Switching Focus in New Business Enterprise: From a Survival to a Profit Orientation

by

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Author's declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

What objective should an entrepreneur focus on when starting a new business enterprise? Both a survival orientation and a profit one are important for the continuity of the new venture, but a survival focus is key in the hazardous early months or even years. In this thesis, I identify the conditions under which an entrepreneur should switch from a survival orientation, where the venture's likelihood of survival is more critical, to a profit orientation where the venture's profit instead is more critical.

I accomplish this task by determining the optimal time to switch from a survival to a profit orientation based on maximizing the entrepreneur's accumulated utility over a given time horizon. At each time period, the utility is positively associated with the amount of added value to the business venture that entrepreneur owns and manages, and the time horizon is determined by the time at which the entrepreneur's venture exit – for instance, it is being sold. That added value contains a planned portion (e.g., due to what the entrepreneur can control) and an unplanned portion. The portion of a firm's added value that is unplanned depends on the entrepreneur's orientation, whereby, at any time period, the expected added value and its variation are considered to be low under a survival orientation, but they are considered to be high under a profit orientation. I use an approach from the economics literature, known as the LEN model, where the use of an exponential utility function (E), a linear relationship between the utility and random effects (L), and normality of those random effects (N) allow me to transfer the probabilistic objective function into a certainty equivalent that makes the problem tractable.

The decision framework and its resulting findings suggest two environmental and two entrepreneurial characteristics that influence the existence of a time at which to switch

orientation from survival to profit. Based on these characteristics, I derive sixteen scenarios and discussed some of the necessary conditions for the existence of a switching time. I find that it is not straightforward to determine whether the orientation switch should be delayed or expedited as business environments (or entrepreneurial types) are compared. I thus further develop my analysis by adding more structure to the functional forms that underline the behavior of how the mean of and variation in the firm's added value are regulated over time, as well as for the risk propensity of the firm's owner. This exercise allow me to study the conditions under which the switching time should be delayed or expedited, and to numerically investigate the behavior of a firm's total valuation as changes occur in key model parameters.

I use franchising as an application of the sensitivity analysis I perform to identify whether a change in a model parameter (everything else being equal) should delay or expedite the orientation switch. Based on this application, I would advise entrepreneurs to switch their orientation later if they go into entrepreneurship as a franchisee rather than as a franchisor. A simulation analysis allows me to further propose a positive relationship between a firm's total valuation and the planned added value by the entrepreneur to that firm. That analysis also suggests a positive relationship between a firm's total valuation and the expected unplanned-added-value growth under a profit orientation, but a negative relationship under a survival orientation. Further, I find a positive relationship between total valuation and the variation in unplanned-added-value growth under a survival orientation, but a negative relationship under a profit orientation.

One of the key challenges that have been raised for future entrepreneurship research is how to define an entrepreneur's objective function. My thesis contributes to this debate by suggesting that, in the early years, there should be an orientation switch, that is, sequentially as opposed to simultaneously consider both survival and profit maximization. My thesis also contributes to the literature on firm growth because using risk-return tradeoffs to characterize the two orientations is unique in the entrepreneurial context, and so is the consideration of a sequential use of these orientations to study firm added value over time and the resulting accumulated total valuation. Characterizing each of the two orientations – survival and profit – based on risk-return tradeoffs and linking these orientations to firm growth open up new avenues for research in entrepreneurial decision making.

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I am indebted to many people for their thoughts, insights, engagement and feedback which helped me with transforming an interesting research question into the presented thesis. It is important to highlight the patience, support and guidance of Dr. Moren Lévesque who supervised this thesis as well as her continued encouragement.

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Dedicated to my family:

In appreciation of all their unlimited support and irreplaceable love

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1. Introduction

Entrepreneurs enter their selected markets in pursuit of profitability. Although it seems to be a reasonable goal, Schaffer (1989) suggests that it may not be a rational economic behavior for new business enterprises. Gilbert et al. (2006) point out that, with enough stability, profit maximization can be a justifiable goal for more established firms, but Storey (2000) argues that entrepreneurs involved in startups, instead, worry about the likelihood of survival of their new ventures. Startup owners are concerned about remaining in the market and trying to avoid bankruptcy. For instance, in Canada only 50% of new enterprises survive for three years, and only 20% survive for a decade (Baldwin et al., 2000). In the US, Headd (2003) maintains that failure rates are as high as 30% over the first two years of operations.

However, those that survive and grow become eventually able to think beyond survival. Then, a key decision is the timing at which an entrepreneur should switch from maximizing the venture's likelihood of survival to maximizing its profitability. In other words, when should there be a switch from a survival orientation to a profit orientation. This thesis theoretically addresses this question.

The identification of the right orientation is critical to a new firm. Dutta et al. (2001) design a model consisting of two diverse groups of firms where the firms in the first group exhibit a survival orientation and those in the second group a profit orientation. Given these two objective functions, they investigate the wealth controlled by each segment and show that, in equilibrium, the profit-oriented group, although smaller than the survival-oriented group, dominates in terms of wealth-controlled shares. In an earlier study, Schaffer (1989) maintained that whether or not a firm chooses to be profit oriented heavily depends on its dominance in the market. The selected objective function can also determine the role played by shareholders in the firm's investment decisions. Stockhammer (2006) argue that shareholders' strategies are often associated with reduced investment and reduced outputs, but increased profits. Moreover, switching orientation (from survival to profit maximization) at a suboptimal time can be fatal to a new firm because the switch may, for instance, increase production beyond the firm's capacity, raise prices before the market is ready, and/or force the firm to invest prematurely in new products (Gaskill et al. 1993).

To date, the literature has mostly considered profit maximization and survival maximization as two distinct orientations (as in, e.g., Radner 1995, Dutta et al. 2001). In other words, that stream of work has investigated the differences in firm behavior under either orientation. Although a few scholars have considered both orientations simultaneously (e.g., Choi et al. 2008), the present thesis offers a new point of view in that both profit and survival orientations are considered in the firm's growth process, yet sequentially.

I thus offer a utility-maximization framework where the owner of a startup firm wishes to establish the best time at which to switch orientation from survival to profitability. In line with Jensen (2002), who suggests that a firm's decisions be made so as to maximize that firm's market value, the owner optimizes her total utility until the firm exit (e.g., through a sell or a buyout), where, at any given time period, the higher the added value of the firm is, the higher the owner's utility. The firm's added value depends on the risk-return tradeoff faced by the owner and therefore on her orientation (i.e., being a survival maximizer versus a profit maximizer). In later years, the firm faces more fortune and, as a result, it can afford to take higher risks (Shapira and March 1992**,** Walls et al. 1996), which in turn is associated with higher financial returns (Lin et al. 1974, Walls et al. 1996, Raynor 2007). Consequently, in my decision framework, a survival orientation yields both lower risk and lower return than does a profit orientation.

By gaining a better understanding of the effects of different market environments on the time at which a firm should switch from a survival to a profit orientation, my findings can help entrepreneurs increase their odds of surviving during the early hazardous years. My focus on added value to the firm and firm valuation can also help both owner and financers of startup businesses shape their investment deals. Indeed, by being aware of what type of switching time (early or late) is imposed on the entrepreneurs in different markets, business angels and venture capitalists can make more accurate decisions about the money they invest and more precise predictions of their returns on investment. Entrepreneurs, on the other hand, can propose more realistic deals to their investors based on the market they enter. As for policy makers, they can be better informed on what may cause a premature orientation switch and set appropriate policies in order to encourage entrepreneurship.

2. Literature Review

Our formulation and analysis of the orientation switch touches upon multiple research streams. I first bring about the work on survival orientation in startup firms. I then contrast these studies with the work on profit orientation, which allow me to argue for the need of studying the timing decision to switch orientation. I also bring the literature on risk-return tradeoffs because such tradeoffs will result when the firm switches from a survival to a profit orientation.

2.1. Survival versus Profit Orientation

Scholars have considered survival as a firm's key focus. Some have defined a survival-orientated firm as one that maximizes its probability of not going bankrupt (e.g., Dutta et al. 2001, Radner 1991). Others have associated a survival orientation to maximizing the probability of positive profit or, more generally, maximizing the probability that profit exceeds a specified threshold (e.g., Lévesque and Zhao 2009). Although firms experiencing positive profit on a continuous basis will typically survive (Demsetz 1996), most new business enterprises are unprofitable in their early years of existence due to their early costly strategies for growth that often focus on investing (any profits, borrowed money, and/or invested funds) in R&D and marketing. In addition to bankruptcy and profit exceeding a threshold, survival has been considered in the empirical literature as a binary variable (success or failure). Murphy et al. (1996) review that literature. For instance, scholars have investigated the relationship between success/failure and return on net worth, which is the ratio of after-tax income to total assets minus total liabilities (Harris and Katz 1991).

However, Friedman (1953) argues that, to last in the market, a firm should emphasize profitability – a profit rather than a survival orientation, although this statement has received many criticisms including one from Radner (1995) who claims that a profit maximizer will fail in finite time, and one from Dutta and Radner (1999) who show that an entrepreneur who maximizes the expected sum of discounted dividends will fail in finite time. Nevertheless, a profit orientation is commonly used in theory and practice, where profit is measured as sales revenues minus the sum of various costs. For instance, Fuller (2008) uses sales revenues minus production and transportation costs, where the amount of production is regulated by the consumer's demand function and limited by firm capacity. Lévesque and Zhao (2009) also use this definition while considering the effect of a competitor's amount of production on the product's price, as well as goodwill and inventory costs. I offer in this thesis a new definition for a survival orientation and for a profit orientation that takes into consideration key tradeoffs associated with each of these two orientations.

