countries, habitual entrepreneurship is common in transition and developing countries (Smallbone and Welter, 2001; Akhter et al., 2016), including Vietnam. There are numerous avenues where further research is required to fully understand the theoretical and phenomenon-based aspects of both types of habitual entrepreneurship. Although we believe that the key findings of our study (i.e., habitual entrepreneurs possess higher entrepreneurial skills, higher business quality, and longer survival duration) could be generalized across other transition countries, their development might be limited by unstable macro-economic conditions and weak institutional mechanisms. In fact, it is largely acknowledged in the relevant literature that the institutional environment and the entrepreneurial ecosystem play important roles for shaping entrepreneurial behavior also in transition economies (Acs et al., 2008; Carbonara et al., 2016). Based on our and previous findings, we therefore plan to extend our research in three directions.

First, we would like to investigate how both formal and informal institutions influence the occupational choice of entrepreneurs. Second, we plan to analyze the linkage between habitual entrepreneurship and productive entrepreneurship with the aim of shedding light on how habitual entrepreneurs produce growth and contribute to the national economic development. Our model can in fact be further generalized to provide testable predictions about capital accumulation and firm growth/size.

Third and most important, we would like to study the case of entrepreneurs bouncing back from business failure. In the present analysis, we have not distinguished the motivations pushing an entrepreneur to become serial: learning from failure, experimenting with luck, or truly exploiting a newly-recognized opportunity. This will be a promising field for future research.

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Appendix 1: Proofs.

Proof of Proposition 1.
Differentiating expression (4) with respect to γ, the first order condition for the maximization of $V^P(q, s, \hat{q}, \gamma)$ is

$$qK^s\gamma^{*(s-1)} - \hat{q}[(1-\tau)K]^s(1-\gamma^*)^{s-1} = 0 \tag{A.1}$$

which can be rewritten as

$$\frac{\gamma^{(s-1)}}{(1-\gamma)^{s-1}} = \frac{\hat{q}}{q}(1-\tau)^s \tag{A.2}$$

Solving equation (A.1) for γ always yields an interior solution $\gamma^* \in (0,1)$. In fact, when $s < 1$, $R_1(\gamma) = \frac{\gamma^{(s-1)}}{(1-\gamma)^{s-1}}$ is always decreasing in γ, with $\lim_{\gamma \to 0} R_1(\gamma) = +\infty$, and $R_1(1) = 0$. Since the right-hand side of (A.2) is constant with respect to γ and positive, there will always exist a value $0 < \gamma^* < 1$ such that $\frac{\gamma^{(s-1)}}{(1-\gamma)^{s-1}} = \frac{\hat{q}}{q}(1-\tau)^s$.
The second – order condition for a maximum is

$$(s-1)qK^s\gamma^{s-2} + (s-1)\hat{q}(1-\tau)(1-\gamma)^{s-2} < 0 \tag{A.2}$$

Being $(s-1) < 0$, the second-order condition is always satisfied and γ^* is a maximum.
Finally, totally differentiating the first-order condition in (7) with respect to γ, $\hat{q}$ and τ yields

$$\frac{d\gamma^*}{d\hat{q}} = \frac{(1-\tau)^s(1-\gamma^*)^{s-1}}{\left[q\gamma^{*(s-2)} + \hat{q}(1-\tau)^s(1-\gamma^*)^{s-2}\right](s-1)} < 0 \tag{A.3}$$

since $(s-1) < 0$. Similarly

$$\frac{d\gamma^*}{dq} = -\frac{\gamma^{*s-1}}{\left[q\gamma^{*(s-2)} + \hat{q}(1-\tau)^s(1-\gamma^*)^{s-2}\right](s-1)} > \quad 0 \tag{A.4}$$

and

$$\frac{d\gamma^*}{d\tau} = \frac{\hat{q}(1-\tau)^{s-1}(1-\gamma)^{*s-1}}{\left[q\gamma^{*(s-2)} + \hat{q}(1-\tau)^s(1-\gamma^*)^{s-2}\right](s-1)} < \quad 0 \tag{A.5}$$

Thus, γ^* is increasing in q and decreasing in $\hat{q}$ and τ when $s < 1$.

Finally,

$$\frac{d\gamma^*}{ds} = -\frac{q\gamma^{*(s-1)}\ln(\gamma) - \hat{q}(1-\tau)^s(1-\gamma^*)^{s-1}[\ln(1-\gamma) + \ln[1-\tau)]}{\left[q\gamma^{*(s-2)} + \hat{q}(1-\tau)^s(1-\gamma^*)^{s-2}\right](s-1)} \tag{A.6}$$

being γ and $\tau \in (0,1)$, then all the natural logarithms in expression (A.6) are negative numbers. Therefore, the numerator is positive if $\hat{q}$ is large relative to q and τ is small. Given the minus sign in front of the r.h.s., a positive numerator implies that γ^* is increasing in s (since $s < 1$ and the denominator is negative). Vice-versa, the numerator is negative if $\hat{q}$ is small relative to q and τ is large. This implies that, in this case, γ^* is decreasing in s. ■

Proof of Proposition 2. Given $s = 1$, the value $V^P(q, s, \hat{q}, \gamma)$ in expression (4) is linear in γ and can be written as

$$V^P(q, 1, \hat{q}, \gamma) = \frac{qK}{1-\beta} - \frac{\beta(1-\gamma)K}{1-\beta}[q - (1-\tau)\hat{q}] \tag{A.7}$$

which is increasing in γ (and thus maximized at $\gamma = 1$) if $q \geq \hat{q}(1-\tau)$, whereas it is decreasing in γ (and thus maximized at $\gamma = 0$) if $q < \hat{q}(1-\tau)$. ■

Appendix 2: T-test on the equality of means of age, firm age, and education among novice, serial and portfolio; and tabulation of ownership types adopted by novice, serial and portfolio

[Table A2.a about here]
[Table A2.b about here]
[Table A2.c about here]
[Table A2.d about here]
[Table A2.e about here]
[Table A2.f about here]
[Table A2.g about here]

Appendix 3: The survival equation. A formal analysis

In this paper, we use three different estimation models: the nonparametric Kaplan-Meier estimator, the semi-parametric Cox proportional hazards regression, and the parametric Weibull model.

The *Kaplan-Meier estimator* is a nonparametric estimator of the survival function *S(t)*. If all the failure times are ordered and labeled $t_{(j)}$ such that $t_{(1)} \leq t_{(2)} \ldots \leq t_{(n)}$, the estimator is given by $\hat{S}(t) = \prod_{j|t_{(j)} \leq t}(1 - \frac{d_j}{n_j})$, where d_j is the number of entrepreneurs who exit at time $t_{(j)}$, and n_j is the number of entrepreneurs who are still in the business at the time and are therefore still "at risk" of experiencing *exit*.

The *Cox hazard function* for entrepreneur *i* is $h_i(t) = h_0(t)\exp(s_i\ q_i\ K_i, \theta)$, where $h_0(t)$ is the baseline hazard function when all covariates are zero. The parameters θ are estimated by maximizing the partial log likelihood given by $\sum_f \log(\frac{\exp(s_i\ q_i\ K_i, \theta)}{\sum_{i \in r(f)} \exp(s_i\ q_i\ K_i, \theta)})$, where the first summation is over all failures exit *f*, and the second summation is over all entrepreneurs *r(f)* who are still at risk at the time of failure.

The *Weibull model* assumes the Weibull distribution for T with parameters λ and p, denoted $T \sim W(\lambda, p)$, if $T^p \sim E(\lambda)$. The cumulative hazard is $H(t) = (\lambda t)^p$, the survivor function $S(t) = \exp(-(\lambda t)^p)$, and the hazard is $\lambda(t) = \lambda^p p t^{p-1}$. Both semi-parametric and parametric survival model are estimated by maximum likelihood estimation technique.

Appendix 4: **Summary statistics and matrix of correlation**

[Table A4 about here]

Figure 1: Individual Occupational Choices (s<1: Portfolio vs. Paid Work)