Radner (1995) comments that a firm's probability of survival increases (with diminishing return) as that firm ages to eventually reach one. In an earlier empirical study, Evans (1987) finds that the positive relationship between survival and age holds for 83% of the studied industries. This positive relationship between the likelihood of survival and age suggests the existence of a time at which survival is no longer crucial. Consequently, it also suggests the need to understand an entrepreneur's timing decision to switch orientation (from survival to profit), and the conditions under which this orientation switch might need to be delayed or expedited.

2.2. Timing Decision for an Orientation Switch

Timing decisions are crucial to the success of newly formed enterprises because they are typically irreversible, such as the timing at which to enter a market. Finding the optimal time at which to enter a market has received wide scholarly interest at both the theoretical (modeling) and empirical levels. For instance, Armstrong and Lévesque (2002) investigate the time at which to stop product development activities and launch production in order to maximize a firm's profit. Lévesque and Shepherd (2004) study the combination of optimal market entry timing and optimal level at which to imitate other firms in key practices so as to minimize the loss of performance.

Benninga et al. (2005) characterize the time at which a firm should go public and the effect of that timing decision on firm value and associated risk. Choi et al. (2008) consider the level of the entrepreneur's ignorance as a determinant for the optimal time at which to switch from exploring a business opportunity to exploiting it (and make a major financial commitment) based on maximizing a linear combination of profit, mortality risk and exploration costs. Others have looked at the optimal time at which to adopt a new technology (e.g., Dutta et al. 1999, Chambers et al. 2009).

Nevertheless, I am unaware of works where both profit and survival orientations are considered in the firm's growth process, yet *sequentially* rather than simultaneously. This approach also allows me to consider different tradeoffs than those that are most important in other timing literature. For instance, Jovanovic and Lach (1989) articulate a market-entry tradeoff by arguing that early market entry of innovative product yields a higher revenue stream, but delaying market entry yields lower production cost due to vicarious learning (i.e., learning from the actions of other firms). I instead focus on the switch-orientation tradeoff born from the return and the risk a firm faces as it transfers from a survival to a profit orientation, as described next.

2.3. Risk-Return Tradeoff

With the modern portfolio theory, one can go back to Markowitz (1952) who shows how a rational investor maximizes the expected return of her portfolio using diversification. This theory models an investment's return as a random variable, where the variance of that return represents the investment risk. According to Markowitz, "the portfolio with maximum return is not necessarily the one with minimum variance. There is a rate at which the investor can gain expected return by taking on variance, or reduce variance by giving up expected return" (p. 79).

Since then, numerous empirical studies have investigated the relationship between the risk and then return that are faced in various financial activities. Ghysels et al. (2005) support a strong positive relationship between risk and return in the stock market. Goyal et al. (2003) have studied the relationship between return from the aggregate stock market and risk as either the average stock variance or the market risk. They find a positive relationship between that return and the average stock variance, but no significant relationship between return and market risk. More recently, Raynor (2007) views the risk-return tradeoff as a "strategy paradox." In other words, a paradox that is born from using a strategy that leads to a high likelihood of both significant returns and failure. Raynor suggests that a way to defeat this paradox may be by "creating and managing a portfolio of real options on the contingent elements of alternative optimal strategies" (p. 231).

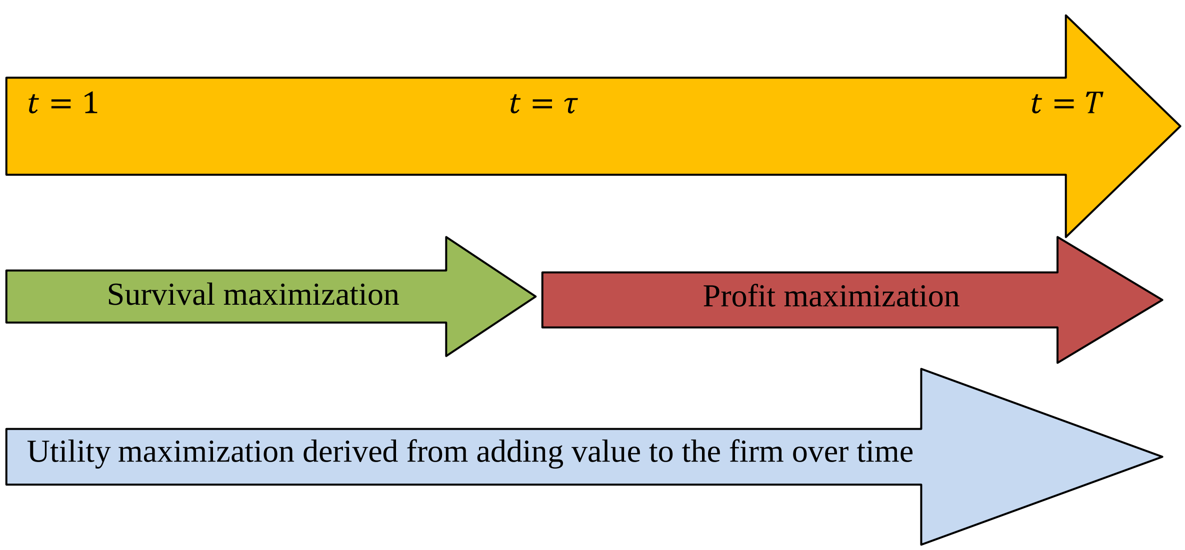
In line with this research, a survival orientation is likely to yield lower risk and lower return as compared to a profit orientation. I therefore offer next a mathematical model that characterizes conditions under which a unique time exists at which a startup firm should switch from a survival to a profit orientation, taking into consideration the differences in the risk-return tradeoff under these two orientations. When such a switch exists, this timing model also allows me to investigate what changes in key model parameters promote an earlier, or a later, time at which to switch orientation.

3. Decision Model

3.1. Narrative Description of the Timing Problem

Let me consider a startup owner, e, deriving utility from adding value to her firm over the life span of that firm (e.g., up to the time it is ready to be acquired). For instance, value is added when e secures additional funding, when she realizes successful R&D, and/or when she acquires new key customers. Detail on how value is added to the firm is unimportant for my analysis, but the orientation of e while adding value is. A survival orientation, whereby e tries to maximize the likelihood of survival of the new enterprise, is selected initially. After a certain time, say τ, however, e will likely wish to grow the business and hence switch focus to a profit orientation and, instead, try to maximize the profitability of the new enterprise. When, then, should this switch take place? Figure 1 offers a schematic representation of this switch.

Figure 1. Schematic representation of the orientation switch



The answer to that question is unobvious because the orientation selected by e determines the speed at which the firm changes its value over time. A survival orientation most likely leads to more conservative actions and hence lower profit potential than would a profit orientation. e's orientation further determines the variation in the firm's valuation growth. The more conservative actions under a survival orientation likely yield lower "shocks" on a firm's added value from one period to the next than a profit orientation does. Consequently, the risk-return combination is at smaller levels for both added value variance (risk) and added value expectation (return) if e is survival oriented than if she is profit oriented, which creates a tradeoff under both orientations.

This description illustrates how the switching time decision may lead to improved firm valuation and hence its owner's utility. The main question then becomes: Under what conditions will an optimal time to switch from a survival to a profit orientation exist? As described earlier, the timing decision will depend on the tradeoff over time between the expected added value to the firm and the variation of that added value. This risk-return tradeoff will be determined by the firm owner's orientation. But how is the owner's orientation switch identified exactly? And how would a change in any of the variables influencing the firm's added value affect that switching time? Intuitive reasoning cannot answer these questions. However, a formal version of the simple decision model I described can. The next subsection translates this intuitive narrative into a simple formal utility-maximizing decision model.

3.2. Formal Description of the Timing Problem

Let T be the firm's life span (e.g., the time at which it will be sold or bought out). For any time period t, $1 < t < T$, the added value to the firm is given by

$$w_t = v_t[1 + X_t], \tag{1}$$

where v_t represents the baseline added value to the firm at t, and X_t is the percentage of change in the firm's added value at t. X_t is assumed to be a normally distributed random variable whose mean and variance depend on whether the startup owner is survival oriented or profit oriented, as explained above. Hence, if τ represents the time at which the owner switches her orientation, then the mean of X_t is given by

$$\mu_{i,t} = \begin{cases} \mu_{s,t} & \text{if } t < \tau \\ \mu_{p,t} & \text{if } t \geq \tau \end{cases} \quad \text{with} \quad \mu_{s,t} < \mu_{p,t} \ , \tag{2}$$

and its variance by

$$\sigma_{i,t}^2 = \begin{cases} \sigma_{s,t}^2 & \text{if } t < \tau \\ \sigma_{p,t}^2 & \text{if } t \geq \tau \end{cases} \quad \text{with} \quad \sigma_{s,t} < \sigma_{p,t} \ , \tag{3}$$

where the index i equals s for a survival orientation and p for a profit orientation.

In a sense, X_t represents the unplanned growth at t in the firm's valuation, as opposed to the "planned" valuation growth via a change over time in the baseline added value v_t, that is, $\frac{dv_t}{dt}$. Hence, $\mu_{i,t}$ is the expected unplanned growth at t and $\sigma_{i,t}$ the variation of that unplanned growth. The expected unplanned growth and its variance also captured the risk-return tradeoff that is paramount in my analysis of the time at which to switch from a survival to a profit orientation. As I articulated in the literature review section, a survival-oriented startup owner likely takes actions that result in a lower risk level, but also a lower return (Penrose 1994) than a profit-oriented one. Consequently, $\mu_{s,t} < \mu_{p,t}$ and $\sigma_{s,t} < \sigma_{p,t}$, for any time period t.