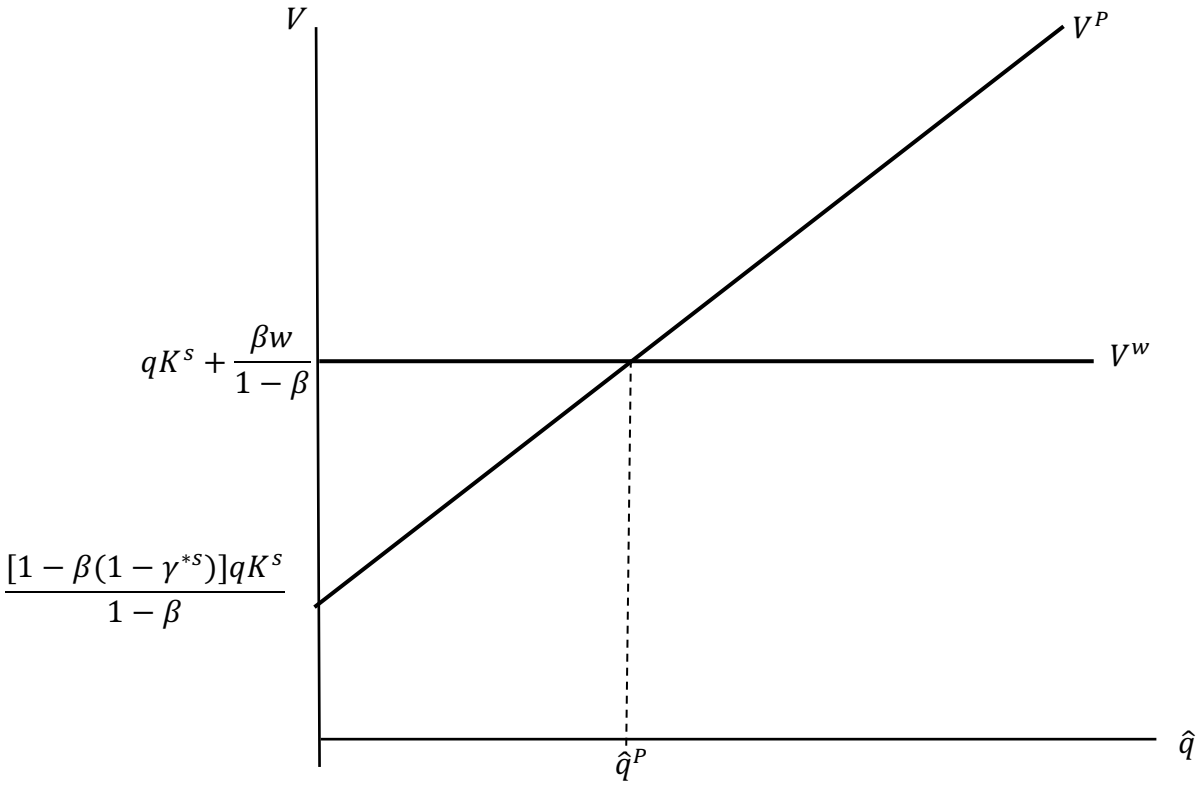
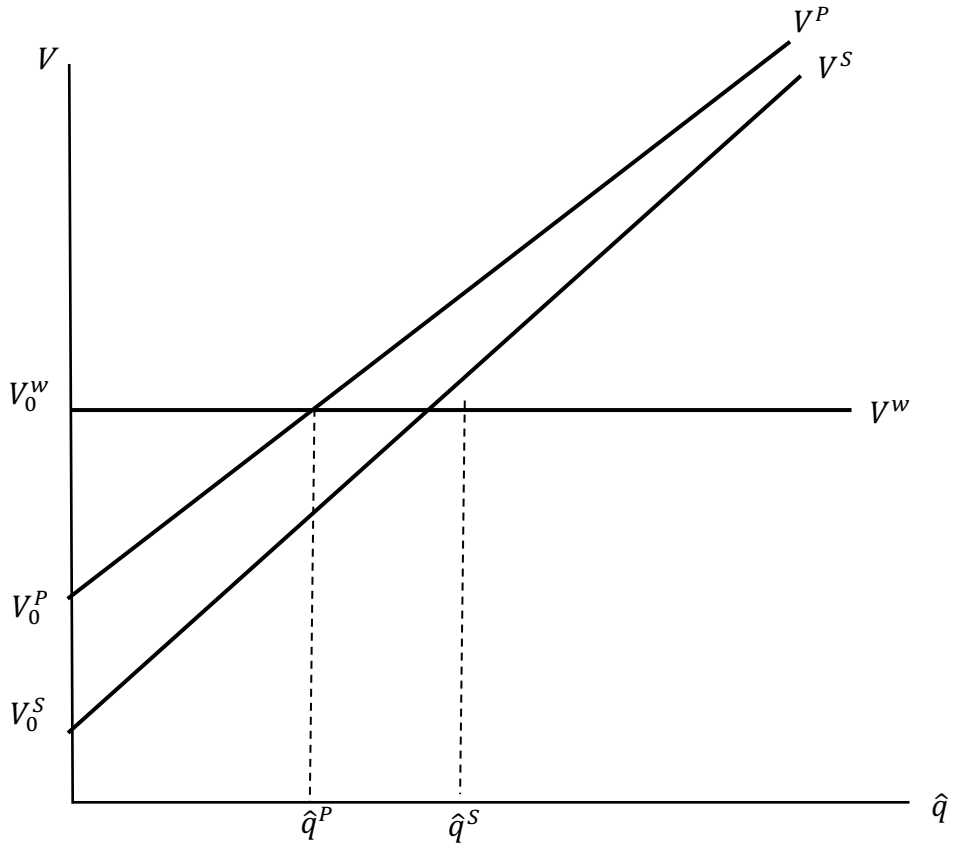


Figure 2: Entrepreneurs' Exit Decisions and Survival

(a)



(b)

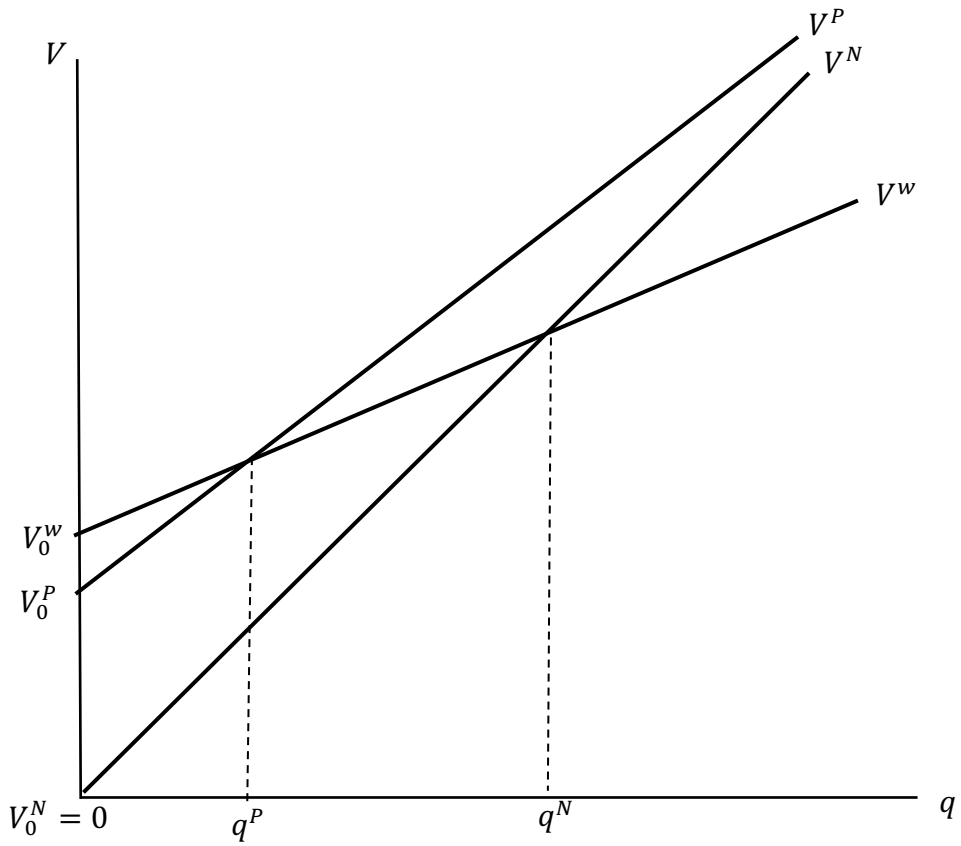
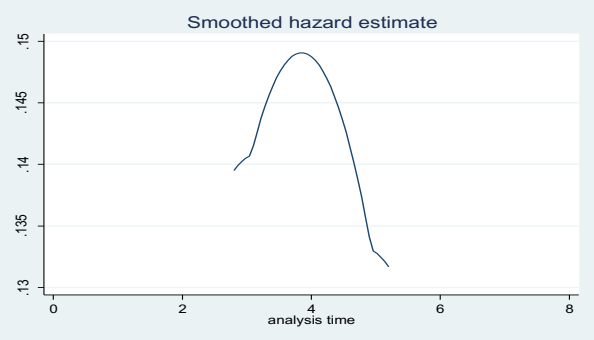
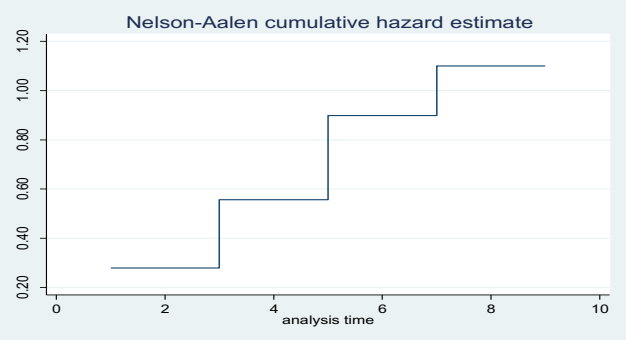