I keep the model tractable by assuming that the startup owner obeys an exponential utility function $U(w_t) = -e^{-\alpha_t w_t}$, where w_t (firm added value at t) is a risky outcome (because X_t is uncertain) and α_t reflects the owner's risk propensity at t. The owner is assumed to be risk averse and thus $\alpha_t > 0$ for any t (which is consistent with existing literature, including

Iyigun and Owen 1998, Kihlstrom and Laffont 1979), and since she may exhibit a change in her risk aversion, I allow this parameter to vary over time. This utility function along with a normally distributed outcome (X_t and thus w_t) lead to a nice property of my model: For alternative w_t, the owner is indifferent between maximizing expected utility and selecting the maximum of $h_i(t) = E_i(w_t) - ½\alpha_t Var_i(w_t)$, where $E_i(\cdot)$ is the expectation and $Var_i(\cdot)$ the variance operators under orientation i, $i \in \{s,p\}$ (e.g., Freund 1956).

Until the firm exits (e.g., it is sold), the startup owner must choose the timing τ at which to switch from being survival oriented to being profit oriented in order to optimize the utility she gains from her firm's valuation. Firm valuation is given by

$$\int_0^\tau h_s(t)dt + \int_\tau^T h_p(t)dt \tag{4}$$

where $h_s(t) = E\left[w_t | \mu_{s,t}, \sigma_{s,t}^2\right] - \frac{1}{2}\alpha_t \, Var\left[w_t | \mu_{s,t}, \sigma_{s,t}^2\right]$

and $h_p(t) = E\left[w_t | \mu_{p,t}, \sigma_{p,t}^2\right] - \frac{1}{2}\alpha_t \, Var\left[w_t | \mu_{p,t}, \sigma_{p,t}^2\right]$.

From Eq. (1), Eq. (2) and Eq. (3), this is equivalent to

$\text{Max}_{\tau\geq 0}\, I(\tau) \equiv \text{Max}_{\tau\geq 0} \left\{\int_0^\tau v_t \left(\left[1 + \mu_{s,t}\right] - \frac{1}{2}\alpha_t v_t \, \sigma_{s,t}^2\right) dt + \int_\tau^T v_t \left(\left[1 + \mu_{p,t}\right] -\right.\right.$

12αtvt σp,t2dt .

(5)

(Note that I verified that the discounting of utility over time can be set to 1 without a loss of generality.)

I next analyze Eq. (5) to identify conditions under which a unique optimal orientation switch exists. This characterization is important because it allows me to discuss circumstances where a switch might, or not, be required. It also allows me to discuss the consequences on the switching time from a change in the business environment. Appendix A provides a summary of the notations.

3.3. Existence of an Orientation Switch

Based on Leibniz's formula,

$$\frac{\partial I}{\partial \tau} = -[\mu_{p,\tau} - \mu_{s,\tau}] + \frac{1}{2}\alpha_\tau v_\tau[\sigma^2_{p,\tau} - \sigma^2_{s,\tau}]. \tag{6}$$

A unique optimal switching time τ^* exists whenever $\frac{\partial I}{\partial \tau} = 0$ and the second order condition for optimality is satisfied, that is,

$$\frac{\partial^2 I}{\partial \tau^2} = -\left[\frac{d\mu_{p,\tau}}{d\tau} - \frac{d\mu_{s,\tau}}{d\tau}\right] + \frac{1}{2}\frac{d\alpha_\tau}{d\tau} v_\tau[\sigma^2_{p,\tau} - \sigma^2_{s,\tau}] + \frac{1}{2}\alpha_\tau v_\tau\left[\frac{d\sigma^2_{p,\tau}}{d\tau} - \frac{d\sigma^2_{s,\tau}}{d\tau}\right] + \frac{1}{2}\alpha_\tau \frac{dv_\tau}{d\tau}[\sigma^2_{p,\tau} - \sigma^2_{s,\tau}] < 0\,. \tag{7}$$

I am now in a position to characterize a set of three sufficient (but not necessary) conditions for the second order condition to hold and an initial condition for $\frac{\partial I}{\partial \tau} = 0$, which will guarantee the existence of τ^*. Specifically, Eq. (7) is satisfied if

$$\frac{d\mu_{p,\tau}}{d\tau} - \frac{d\mu_{s,\tau}}{d\tau} > 0, \tag{8}$$

$$\frac{d\sigma^2_{p,\tau}}{d\tau} - \frac{d\sigma^2_{s,\tau}}{d\tau} < 0, \tag{9}$$

$$\text{and} \quad \frac{d\alpha_\tau}{d\tau} v_\tau + \alpha_\tau \frac{dv_\tau}{d\tau} < 0. \tag{10}$$

Given Eq. (8) and Eq. (9), there exists a τ^* for which $\frac{\partial I}{\partial \tau} = 0$ as long as

$$0 < \mu_{p,0} - \mu_{s,0} < \frac{1}{2}\alpha_0 v_0[\sigma^2_{p,0} - \sigma^2_{s,0}]. \tag{11}$$

In other words, when comparing a profit orientation to a survival orientation, Eq. (8) requires an increasing behavior over time for the differential in the expected unplanned growths in added value. Eq. (9), instead, requires a decreasing behavior over time for the differential in the variation associated with these unplanned growths. The initial condition given by Eq. (11) guarantees that the two curves represented by the left-hand side of Eq. (8) and Eq. (9) are crossing, yielding a non-negative value of τ^*.

Eq. (10) sets conditions on the behavior of the startup owner's risk propensity and of her firm added value. For instance, if the owner becomes more risk averse as she develops her startup (i.e., $\frac{d\alpha_\tau}{d\tau} > 0$), then she will need to face a firm that experiences a decrease in its (baseline) added value, otherwise the switch might not be guaranteed. At a first glance, however, one would instead expect that the startup owner becomes less risk averse as time goes by as she learn and gain confidence; that is, $\frac{d\alpha_t}{dt} < 0$. Also, a pre-requisite for the desire to maximize profit and the switching time to occur is likely to be that the firm's added value grows over time and, as a result, $\frac{dv_t}{dt} > 0$. Taken together, these conditions mean that the startup owner becomes less risk averse as the fortune of the firm increases, which finds support in the literature (e.g., Shapira and March 1992, Walls et al. 1996).

The benefit of characterizing conditions for an orientation switch is that it allows me to conduct scenario analysis where these conditions hold, or not, under various model assumptions. I analyze such scenarios by first noting that they are differentiated by the behavior over the startup's development (i.e., time) of the (1) differential from a profit to a survival orientation in the rates of growth in the (expected) unplanned added value (i.e., Eq. 8), (2) differential from a profit to a survival orientation in the rates-of-growth variation in the unplanned added value (i.e., Eq. 9), (3) evolution of the planned added value, and (4) the evolution of the entrepreneur's risk propensity. Table 1 offers examples of dimensions that are environment driven – for (1) and (2) – and individual driven – for (3) and (4) – in order to characterize when the sign of these four behaviors should be negative or positive.

Table 1. Exemplifying the behavior of the four key characteristics

Sign of	+	–
$\frac{d\mu_{p,\tau}}{d\tau} - \frac{d\mu_{s,\tau}}{d\tau}$	When the size of the market is large and a profit orientation leads to greater investment in marketing efforts. (cell 1.1)	When the size of the market is small and a profit orientation leads to lesser investment in marketing efforts. (cell 1.2)
$\frac{d\sigma^2_{p,\tau}}{d\tau} - \frac{d\sigma^2_{s,\tau}}{d\tau}$	When the firm's product is high-tech and a profit orientation leads to greater investment in risky R&D efforts. (cell 2.1)	When the firm's product is low-tech and a profit orientation leads to lesser investment in risky R&D efforts. (cell 2.3)
$\frac{dv_\tau}{d\tau}$	When the entrepreneur can convince outside investors to continuously inject money in the business. (cell 3.1)	When the entrepreneur cannot convince outside investors to continuously inject money in the business. (cell 3.2)
$\frac{d\alpha_\tau}{d\tau}$	When the entrepreneur becomes more risk averse over time. (cell 4.1)	When the entrepreneur becomes less risk averse over time. (cell 4.2)

In Table 1, Cell 1.1 represents a business environment where the change over time in the expected unplanned growth in added value under a survival orientation is exceeded by the change over time in that growth under a profit orientation. In a good economy, these changes are likely to be positive (i.e., faster rates of growth, or convexity), whereas in a bad economy they could be negative (slower rates of growth, or concavity). But regardless of the state of the economy, that condition on the expected unplanned growth in a firm's added value can be satisfied when, for instance, the new enterprise enters a large market (e.g., local, national or international customers can easily be attracted to that market) because more opportunities become available to the profit-oriented entrepreneur. Indeed, over time a profit-oriented entrepreneur would likely invest (hers or others' money) more in marketing efforts than a survival-oriented entrepreneur would, and hence be able to capture greater shares of that large market, resulting in larger changes of its added-value growth. Cell 1.2, on the other hands, corresponds to an environment where the change over time in the expected unplanned growth in added value under a survival orientation exceeds the change over time in that growth under a profit orientation. In this case, note that, since $\mu_{s,t} < \mu_{p,t}$, the differential $\mu_{p,t} - \mu_{s,t}$ decreases and the two expected unplanned growths in added value are getting closer over time; in other words, the orientation no longer matters, everything else being equal. This can now be the case when the new enterprise faces limited demand (e.g., the product is only of interest to a minority) because the small market size would limit the benefits of relatively larger investments from the profit-oriented entrepreneur.

Cell 2.1 represents a business environment where the change over time in the variation of the unplanned-added-value growth under a survival orientation is exceeded by the change over time in that variation under a profit orientation. It can be the case, for instance, with high-tech products where the rapid change of technology over time requires more risky investments. Indeed, over time a profit-oriented entrepreneur would likely invest (hers or others' moneys) more in R&D than a survival-oriented entrepreneur would and hence encounter more technological challenges, resulting in larger changes in the variation in its added-value growth. Cell 2.2, on the other hands, corresponds to an environment where the change over time in the variation of the unplanned growth in the firm's added value under a survival orientation exceeds the change over time in that variation under a profit orientation. This can now be the case when the new enterprise focuses on low-tech products because it would limit the potential damages associated with relatively larger R&D investments from the profit-oriented entrepreneur.

Cell 3.1 represents an individual who plans to increase over time the (baseline) added value, which is non-random and hence viewed as an individual-based construct. That added value can be increased over time when, for instance, the startup owner's talent and charisma allow her to convince potential investors (e.g., angels and/or venture capitalists) to continuously inject money in the business. Cell 3.2 represents an individual who plans to decrease over time that added value, which can be the case when the startup owner chooses to "wean" herself from the dependence of outside investment and less and less additional money is injected in the firm over time. Cell 4.1 and cell 4.2 represent an individual who becomes either more or, respectively, less risk averse over time.

Table 2 portrays the 16 potential combinations based on the signs of the key behaviors exemplified in Table 1 from cell 1.1 to cell 4.2. To better illustrate the potential of Table 2, I discuss a few of the most representative of these 16 scenarios. I begin with Scenario 8 where the existence of an optimal switching time is ensured because the objective function in Eq. (5) is concave (assuming Eq. 11 holds). This is expected, for instance, in a business environment where the size of the market is large and the product is low-tech (as for many consumer goods), but where the startup owner cannot convince outside investors to continuously inject money in the business as she becomes less risk averse over time.

On the opposite side of the spectrum lies Scenario 16, where an optimal switching time does not exist, or it is immediate and a profit orientation should be adopted at the inception of the firm, because the objective function in Eq. (5) is convex. This scenario occurs, for instance, in a business environment where the size of the market is small, the product is high-tech, and the startup owner can convince outside investors to continuously inject money in the business as she becomes more risk averse over time.

Table 2. Scenario analysis on the existence of an optimal switching time

Scenario	Behavior of key characteristics: Environment driven: $\frac{d\mu_{p,\tau}}{d\tau} - \frac{d\mu_{s,\tau}}{d\tau}$	Environment driven: $\frac{d\sigma_{p,\tau}^2}{d\tau} - \frac{d\sigma_{s,\tau}^2}{d\tau}$	Individual driven: $\frac{d\nu_\tau}{d\tau}$	Individual driven: $\frac{d\alpha_\tau}{d\tau}$	Switch orientation?	Sufficient condition
1	+	–	+	–	It depends	Yes if Eq. (10) holds E.g., when the rate at which the entrepreneur becomes *less* risk averse over time is *fast* enough to overcome the weighted rate at which the firm's baseline added value *improves* over time
2	+	+	+	–	It depends	Yes if Eq. (7) holds E.g., when the rate at which the differential unplanned added value *increases* is sufficiently high to obtain concavity
3	+	–	+	+	It depends	Yes if Eq. (7) holds E.g., when the rate at which the differential unplanned added value *increases* is sufficiently high to obtain concavity
4	+	+	+	+	It depends	Yes if Eq. (7) holds E.g., when the rate at which the differential unplanned added value *increases* is sufficiently high to obtain concavity
5	+	–	–	+	It depends	Yes if Eq. (10) holds E.g., when the rate at which the entrepreneur becomes *more* risk averse over time is *slow* enough to be overcome by the weighted rate at which the firm's baseline added value *deteriorates* over time
6	+	+	–	–	It depends	Yes if $\alpha_\tau \left[\frac{d\sigma_{p,\tau}^2}{d\tau} - \frac{d\sigma_{s,\tau}^2}{d\tau}\right] + \frac{d\alpha_\tau}{d\tau}\left[\sigma_{p,\tau}^2 - \sigma_{s,\tau}^2\right] < 0$ E.g., when the rate at which the entrepreneur becomes *less* risk averse over time is *fast* enough to overcome the weighted rate at which the variation of unplanned added value *improves* over time
7	+	+	–	+	It depends	Yes if Eq. (7) holds E.g., when the rate at which the differential unplanned added value *increases* is sufficiently high to obtain concavity
8	+	–	–	–	Yes	Not applicable – the objective function in Eq. (5) is concave

9	–	–	+	–	It depends	Yes if Eq. (7) holds E.g., when the rate at which the differential unplanned added value *decreases* is sufficiently small to obtain concavity
10	–	–	–	+	It depends	Yes if Eq. (7) holds E.g., when the rate at which the differential unplanned added value *decreases* is sufficiently small to obtain concavity
11	–	+	–	–	It depends	Yes if Eq. (7) holds E.g., when the rate at which the differential unplanned added value *decreases* is sufficiently small to obtain concavity
12	–	–	–	–	It depends	Yes if Eq. (7) holds E.g., when the rate at which the differential unplanned added value *decreases* is sufficiently small to obtain concavity
13	–	+	+	–	It depends	Yes if Eq. (7) holds E.g., when the rate at which the differential unplanned added value *decreases* is sufficiently small to obtain concavity
14	–	–	+	+	It depends	Yes if Eq. (7) holds E.g., when the rate at which the differential unplanned added value *decreases* is sufficiently small to obtain concavity
15	–	+	–	+	It depends	Yes if Eq. (7) holds E.g., when the rate at which the differential unplanned added value *decreases* is sufficiently small to obtain concavity
16	–	+	+	+	No	Not applicable – the objective function in Eq. (5) is convex

The other scenarios are less straightforward because whether or not an orientation switch should occur becomes conditional. Scenario 1, for instance, can characterize an environment where the size of the market is large, the product is low-tech, the startup owner can convince outside investors to continuously inject money in the business as she becomes less risk averse over time. However, in that scenario the rate at which the entrepreneur becomes less risk averse over time is required to be fast enough to overcome the weighted rate at which the firm's baseline added value improves over time (i.e., Eq. 10 holds true to obtain concavity for the objective function in Eq. 5). The rationale for this additional condition is that the entrepreneur may be discouraged to switch to a profit orientation and face more risk (i.e., variation in unplanned-added-value) when she can easily obtain money to be injected in the firm. But this outcome can be overcome by the entrepreneur becoming rapidly less and less risk averse over time. Similarly, Scenario 5 can characterize an environment where the size of the market is large, the product is low-tech, but the startup owner cannot convince outside investors to continuously inject money in the business as she becomes more risk averse over time. In that scenario, the rate at which the entrepreneur becomes more risk averse over time is required to be slow enough to be overcome by the weighted rate at which the firm's baseline added value deteriorates over time.

4. Sensitivity Analysis

4.1. Earlier versus Later Orientation Switch

When a unique optimal switching time exists, I am able to discuss the consequence on that switching time from a change in a key model construct. But to do so, I need to add some structures to the decision problem. In order words, I must specify the functional form of the planned (baseline) added value to the firm (v_t), the expected unplanned growth ($\mu_{i,t}$) in added value under both orientations, the variation of that unplanned growth ($\sigma_{i,t}$) under both orientations, and the risk propensity (α_t). Specifically, I investigate whether the switch from a survival orientation to a profit orientation should occur earlier or later when there is an increase in a parameter on which these functional forms depend.

For simplicity of exposition, I use linear functions. Let

$$v_t = a_v + b_v t;$$

$$\mu_{s,t} = a_{\mu_s} + b_{\mu_s} t \quad \text{and} \quad \mu_{p,t} = a_{\mu_p} + b_{\mu_p} t;$$

$$\sigma^2_{s,t} = a_{\sigma^2_s} + b_{\sigma^2_s} t \quad \text{and} \quad \sigma^2_{p,t} = a_{\sigma^2_p} + b_{\sigma^2_p} t;$$

$$\alpha_t = a_\alpha + b_\alpha t.$$

From a comparative statics analysis (e.g., Varian 1992: 492), with a change in any parameter θ, the optimal switching time τ^* changes according to

$$\frac{d\tau^*}{d\theta} = \left[\frac{\partial^2 I(\tau^*;\theta)}{\partial\tau\,\partial\theta}\right] \Big/ \left[-\frac{\partial^2 I(\tau^*;\theta)}{\partial\tau^2}\right].$$

It follows that, under Eq. (7), the denominator is positive and therefore the sign of $\frac{d\tau^*}{d\theta}$ equals that of $\frac{\partial^2 I(\tau^*;\theta)}{\partial\tau\,\partial\theta}$. From Eq. (6), it is straightforward to verify that $\frac{\partial^2 I(\tau^*;a_v)}{\partial\tau\,\partial a_v} > 0$,

$\frac{\partial^2 I(\tau^*; b_v)}{\partial\tau\, \partial b_v} > 0$, $\frac{\partial^2 I(\tau^*; a_{\mu_s})}{\partial\tau\, \partial a_{\mu_s}} > 0$, $\frac{\partial^2 I(\tau^*; b_{\mu_s})}{\partial\tau\, \partial b_{\mu_s}} > 0$, $\frac{\partial^2 I(\tau^*; a_{\mu_p})}{\partial\tau\, \partial a_{\mu_p}} < 0$, $\frac{\partial^2 I(\tau^*; b_{\mu_p})}{\partial\tau\, \partial b_{\mu_p}} < 0$,

$\frac{\partial^2 I(\tau^*; a_{\sigma_s^2})}{\partial\tau\, \partial a_{\sigma_s^2}} < 0$, $\frac{\partial^2 I(\tau^*; b_{\sigma_s^2})}{\partial\tau\, \partial b_{\sigma_s^2}} < 0$, $\frac{\partial^2 I(\tau^*; a_{\sigma_p^2})}{\partial\tau\, \partial a_{\sigma_p^2}} > 0$, and $\frac{\partial^2 I(\tau^*; b_{\sigma_p^2})}{\partial\tau\, \partial b_{\sigma_p^2}} > 0$. I next present formally and discuss these relationships.