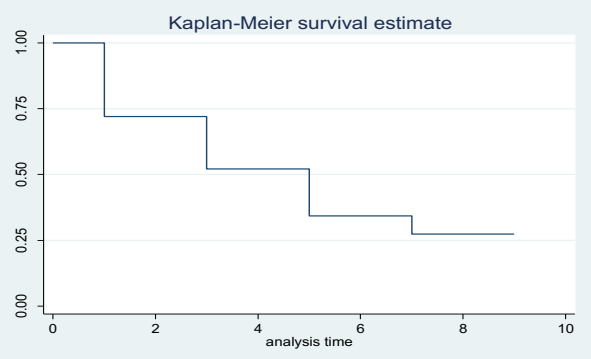
Figure 3: Survival analysis



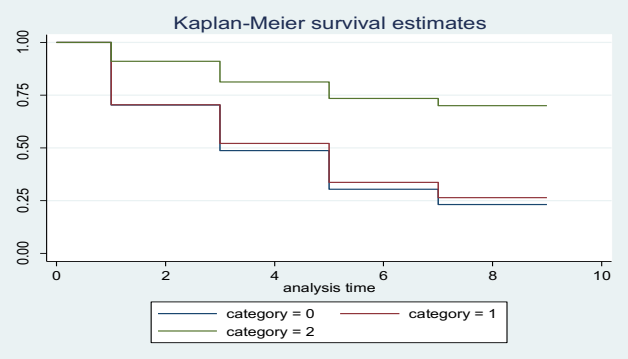
a. Graph of hazard ratio



b. Nelson-Aalen cumulative hazard curve



c. Kaplan-Meier survival curve



d. Kaplan-Meier survival curve for novice (category=0), serial (category=1), portfolio (category=2)

Table 1: Survival Overview

Survey		2002	2005	2007	2009	2011
Categories of surveyed firms	Surveyed firms in 2002	1050				
	Survivors from 2002		644			
	New entrants[29] in 2005		1706			
	Survivors from 2005			1663		
	New entrants in 2007			526		
	Survivors from 2007				1476	
	New entrants from 2009				534	
	Survivors from 2009					1097
	New entrants in 2011					729
Total analyzed firms		1050	2350	2189	2010	1826

[29] New entrants mean new firms entering the survey for the first time regardless of their type as novice, serial or portfolio.

Table 2: Occupational choice for novice entrepreneurs

Variables	Multinomial logit model			
	Serial	Portfolio	Serial	Portfolio
Schooling years	0.052** (0.007)	0.084** (0.013)	0.056** (0.008)	0.097** (0.015)
Industry experience	0.401** (0.055)	0.805** (0.084)	0.442** (0.061)	0.893** (0.089)
Labor market experience	-6.229** (0.189)	-1.305** (0.086)	-6.182** (0.191)	-1.208** (0.092)
Managerial experience	0.591** (0.118)	0.223* (0.094)	0.627** (0.120)	0.306* (0.156)
Innovation intensity	0.036 (0.091)	0.187 (0.141)	0.102 (0.097)	0.352* (0.151)
Innovation intensity squared	-0.0103 (0.018)	-0.037 (0.029)	-0.021 (0.019)	-0.063* (0.031)
Share of technical employees	5.064** (0.571)	9.239** (0.585)	5.513** (0.614)	10.048** (0.651)
Share of managerial employees	-0.486** (0.157)	1.188** (0.199)	-0.407* (0.162)	1.333** (0.205)
Entre skills * Business quality			**0.065* (0.028)**	**0.113** (0.039)**
Land ownership	-0.113* (0.048)	0.764** (0.087)	-0.112* (0.048)	0.768** (0.087)
Debt ratio	-0.127 (0.158)	0.451* (0.243)	-0.126 (0.158)	0.463* (0.243)
Investment capital	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)
Investment capital squared	-0.000 (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.000** (0.000)
Firm size	0.550** (0.086)	-1.149** (0.117)	0.553** (0.086)	-1.144** (0.117)
Firm size squared	-0.108** (0.017)	0.204** (0.021)	-0.110** (0.017)	0.198** (0.021)
Firm age	-0.000 (0.002)	-0.013* (0.006)	-0.004* (0.002)	-0.013* (0.006)
Age	-0.000 (0.002)	-0.009* (0.004)	-0.001 (0.002)	-0.009* (0.004)
Gender	-0.148** (0.051)	0.160* (0.086)	-0.174** (0.047)	0.158* (0.086)
Tenure	-0.008* (0.004)	0.045** (0.007)	-0.008* (0.004)	0.045** (0.007)
Private firms	0.286** (0.104)	-0.119 (0.178)	0.281** (0.106)	-0.125 (0.178)
Partnership / cooperatives	0.044 (0.159)	0.323 (0.249)	0.032 (0.159)	0.304 (0.247)
Limited liability	0.417** (0.102)	-0.155 (0.173)	0.414** (0.102)	-0.155 (0.173)
Joint stock	-0.252 (0.216)	-0.194 (0.304)	-0.265 (0.217)	-0.191 (0.303)
Intercept	-0.847** (0.186)	-3.424** (0.304)	-0.914** (0.188)	-3.601** (0.311)
Likelihood ratio test	$\chi^2(42) = 8658.99$**		$\chi^2(44) = 8668.81$	
No. of observations	16505		16505	