Proposition 1 (added value and switching time). The time at which to switch from a survival orientation to a profit orientation should be later with an increase in

(a) the initial ($t = 0$) added value to the firm (i.e., a_v is increased);

(b) the marginal baseline added value to the firm (i.e., b_v is increased);

(c) the initial expected unplanned growth in added value under a survival orientation (i.e., a_{μ_s} is increased);

(d) the marginal expected unplanned growth in added value under a survival orientation (i.e., b_{μ_s} is increased);

but a decrease in

(e) the initial expected unplanned growth in added value under a profit orientation (i.e., a_{μ_p} is decreased);

(f) the marginal expected unplanned growth in added value under a profit orientation (i.e., b_{μ_p} is decreased).

Part (a) and part (b) of Proposition 1 refer to a situation in which an increase in the baseline added value delays the switching time, everything else being equal. The reason for this positive relationship stands from the fact this (riskless) added value can compensate for lower returns under a survival orientation, which results in a longer time period at which the firm can afford a survival orientation. In part (c) and part (d), an increase in the expected unplanned growth in added value under a survival orientation also delays the switching time from a survival to a profit orientation, everything else being equal. This is the case because, again, this increased growth in added value can compensate for lower returns. In part (e) and part (f), on the other hand, the firm can afford a survival orientation for a longer period of time when it experiences a decrease in the expected unplanned growth in added value under a profit orientation because profit orientation then becomes less attractive.

Proposition 2 (added value variation and switching time). The time at which to switch from a survival orientation to a profit orientation should be later with an increase in

(a) the initial variation in the unplanned growth in added value under a profit orientation (i.e., $a_{\sigma_p^2}$ is increased);

(b) the marginal variation in the unplanned growth in added value under a profit orientation (i.e., $b_{\sigma_p^2}$ is increased);

but a decrease in

(c) the initial variation in the unplanned growth in added value under a survival orientation (i.e., $a_{\sigma_s^2}$ is decreased);

(d) the marginal variation in the unplanned growth in added value under a survival orientation (i.e., $b_{\sigma_s^2}$ is decreased).

In part (a) and part (b) of Proposition 2, when the variation in the unplanned growth in added value under a profit orientation increases, everything else being equal, switching to a profit orientation becomes less attractive and the entrepreneur should wait because it faces less risk under a profit orientation. What also makes the switch less attractive, as in part (c) and part (d), is a decrease in the variation in the unplanned growth in added value under a survival orientation. The next proposition is intuitive since a more risk-averse startup owner will be less attracted to switch as she will face more risk under a profit orientation.

Proposition 3 (risk propensity and switching time). The time at which to switch from a survival orientation to a profit orientation should be later with an increase in

(a) the initial risk propensity (i.e., a_α is increased);

(b) the marginal risk propensity (i.e., b_α is increased).

4.2. The Effects of Franchising

To illustrate how Propositions 1 to 3 can be used, I investigate if the orientation switch should occur earlier or later when the entrepreneur is a franchisee as compared to being a franchisor. A franchise is "[a] form of business organization in which a firm which already has a successful product or service (the franchisor) enters into a continuing contractual relationship with other businesses (franchisees) operating under the franchisor's trade name and usually with the franchisor's guidance, in exchange for a fee" (investorwords.com). One of the recognized key differences between being a franchisee and a franchisor (i.e., an independent business owner) is the lower risk of failure faced by franchisees (e.g., Castrogiovanni et al. 1993). Unlike the franchisor that can provide new offerings, franchisees must limit their level of innovativeness (Kaufmann and Dant 1999) and as such are likely to experience less risk (Hisrich et al., 2006). For instance, they face less production risk as the product is already developed for them, or less marketing risk as the market has already been identified for them. For the franchisor, on the other hand, an important advantage is her ability to grow rapidly.

Therefore, in the context of my decision framework, I first observe that a franchisee faces less variation in the unplanned-added-value growth under both orientations than the franchisor does. Second, the franchisee's unplanned-added-value growth under a survival orientation is higher than that of the franchisor because, by taking advantage of the trade name, the franchisee needs not to introduce the product to the market. However, the franchisor's unplanned-added-value growth under a profit orientation is higher than that of the franchisee since the former faces higher growth opportunities. Third, at least initially, franchisees are expected to be more risk averse than franchisors since they chose a type of business where they face less risk (Morrison et al. 1999). Table 3 summarizes the impacts of these observations based on Propositions 1 to 3 and proposed that the franchisee switches from a survival to a profit orientation later then the entrepreneur. Note that, since I have no evidence to support whether the franchisee's rate of change in risk propensity over time or the planned added value are distinct from that of the franchisor, these parameters are assumed to be of comparable values.

Table 3. Orientation switch and franchising

	$\mu_{s,t}$		$\mu_{p,t}$		$\sigma^2_{s,t}$		$\sigma^2_{p,t}$		α_t		v_t	
	a_{μ_s}	b_{μ_s}	a_{μ_p}	b_{μ_p}	$a_{\sigma^2{}_s}$	$b_{\sigma^2{}_s}$	$a_{\sigma^2{}_p}$	$b_{\sigma^2{}_p}$	a_α	b_α	a_v	b_v
Franchisee	D	D	D	D	D	D	E	E	D	NA	NA	NA
Franchisor	E	E	E	E	E	E	D	D	E	NA	NA	NA

E: expedite; D: delay

Propositions 1 to 3 can also be used to investigate the behavior of the firm's total valuation as changes occur in a key model parameter. This investigation cannot, however, be done analytically given the need for a closed-form solution for the optimal switching time, which must be incorporated into the objective function of the startup owner. Nevertheless, it can be done numerically to provide some conjectures on the sensitivity of a firm's total valuation. I therefore end the analysis of this orientation-switch problem with a simulation analysis of firm valuation behavior.

5. Firm Valuation Behavior: A Simulation Approach

5.1. Simulation Specifics

In this section I investigate the effect of key model parameters on the total valuation of the firm based on Scenario 8 in Table 2 (to ensure the existence of an optimal switching time). The optimal switching time is obtained from maximizing the total utility gained by the added value to the firm over the planning horizon $[0,T]$. I use MATLAB to simulate added firm values and utility accumulation over time (the detailed coding appears in Appendix B). The continuous accumulation of added firm values is represented by the summation of discrete time periods $t \in [0,100]$, i.e. T = 100. A time period t can be thought of as the number of months, which yields a horizon of a little over 8 years. For each analysis presented below, the simulation is repeated 100 times and I take the average value of total valuation over these 100 runs.

I selected numerical values for the parameters that were consistent with data on 5000 newly established enterprises, as per Inc. Magazine (2008). The median amount of capital used to launch these businesses was USD$25,000, which I use as the initial valuation (to be added to the accumulated firm's added values w_t). The median growth rate of these firms was 147% over three years, which yields a monthly average added value of about USD$320 ($0.47 \times 25000 = 11750 \div (3 \times 12) = 326$ $). This amount was used to estimate the average added value over the 100 periods, which allowed me to find a reasonable set of numerical values for a_v, b_v, a_{μ_s}, b_{μ_s}, a_{μ_p} and b_{μ_p}. These values are offered in Table 4, along with the variation parameters, $a_{\sigma_s^2}$, $b_{\sigma_s^2}$, $a_{\sigma_p^2}$ and $b_{\sigma_p^2}$. For risk propensity (α), Freund (1956: p.258) comments that "[t]he estimation of the risk aversion constant α is a purely subjective task, and any chosen value is exceedingly difficult to defend." To keep the analysis manageable I assumed α to be constant over time and, to ensure proper calibration, I conducted a preliminary analysis (please refer to Appendix C for details) to find the best possible values for α to be 1. In other words, the values for a_α and b_α are 1 and 0, respectively.

Table 4. Selected parameter values for the base case

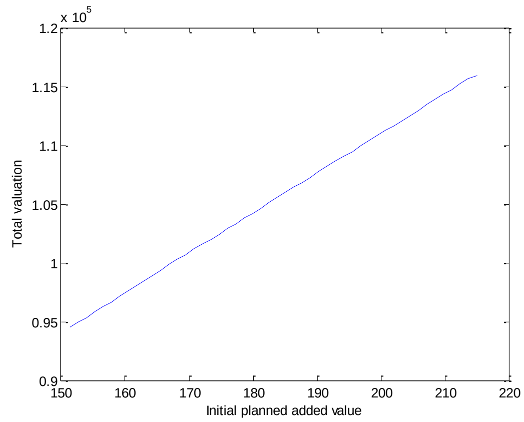
Parameters	Value	Value range
a_{μ_s}	0.6	NA
b_{μ_s}	0.0015	0.001 to 0.002
a_{μ_p}	0.7	NA
b_{μ_p}	0.002	0.0015 to 0.0025
$a_{\sigma_s^2}$	0.003	NA
$b_{\sigma_s^2}$	0.0003	0.00028 to 0.0003049
$a_{\sigma_p^2}$	0.005	NA
$b_{\sigma_p^2}$	0.000285	0.00028 to 0.0003075
a_v	200	150 to 220
b_v	-0.5	NA
a_α	1	NA
b_α	0	NA

*units are in dollars

5.2. Analysis

Figure 2 suggests a positive relationship between total valuation and the initial planned added value a_v, everything else being equal. This positive relationship is expected because an increase in a_v pushes upward the accumulated valuation at any time periods. As a result, regardless on when the orientation switch occurs, total valuation is improved. Therefore, startup owners who are able, for instance, to initially secure more funding are expected to experience higher valuation for their business ventures when comes time to exit (i.e., sell the business).