Note: *: significant at 5% level; **: significant at 1% level. Standard errors are in parentheses.

Table 3: Survival of entrepreneurs

Variables	Cox pro. hazard model		Weibull model		Discrete-time survival model (xtlogit)
	Log hazard rate	Hazard rate	Log hazard rate	Hazard rate	
Novice entrepreneurs	0.221* (0.096)	1.247* (0.120)	0.213* (0.096)	1.235* (0.119)	0.944** (0.189)
Schooling years	-0.024** (0.008)	-0.977** (0.008)	-0.026** (0.008)	-0.973** (0.008)	-0.081** (0.017)
Industry experience	0.547** (0.062)	1.729** (0.107)	0.546** (0.062)	1.726** (0.107)	1.087** (0.131)
Employee experience	-0.027 (0.073)	-1.027 (0.075)	-0.039 (0.073)	-1.039 (0.076)	-0.203 (0.144)
Managerial experience	0.337** (0.078)	1.401** (0.109)	0.368** (0.078)	1.446** (0.113)	0.921** (0.196)
Innovation intensity	0.203** (0.035)	1.225** (0.043)	0.219** (0.035)	1.244** (0.043)	2.562** (0.281)
Share of technical employees	0.736** (0.083)	2.089** (0.174)	0.768** (0.083)	2.157** (0.181)	4.223** (0.458)
Share of managerial employee	-1.184** (0.176)	-0.306** (0.053)	-1.222** (0.177)	-0.294** (0.052)	-1.366** (0.283)
Novice*Entre. skills*Bus quality	**-0.046* (0.016)**	**-0.898* (0.033)**	**-0.062* (0.027)**	**-0.994* (0.035)**	**-0.184 (0.126)**
Novice*Entre. skills	-0.085 (0.060)	-0.956 (0.065)	-0.185** (0.061)	-1.204** (0.074)	-0.068 (0.063)
Novice*Bus quality	0.061* (0.008)	0.104 (0.009)	0.211** (0.086)	1.234** (0.106)	0.088 (0.092)
Entre. skills*Bus quality	-0.019 (0.038)	-0.963 (0.037)	-0.033 (0.039)	-0.966 (0.038)	-0.335** (0.084)
Land ownership	0.164** (0.043)	1.178** (0.052)	0.165** (0.044)	1.180** (0.052)	0.941** (0.084)
Debt ratio	0.739** (0.121)	2.094** (0.252)	0.758** (0.122)	1.710** (0.203)	0.701** (0.126)
Investment capital	-0.000** (0.000)	-0.999** (0.000)	-0.000** (0.000)	-0.999** (0.000)	-0.000** (0.000)
Investment capital squared	0.000** (0.000)	1** (0.000)	0.000** (0.000)	1** (0.000)	0.000** (0.000)
Firm size	0.116** (0.025)	0.908** (0.002)	0.113** (0.026)	1.119** (0.029)	0.505** (0.059)
Firm age	-0.096** (0.003)	-0.908** (0.003)	-0.101** (0.003)	-0.904** (0.003)	-0.017** (0.004)
Age	-0.020** (0.002)	-0.979** (0.002)	-0.021** (0.002)	-0.979** (0.002)	-0.004 (0.004)
Intercept			-3.702** (0.179)	-0.025** (0.004)	-0.199** (0.317)
LR statistic	$\chi^2(18) = 2728.12$**		$\chi^2(18) = 3121.45$**		$\chi^2(18)$=419.46
Observations	4317		4317		18382

Note : *: significant at 5% level; **: significant at 1% level. Standard errors are in parentheses. 4317 observations

Table A2: Analysis of the statistical differences in age, firm age, and education among novice, serial and portfolio entrepreneurs

Table A2.a: Age - Novice and habitual entrepreneurs

Group	Mean	Std. Err.	Std. Dev.	95% Conf. Interval	
Novice	47.46	0.092	10.457	47.389	47.75
Habitual	46.291	0.131	9.915	46.036	46.547
Combined	47.175	0.075	10.309	47.027	47.322
Diff	1.277	0.163		0.958	1.597

t = 7.838 Degrees of freedom = 18668

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr (T < t) = 1.000 Pr (|T| > |t|) = 0.000 Pr (T > t) = 0.000

We can reject the hypothesis that the mean age of novice and habitual entrepreneurs are equal and support the alternative hypothesis that mean age of novice entrepreneurs is higher than that of habitual ones. In other words, habitual entrepreneurs averagely are younger than novice ones.

Table A2.b: Age - Serial and portfolio entrepreneurs

Group	Mean	Std. Err.	Std. Dev.	95% Conf. Interval	
Serial	46.035	0.143	9.991	45.755	46.316
Portfolio	47.687	0.313	9.377	47.072	48.303
Combined	46.291	0.131	9.915	46.036	46.547
Diff	-1.652	0.360		-2.358	-0.946

t = -4.587 Degrees of freedom = 5766

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr (T < t) = 0.000 Pr (|T| > |t|) = 0.000 Pr (T > t) = 1.000

We can reject the hypothesis that the mean age of serial and portfolio entrepreneurs are equal and support the alternative hypothesis that mean age of portfolio entrepreneurs is higher than that of serial ones. In other words, habitual entrepreneurs averagely are older than serial ones.

Table A2.c: Firm age – Novice and habitual entrepreneurs

Group	Mean	Std. Err.	Std. Dev.	95% Conf. Interval	
Novice	13.191	0.088	10.128	13.016	13.364
Habitual	13.709	0.142	10.789	13.431	13.987
Combined	13.349	0.075	10.338	13.201	13.497
Diff	-0.518	0.163		-0.838	-0.198

t = -3.173 Degrees of freedom = 18828

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr (T < t) = 0.001 Pr (|T| > |t|) = 0.002 Pr (T > t) = 0.9992

We can reject the hypothesis that the mean firm age of habitual and novice entrepreneurs are equal, and support the alternative hypothesis that mean firm age of habitual entrepreneurs is higher than that of novice ones. In other words, firms of habitual entrepreneurs averagely are older than those of novice ones.

Table A2.d: Firm age – Serial and portfolio entrepreneurs

Group	Mean	Std. Err.	Std. Dev.	95% Conf. Interval	
Serial	13.426	0.157	10.987	13.118	13.735
Portfolio	15.251	0.318	9.498	14.626	15.875
Combined	13.709	0.142	10.789	13.431	13.987
Diff	-1.824	0.392		-2.593	-1.055

t = -4.651 Degrees of freedom = 5764

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr (T < t) = 0.000 Pr (|T| > |t|) = 0.000 Pr (T > t) = 1.000

We can reject the hypothesis that the mean firm age of serial and portfolio entrepreneurs are equal and support the alternative hypothesis that mean firm age of portfolio entrepreneurs is higher than that of serial ones. In other words, firms of portfolio entrepreneurs averagely are older than those of serial ones.

Table A2.e: Education – Novice and habitual entrepreneurs

Group	Mean	Std. Err.	Std. Dev.	95% Conf. Interval

Novice	11.107	0.043	3.316	11.021	11.192
Habitual	11.653	0.031	3.476	11.593	11.713
Combined	11.484	0.025	3.438	11.435	11.533
Diff	0.545	0.054		0.439	0.652

t = 10.049 Degrees of freedom = 18682

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr (T < t) = 1.000 Pr (|T| > |t|) = 0.000 Pr (T > t) = 0.000

We can reject the hypothesis that the number of schooling years of novice and habitual entrepreneurs are equal and support the alternative hypothesis that the number of schooling years of habitual entrepreneurs is higher than that of novice ones. In other words, habitual entrepreneurs averagely have higher education than novice ones do.