Figure 2. Total valuation and planned added value



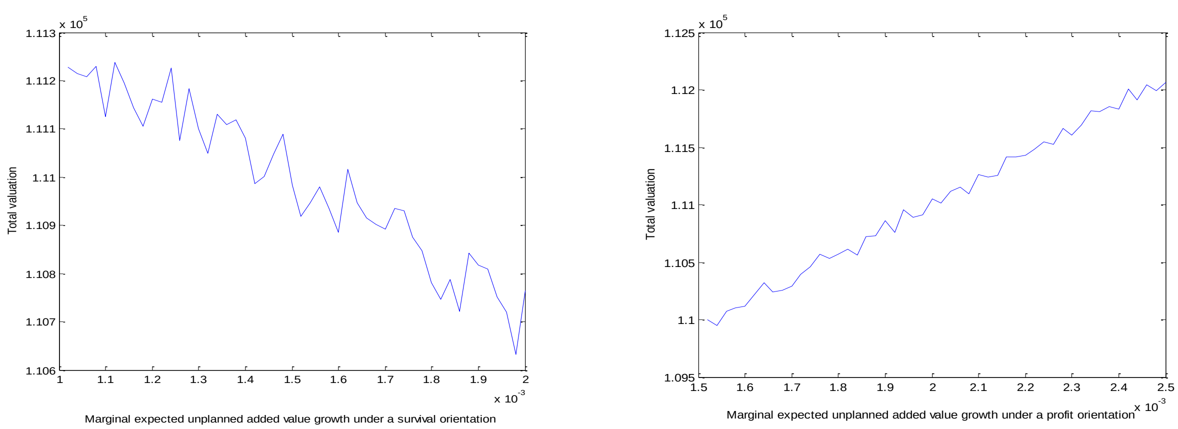
In Figure 3(a), an increase in the marginal expected unplanned growth in added value under a survival orientation b_{μ_s} pushes down total valuation, everything else being equal. The rational for this behavior goes as follows. An increase in the marginal expected unplanned growth in added value under a survival orientation encourages the startup owner to switch orientation later than before that increase (Proposition 1d). Consequently, the larger unplanned growth in added values faced under a profit orientation start later and the summation of firm valuations over time augments at a slower pace than prior to that increase in a_{μ_s}, resulting in a smaller total valuation. Startup owners who can grow their firm value faster under a survival orientation are thus advised to stick longer to their survival focus (because it provides them with more utilities, which not only takes returns/valuation in to consideration but also risk), but at the cost of experiencing a smaller valuation for their firms when comes time to exit.

In Figure 3(b), on the other hand, an increase in the marginal expected unplanned growth in added value under a profit orientation b_{μ_p} pushes upward total valuation, everything else being equal. First, I note that there will be an earlier orientation switch when b_{μ_p} is increased (Proposition 1f). Consequently, the larger unplanned growth in added values faced under a profit orientation start earlier and the summation of firm valuations over time augments at a faster pace than prior to that increase in b_{μ_p}, resulting in a larger total valuation. Startup owners who can grow their firm value faster under a profit orientation are thus advised to not stick as long to a survival focus (because it provides them with less utilities), but even at the cost of facing more risk they will experience higher valuation for their firms when comes time to exit.

Note that the fluctuations in total variation with respect to a change in these marginal growths in expected unplanned-added-value growth are more pronounced under a survival than a profit orientation. The reason lies in the fact that, to satisfy the sufficient conditions for concavity (Table 2), the variation in the unplanned-added-value growth under a survival orientation exceeds that variation under a profit orientation.

Figure 3. Total valuation and marginal expected unplanned added value growth

(a) under a survival orientation **(b) under a profit orientation**

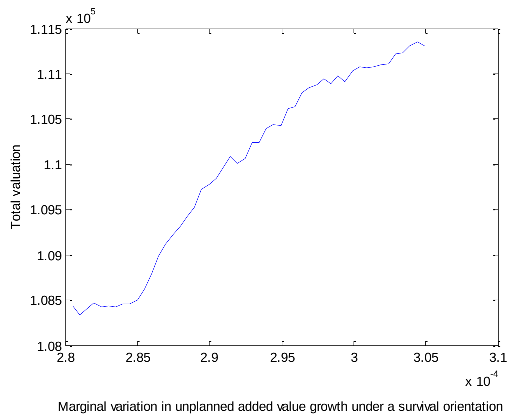


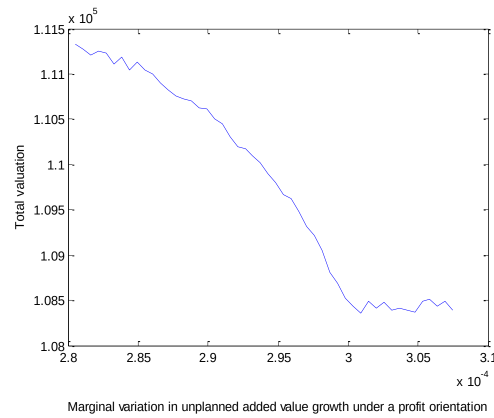
Lastly, Figure 4 portrays the behavior of total valuation when the marginal variation in unplanned-added-value growth changes. In Figure 4(a), an increase in that marginal variation under a survival orientation ($b_{\sigma_s^2}$) boosts the total valuation, although at a diminishing rate. The rationale for this behavior goes as follows. An increase in $b_{\sigma_s^2}$ encourages the startup owner to switch orientation earlier than before that increase (Proposition 2d). Since the startup owner enjoys higher unplanned-added-value growth under a profit orientation, this earlier switching time allows for a larger expected accumulation of added values, and hence a higher total valuation. As for the decreasing returns, note that, as $b_{\sigma_s^2}$ increases enough for the variation in unplanned-added-value growth under a survival orientation to reach the level of that variation under a profit orientation, the benefit to total valuation starts to wash out. Startup owners who face more volatility in the value that can be added to their firm under a survival orientation are thus advised to not stick as long to their survival focus as those who face less volatility (because they can now afford to let go of the lesser returns under the survival orientation), and enjoy an expected higher valuation for their firms when comes time to exit.

In Figure 4(b), on the other hand, an increase in that marginal variation in unplanned-added-value growth under a profit orientation ($b_{\sigma_p^2}$) damages the total valuation. This is the case because an increase in $b_{\sigma_p^2}$ encourages the startup owner to switch orientation later than before that increase (Proposition 2b). Since again the startup owner enjoys higher unplanned-added-value growth under a profit orientation, this later switching time results in a slower expected accumulation of added values, and hence a lower total valuation. However, when that variation becomes quite large, the orientation switch from survival to profit never takes place (i.e., $\tau^* = 100$) and the total valuation stabilizes to its lowest value (because valuation accumulates slower under a survival orientation). Startup owners who face more volatility in the value that can be added to their firm under a profit orientation are thus advised to stick longer with their survival focus and face a lesser risk, but at the cost of experiencing a smaller valuation for their firms when comes time to exit.

Figure 4. Total valuation and marginal variation in unplanned added value growth

(a) under a survival orientation **(b) under a profit orientation**





6. Conclusion

6.1. Contributions

My thesis can potentially contribute to the current debate on entrepreneurial goals. *How to define an individual's objective function* has been identified by Burmeister et al. (2008) as one of the key challenges in future entrepreneurship research. Should the objective be economic (e.g., profit or survival maximization, or a combination of both) or a life perspective (e.g., happiness maximization, although not as straightforward to measure as profit or survival)? In fact, most decision makers are likely to consider more than one perspective. In this thesis, I moved a step further by suggesting that, in the early years, there should be an orientation switch, that is, sequentially as opposed to simultaneously considering both survival and profit maximization.

In addition, employing risk-return tradeoffs to characterize the two orientations is, to the best of my knowledge, unprecedented in the entrepreneurial context I have explored. Moreover, considering sequentially a survival and then profit orientations to study firm added value over time and the resulting accumulated total valuation contributes to the literature on firm growth. Paying more attention to the characterization of each of the two orientations – survival and profit – and linking these orientations to firm growth open up new avenues for research in entrepreneurial decision making.

6.2. Practical Implications

Entrepreneurship plays a key role in economic growth (Minniti and Lévesque, in press). Firms are likely to grow faster under a profit orientation, yet, based on the findings herein, some environmental and entrepreneurial characteristics discourage entrepreneurs to make the switch from a survival to a profit orientation. Governments and policy makers can, to some extent, shape the business environment to be more conducive to a switch. These incentives must help make the profit orientation more attractive by reducing the risk-return tradeoff faced by profit-oriented entrepreneurs. Financial capital could limit the risk whereas affordable marketing services could help boost the return.

Further, investors such as angels and venture capitalists can select the business opportunities in which to invest based on new information provided in this thesis. Investors can evaluate the environmental and entrepreneurial characteristics I put forward and regulate the planned added value according to the switching time they desire. For entrepreneurs, one key implication is the recognition that a time at which to switch orientation may or may not exist.

6.3. Opportunities for future work

Based on my review of the entrepreneurship and related literature, studies of business startups' orientation are few, and none have focused on an optimal switching time from a survival to a profit orientation. Considering the importance of survival in the early years of a firm, fruitful research questions that currently limit the scope of my thesis include: In the proposed framework, what if a profit orientation is replaced by a growth orientation? How would it affect the risk-return tradeoff I have put forward based on supporting literature? How would the sufficient conditions for the existence of an optimal switching time be altered?

Another limitation lies in the way I handle constraints in the optimization problem by assuming that there are none. In reality, firms are constrained by their capacity, managerial abilities, geographical limits, to name a few, and acknowledging these constraints would likely modify my findings. Also, adding a competitor would increase the potential from this research, as most entrepreneurial firms live in a highly competitive business environment. The presence of a competing firm could encourage the focal firm to switch its orientation earlier in order to grab market share. In this context, game theory would be the approach of choice. Finally, an empirical test of the relationships I theoretically put forward between the switching time and key model parameters, and of the behavior of firm total valuation I portrayed, could significantly strengthen this work.