Table A2.f: Education – Serial and portfolio entrepreneurs

Group	Mean	Std. Err.	Std. Dev.	95% Conf. Interval	
Serial	10.984	0.047	3.312	10.891	11.077
Portfolio	11.776	0.108	3.254	11.562	11.989
Combined	11.107	0.043	3.316	11.021	11.192
Diff	-0.791	0.120		-1.027	-0.556

t = -6.586 Degrees of freedom = 5768

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr (T < t) = 0.000 Pr (|T| > |t|) = 0.000 Pr (T > t) = 1.000

We can reject the hypothesis that the number of schooling years of serial and portfolio entrepreneurs are equal, and support the alternative hypothesis that the number of schooling years of portfolio entrepreneurs is higher than that of serial ones. In other words, portfolio entrepreneurs averagely have higher education than serial ones do.

Table A2.g: Tabulation of legal ownership

Types of entrepreneurs	Household	Private	Partnership	Ltd liability	Joint stock
Novice	73.93%	7.86%	3.47%	12.74%	1.96%
Serial	72.72%	9.02%	2.67%	14.07%	1.35%
Portfolio	74.94%	6.94%	2.91%	12.53%	2.24%%
Total	**73.67%**	**8.12%**	**3.24%**	**13.07%**	**1.81%**

In general, there is a consistent pattern of preference over legal ownership choices among novice, serial and portfolio entrepreneurs. More than 70% of sampled entrepreneurs regardless of their types adopt household ownership for their firms. The next common legal ownership type is limited liability, accounting for over 12% of sampled firms.

Table A3: **Summary statistics and matrix of correlation**

	Mean	Std. Dev	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1)	0.145	0.352	1.00															
(2)	0.271	0.444	-.003	1.00														
(3)	0.047	0.212	-.03*	0.002	1.00													
(4)	11.484	3.438	.015	.086*	0.01*	1.00												
(5)	0.310	0.462	0.02*	0.06*	0.04*	-.05*	1.00											
(6)	0.472	0.499	-.001	-.056*	-.03*	0.26*	.051*	1.00										
(7)	0.074	0.261	.057*	-.003	.001	0.17*	.018	0.11*	1.00									
(8)	0.235	0.742	.003	.014	.011	.039*	0.124*	0.018	.042*	1.00								
(9)	0.116	0.275	.055*	.023*	-.04*	-.11*	.161*	-.059*	.028*	-.065*	1.00							
(10)	0.218	0.209	-.05*	-.04*	.014*	-.09*	-.19*	-.05*	-.105*	-.127*	-.227*	1.00						
(11)	10.893	3.903	-.015	-.006	.013	.059*	-.012	.015	-.001	.079*	.041*	-.04*	1.00					
(12)	0.581	0.493	-.011	-.004	.061*	-.16*	-.036*	-.058*	-.057*	.009	.059*	.096*	-.05*	1.00				
(13)	0.075	0.157	.023*	0.001	.024*	.081*	-.003	.027*	.062*	.025*	.009	-.062*	.43*	-.056*	1.00			
(14)	1.827	1.064	.106*	.021*	-.07*	.318*	.039*	.099*	.205*	.06*	.075*	-.273*	.108*	-.212*	.182*	1.00		
(15)	45.39	10.43	.031*	-.06*	.011	-.06*	-.126*	.081*	.087*	-.024*	-.062*	.051*	.012	.052*	.019*	.013	1.00	
(16)	0.735	0.441	-.01*	-.05*	-.01	.095*	.03*	.08*	.016*	.019*	.05*	-.085*	.000	-.027*	-.01	.077*	.016	1.00

*Note: * significant at 1% level. Observations: 18850.*

(1) Exit; (2) Serial entrepreneurs; (3) Portfolio entrepreneurs; (4) Education (number of schooling years); (5) Industry experience; (6) Employee experience; (7) Management experience; (8) Innovation intensity; (9) The share of technical employees in the total labor force; (10) The share of managers in the total labor force; (11) Initial investment capital; (12) Land ownership; (13) Debt ratio; (14) Firm size; (15) Age; (16) Gender.