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Appendices

Appendix A. Notation summary

Table A1. Notation summary

Notation	Description
τ	Switching time from a survival to a profit orientation
T	Firm exit time (e.g., from being sold)
$\mu_{s,t}$	Expected unplanned growth at *t* in added value under a survival orientation
$\mu_{s,t}$	Expected unplanned growth at *t* in added value under a profit orientation
$\sigma_{s,t}^2$	Variation in the unplanned growth at *t* in added value under a survival orientation
$\sigma_{s,t}^2$	Variation in the unplanned growth at *t* in added value under a profit orientation
v_t	Planned added value at *t*
α_t	Risk propensity at *t*
a_{μ_s}	Initial expected unplanned growth in added value under survival orientation
b_{μ_s}	Marginal expected unplanned growth in added value under a survival orientation
$a_{\sigma_s^2}$	Initial variation in the unplanned growth in added value under a survival orientation
$b_{\sigma_s^2}$	Marginal variation in the unplanned growth in added value under a survival orientation
a_{μ_p}	Initial expected unplanned growth in added value under a profit orientation
b_{μ_p}	Marginal expected unplanned growth in added value under a profit orientation
$a_{\sigma_p^2}$	Initial variation in the unplanned growth in added value under a profit orientation
$b_{\sigma_p^2}$	Marginal variation in the unplanned growth in added value under a profit orientation
a_v	Initial planned added value
b_v	Marginal baseline planned added value
a_α	Initial risk propensity
b_α	Marginal baseline risk propensity

Appendix B. Coding for numerical analysis

B.1. Coding for finding the best horizon for risk propensity

```
u5=zeros(100,1);

for d=1:100

u5(d,1)=-1000000;

end,

h=1;

cc=zeros(1,9);

mu1=zeros(100,1);

mu2=zeros(100,1);

zig1=zeros(100,1);

zig12=zeros(100,1);

zig2=zeros(100,1);

zig22=zeros(100,1);

alpha=zeros(50,1);

rand1=zeros(100,1);

rand2=zeros(100,1);

uetau=zeros(50,100);

taumean=zeros(50,1);

w=zeros(50,1);

cw=zeros(50,1);

cw1=zeros(1000,1);

h1=zeros(100,1);

h2=zeros(100,1);

w1=zeros(100,1);

w2=zeros(100,1);

tau=zeros(50,9);

v=zeros(100,1);
```

```
u=zeros(100,1);
for k=-4:4
cc(h,1)=power(10,k);
for i=1:50
alpha(i,h)=0.02*i*cc(h,1);
for s=1:100
u=u5;
for t=1:100
mu1(t,1)=0.6+0.0015*t;
mu2(t,1)=0.7+0.002*t;
zig1(t,1)=0.003+ 0.0003*t;
zig2(t,1)=0.005+ 0.000285*t;
zig12(t,1)=power(zig1(t,1),0.5);
zig22(t,1)=power(zig2(t,1),0.5);
v(t,1)=200-0.5*t;
rand1(t,1)=normrnd(mu1(t,1),zig12(t,1));
rand2(t,1)=normrnd(mu2(t,1),zig22(t,1));
w1(t,1)=v(t,1)*(1+rand1(t,1));
w2(t,1)=v(t,1)*(1+rand2(t,1));
h1(t,1)=(v(t,1)*(1+mu1(t,1)))-0.5*v(t,1)*v(t,1)*zig1(t,1)*alpha(i,h);
h2(t,1)=(v(t,1)*(1+mu2(t,1)))-0.5*v(t,1)*v(t,1)*zig2(t,1)*alpha(i,h);
aa1=h1(1:t,1:1);
aa2= h2(t+1:100,1:1);
u(t,1)= sum(aa1)+sum(aa2);
if (t>1) && (u(t,1)>u(t-1,1))
tau(i,h)= t;
end,
if (t<2)
```

```
tau(i,h)=t;
end,
utau(i,s)=tau(i,1);
taumean(i,1)=sum(utau(i,s))*0.02;
wa1=w1(1:tau(i,1),1:1);
wa2=w2(tau(i,1)+1:100,1:1);
w(i,1)=25000+sum(wa1)+sum(wa2);
cw1(s,1)=w(i,1);
cw(i,1)=((sum(cw1)*0.02));
t=t+1;
end,
s=s+1;
end
i=i+1;
end,
h=h+1;
k=k+1
end
```

B.2. Coding for the relationship between total valuation and initial planned added value

```
h=1;
cc=zeros(1,9);
mu1=zeros(100,1);
mu2=zeros(100,1);
zig1=zeros(100,1);
zig12=zeros(100,1);
zig2=zeros(100,1);
zig22=zeros(100,1);
rand1=zeros(100,1);
```

```
rand2=zeros(100,1);
uetau=zeros(50,100);
taumean=zeros(50,1);
alpha=1;
w=zeros(50,1);
cw=zeros(50,1);
cw1=zeros(1000,1);
h1=zeros(100,1);
h2=zeros(100,1);
w1=zeros(100,1);
w2=zeros(100,1);
tau=zeros(50,9);
v=zeros(100,1);
av=zeros(50,1);
u=zeros(100,1);
for k=0:0
cc(h,1)=power(10,k);
for i=1:50
av(i,1)=150+1.3*i;
for s=1:100
for t=1:100
mu1(t,1)=0.6+0.0015*t;
mu2(t,1)=0.7+0.002*t;
zig1(t,1)=0.003+ 0.0003*t;
zig2(t,1)=0.005+ 0.000285*t;
zig12(t,1)=power(zig1(t,1),0.5);
zig22(t,1)=power(zig2(t,1),0.5);
v(t,1)=av(i,1)-0.5*t;
rand1(t,1)=normrnd(mu1(t,1),zig12(t,1));
rand2(t,1)=normrnd(mu2(t,1),zig22(t,1));
```

```
w1(t,1)=v(t,1)*(1+rand1(t,1));
w2(t,1)=v(t,1)*(1+rand2(t,1));
h1(t,1)=(v(t,1)*(1+mu1(t,1)))-0.5*v(t,1)*v(t,1)*zig1(t,1)*alpha;
h2(t,1)=(v(t,1)*(1+mu2(t,1)))-0.5*v(t,1)*v(t,1)*zig2(t,1)*alpha;
aa1=h1(1:t,1:1);
aa2= h2(t+1:100,1:1);
u(t,1)= sum(aa1)+sum(aa2);
u1=max(u);
tau(i,h)= find(u>= u1);
utau(i,s)=tau(i,1);
taumean(i,1)=sum(utau(i,s))*0.02;
wa1=w1(1:tau(i,1),1:1);
wa2=w2(tau(i,1)+1:100,1:1);
w(i,1)=25000+sum(wa1)+sum(wa2);
cw1(s,1)=w(i,1);
cw(i,1)=((sum(cw1)*0.02));
t=t+1;
end,
s=s+1;
end
i=i+1;
end,
h=h+1;
k=k+1
end
```

B.3. Coding for the relationship between total valuation and marginal expected unplanned growth in added value under a survival orientation

```
h=1;
cc=zeros(1,9);
mu1=zeros(100,1);
```

```
mu2=zeros(100,1);

zig1=zeros(100,1);

zig12=zeros(100,1);

zig2=zeros(100,1);

zig22=zeros(100,1);

rand1=zeros(100,1);

rand2=zeros(100,1);

uetau=zeros(50,100);

taumean=zeros(50,1);

alpha=1;

w=zeros(50,1);

cw=zeros(50,1);

cw1=zeros(1000,1);

h1=zeros(100,1);

h2=zeros(100,1);

w1=zeros(100,1);

w2=zeros(100,1);

tau=zeros(50,9);

v=zeros(100,1);

bmu1=zeros(50,1);

u=zeros(100,1);

for k=0:0

cc(h,1)=power(10,k);

for i=1:50

bmu1(i,1)=0.001+0.00002*i;

for s=1:100

for t=1:100

mu1(t,1)=0.6+bmu1(i,1)*t;
```

```
mu2(t,1)=0.7+0.002*t;
zig1(t,1)=0.003+ 0.0003*t;
zig2(t,1)=0.005+ 0.000285*t;
zig12(t,1)=power(zig1(t,1),0.5);
zig22(t,1)=power(zig2(t,1),0.5);
v(t,1)=200-0.5*t;
rand1(t,1)=normrnd(mu1(t,1),zig12(t,1));
rand2(t,1)=normrnd(mu2(t,1),zig22(t,1));
w1(t,1)=v(t,1)*(1+rand1(t,1));
w2(t,1)=v(t,1)*(1+rand2(t,1));
h1(t,1)=(v(t,1)*(1+mu1(t,1)))-0.5*v(t,1)*v(t,1)*zig1(t,1)*alpha;
h2(t,1)=(v(t,1)*(1+mu2(t,1)))-0.5*v(t,1)*v(t,1)*zig2(t,1)*alpha;
aa1=h1(1:t,1:1);
aa2= h2(t+1:100,1:1);
u(t,1)= sum(aa1)+sum(aa2);
u1=max(u);
tau(i,h)= find(u>= u1);
utau(i,s)=tau(i,1);
taumean(i,1)=sum(utau(i,s))*0.02;
wa1=w1(1:tau(i,1),1:1);
wa2=w2(tau(i,1)+1:100,1:1);
w(i,1)=25000+sum(wa1)+sum(wa2);
cw1(s,1)=w(i,1);
cw(i,1)=((sum(cw1)*0.02));
t=t+1;
end,
s=s+1;
end
```

```
i=i+1;
end,
h=h+1;
k=k+1
end
```

B.4. Coding for the relationship between total valuation and marginal expected unplanned growth in added value under a profit orientation

```
h=1;
cc=zeros(1,9);
mu1=zeros(100,1);
mu2=zeros(100,1);
zig1=zeros(100,1);
zig12=zeros(100,1);
zig2=zeros(100,1);
zig22=zeros(100,1);
rand1=zeros(100,1);
rand2=zeros(100,1);
uetau=zeros(50,100);
taumean=zeros(50,1);
alpha=1;
w=zeros(50,1);
cw=zeros(50,1);
cw1=zeros(1000,1);
h1=zeros(100,1);
h2=zeros(100,1);
w1=zeros(100,1);
w2=zeros(100,1);
tau=zeros(50,9);
```

```
v=zeros(100,1);
bmu2=zeros(50,1);
u=zeros(100,1);
for k=0:0
cc(h,1)=power(10,k);
for i=1:50
bmu2(i,1)=0.0015+0.00002*i;
for s=1:100
for t=1:100
mu1(t,1)=0.6+0.0015*t;
mu2(t,1)=0.7+bmu2(i,1)*t;
zig1(t,1)=0.003+ 0.0003*t;
zig2(t,1)=0.005+ 0.000285*t;
zig12(t,1)=power(zig1(t,1),0.5);
zig22(t,1)=power(zig2(t,1),0.5);
v(t,1)=200-0.5*t;
rand1(t,1)=normrnd(mu1(t,1),zig12(t,1));
rand2(t,1)=normrnd(mu2(t,1),zig22(t,1));
w1(t,1)=v(t,1)*(1+rand1(t,1));
w2(t,1)=v(t,1)*(1+rand2(t,1));
h1(t,1)=(v(t,1)*(1+mu1(t,1)))-0.5*v(t,1)*v(t,1)*zig1(t,1)*alpha;
h2(t,1)=(v(t,1)*(1+mu2(t,1)))-0.5*v(t,1)*v(t,1)*zig2(t,1)*alpha;
aa1=h1(1:t,1:1);
aa2= h2(t+1:100,1:1);
u(t,1)= sum(aa1)+sum(aa2);
u1=max(u);
tau(i,h)= find(u>= u1);
utau(i,s)=tau(i,1);
```

```
taumean(i,1)=sum(utau(i,s))*0.02;

wa1=w1(1:tau(i,1),1:1);

wa2=w2(tau(i,1)+1:100,1:1);

w(i,1)=25000+sum(wa1)+sum(wa2);

cw1(s,1)=w(i,1);

cw(i,1)=((sum(cw1)*0.02));

t=t+1;

end,

s=s+1;

end

i=i+1;

end,

h=h+1;

k=k+1

end
```

B.5. Coding for the relationship between total valuation and marginal variation in the unplanned growth in added value under a survival orientation

```
h=1;

cc=zeros(1,9);

mu1=zeros(100,1);

mu2=zeros(100,1);

zig1=zeros(100,1);

zig12=zeros(100,1);

zig2=zeros(100,1);

zig22=zeros(100,1);

rand1=zeros(100,1);

rand2=zeros(100,1);

uetau=zeros(50,100);
```

```
taumean=zeros(50,1);
alpha=1;
w=zeros(50,1);
cw=zeros(50,1);
cw1=zeros(1000,1);
h1=zeros(100,1);
h2=zeros(100,1);
w1=zeros(100,1);
w2=zeros(100,1);
tau=zeros(50,9);
v=zeros(100,1);
bzig1=zeros(50,1);
u=zeros(100,1);
for k=0:0
cc(h,1)=power(10,k);
for i=1:50
bzig1(i,1)=0.00028+0.000000498*i;
for s=1:100
for t=1:100
mu1(t,1)=0.6+0.0015*t;
mu2(t,1)=0.7+0.002*t;
zig1(t,1)=0.003+ bzig1(i,1)*t;
zig2(t,1)=0.005+ 0.000285*t;
zig12(t,1)=power(zig1(t,1),0.5);
zig22(t,1)=power(zig2(t,1),0.5);
v(t,1)=200-0.5*t;
rand1(t,1)=normrnd(mu1(t,1),zig12(t,1));
rand2(t,1)=normrnd(mu2(t,1),zig22(t,1));
```

```
w1(t,1)=v(t,1)*(1+rand1(t,1));

w2(t,1)=v(t,1)*(1+rand2(t,1));

h1(t,1)=(v(t,1)*(1+mu1(t,1)))-0.5*v(t,1)*v(t,1)*zig1(t,1)*alpha;

h2(t,1)=(v(t,1)*(1+mu2(t,1)))-0.5*v(t,1)*v(t,1)*zig2(t,1)*alpha;

aa1=h1(1:t,1:1);

aa2= h2(t+1:100,1:1);

u(t,1)= sum(aa1)+sum(aa2);

u1=max(u);

tau(i,h)= find(u>= u1);

utau(i,s)=tau(i,1);

taumean(i,1)=sum(utau(i,s))*0.02;

wa1=w1(1:tau(i,1),1:1);

wa2=w2(tau(i,1)+1:100,1:1);

w(i,1)=25000+sum(wa1)+sum(wa2);

cw1(s,1)=w(i,1);

cw(i,1)=((sum(cw1)*0.02));

t=t+1;

end,

s=s+1;

end

i=i+1;

end,

h=h+1;

k=k+1

end
```

B.6. Coding for the relationship between total valuation and marginal variation in the unplanned growth in added value under a profit orientation

```
h=1;
```

```
cc=zeros(1,9);
mu1=zeros(100,1);
mu2=zeros(100,1);
zig1=zeros(100,1);
zig12=zeros(100,1);
zig2=zeros(100,1);
zig22=zeros(100,1);
rand1=zeros(100,1);
rand2=zeros(100,1);
uetau=zeros(50,100);
taumean=zeros(50,1);
alpha=1;
w=zeros(50,1);
cw=zeros(50,1);
cw1=zeros(1000,1);
h1=zeros(100,1);
h2=zeros(100,1);
w1=zeros(100,1);
w2=zeros(100,1);
tau=zeros(50,9);
v=zeros(100,1);
bzig2=zeros(50,1);
u=zeros(100,1);
for k=0:0
cc(h,1)=power(10,k);
for i=1:50
bzig2(i,1)=0.00028+0.00000055*i;
for s=1:100
```

```
for t=1:100

mu1(t,1)=0.6+0.0015*t;

mu2(t,1)=0.7+0.002*t;

zig1(t,1)=0.003+ 0.0003*t;

zig2(t,1)=0.005+ bzig2(i,1)*t;

zig12(t,1)=power(zig1(t,1),0.5);

zig22(t,1)=power(zig2(t,1),0.5);

v(t,1)=200-0.5*t;

rand1(t,1)=normrnd(mu1(t,1),zig12(t,1));

rand2(t,1)=normrnd(mu2(t,1),zig22(t,1));

w1(t,1)=v(t,1)*(1+rand1(t,1));

w2(t,1)=v(t,1)*(1+rand2(t,1));

h1(t,1)=(v(t,1)*(1+mu1(t,1)))-0.5*v(t,1)*v(t,1)*zig1(t,1)*alpha;

h2(t,1)=(v(t,1)*(1+mu2(t,1)))-0.5*v(t,1)*v(t,1)*zig2(t,1)*alpha;

aa1=h1(1:t,1:1);

aa2= h2(t+1:100,1:1);

u(t,1)= sum(aa1)+sum(aa2);

u1=max(u);

tau(i,h)= find(u>= u1);

utau(i,s)=tau(i,1);

taumean(i,1)=sum(utau(i,s))*0.02;

wa1=w1(1:tau(i,1),1:1);

wa2=w2(tau(i,1)+1:100,1:1);

w(i,1)=25000+sum(wa1)+sum(wa2);

cw1(s,1)=w(i,1);

cw(i,1)=((sum(cw1)*0.02));

t=t+1;

end,
```

```
s=s+1;

end

i=i+1;

end,

h=h+1;

k=k+1

end
```

Appendix C. Estimating the best interval of values for risk propensity

This exercise allows me to find a value for risk propensity that will yield some sensitivity for the total valuation function when it is investigated as changes occur in a key model parameter. For this to happen, the switching time must not be 1 or 100. For a given set of parameter values, an interval of values for risk propensity is considered too small when the corresponding optimal switching time stays fixed as the value of risk propensity changes. Also, a risk propensity interval is considered too large when the corresponding optimal switching times change too drastically. Table 6 offers some examples of risk propensity intervals and the corresponding optimal switching times. The interval [0,0.0001] is considered too small, whereas the interval [0,1000] is considered too large.

Table C1. Risk propensity intervals' comparison

Intervals	Optimal switching times	Comments
[0,0.0001]	$t = 1$	The startup owner is too much of a risk taker and the interval is small so there is merely one value for the optimal switching time and that is the first period
[0,0.001]	$t = 1$	The startup owner is too much of a risk taker and the interval is small so there is merely one value for the optimal switching time and that is the first period
[0,0.01]	$t = 1$	The startup owner is too much of a risk taker and the interval is small so there is merely one value for the optimal switching time and that is the first period
[0,0.1]	$t = 1$	The startup owner is too much of a risk taker and the interval is small so there is merely one value for the optimal switching time and that is the first period
[0,1]	$t \in [1,42]$	The size of the interval is proper so a range of optimal switching times are obtained.
[0,10]	$t \in [1,100]$	The size of the interval is proper so a range of optimal switching times are obtained. Although the switching times are spread over [1,100], more than half of optimal switching times are the ending period (t = 100).
[0,100]	$t = 100$	The startup owner is too risk averse and the interval is too wide so the majority of optimal switching times are the last period.
[0,1000]	$t = 100$	The startup owner is too risk averse and the interval is too wide so the majority of optimal switching times are the last period.
[0,10000]	$t = 100$	The startup owner is too risk averse and the interval is too wide so the majority of optimal switching times are the last period.

To find a proper risk propensity interval (value), I ran the simulation for the following nine different intervals: $\alpha_k \in [0, 10^k]$, $k \in \{-4,-3,-2,-1,0,1,2,3,4\}$. For each interval, 50 values of risk propensity are equally spread, with 100 runs of simulation for each of these 50 values. I focus on those intervals that are not considered too small or too large interval, as per my explanation above. I chose the intervals that exhibited the most variability (i.e., the least repetitiveness) in the 50 optimal switching times (one for each of the 50 values of risk propensity α). The best intervals were [0,1] and [0,10]. I therefore chose the risk propensity α to be 1 (which corresponded to a switching τ^* = 42).