Entrepreneur Historical Performance, Firms Survival Rate and The Expected Return on Equity: A Probabilistic Approach

Andrea Moro* University of Leicester,

Sandra Nolte† University of Leicester

This version: January 14, 2012

EFM classification codes: 150, 180

*Corresponding author: University of Leicester, School of Management, Institute of Finance, Leicester, LE1 7RH, United Kingdom. Phone ++44-116-252-3376, Fax -5515, email: a.moro@leicester.ac.uk

†University of Leicester, School of Management, Institute of Finance, LE1 7RH, Leicester, United Kingdom. Phone ++44-116-252-5634, Fax -5515, email: Sandra.Nolte@leicester.ac.uk. The usual disclaimer applies.

Abstract

Existing research approaches the return on investment expected by entrepreneurs from the perspective of the investor. This paper argues that this perspective is inadequate when applied to entrepreneurs of small and medium sized enterprises (SMEs). In fact, return on equity cannot be ascertained from financial reports or markets. In addition, entrepreneurs can hardly provide a figure since their decision to invest in the venture is driven by many other reasons over and above simple return on equity.

The solution suggested in this paper is to approach the issue by viewing the entrepreneurs as a special kind of lenders who expect a return for the risk they incur from the possible bankruptcy of the firm and the impact this would have on their personal wealth. We decompose the entrepreneur risk into a cluster risk (cluster survival rate) and a firm specific risk (historical un-success of the entrepreneur). We relate both through the introduction of a Markov transition probability matrix. The transition probabilities are modeled with a logit and estimated with Maximum-Likelihood. The overall risk is, then weighted by the percentage of personal wealth the entrepreneur invested in the venture. Examples of applications are provided.

1 Introduction

It is possible to distinguish two separate strands in the literature on firms' capital structure. On the one hand, there is the research rooted in Modigliani and Miller's (1958) model, which is based on the assumption of efficient markets (e.g. Fama, 1970). This stream of research focuses mainly on modeling theoretically the decisions on capital structure of large corporations and focuses on investor expectations as the core determinant of the cost of capital (e.g. capital asset pricing model, Sharpe, 1964) and the key role of portfolio diversification as a tool for dealing with diversifiable risk incurred by investors. (Markowitz, 1952). On the other hand, there is the empirical research on capital structure of SMEs and on SMEs' lending relationships. This research tends to consider the owner and the manager of the firm as one actor and investigates mainly how external actors (banks, trade creditors, etc.) deal with the information asymmetries resulting from the opaqueness of SMEs (see for instance Berger, et al., 2001, Ebben & Johnson, 2006, Rodriguez-Rodriguez, 2006, Voordeckers & Steijvers, 2006, Wingborg & Landström, 2000). In addition, the expected return of the entrepreneur, the cost of capital and the capital structure of the firm, is examined by looking at the opportunity cost, that is by evaluating the potential benefit of investing in a venture with respect to the cost of missing the opportunity to invest somewhere else (e.g. Müller, 2011). This approach works properly for a traditional investor in shares of listed corporations but it does not when it is applied to entrepreneurs who have their own business idea and are interested in developing it (Timmons, 1999). In fact, the predictors of capital structure in SMEs are found to be different from large corporations. Aspects like management values and goals, the optimistic/pessimistic vision of the future for the firm, the access to finance and to human capital, the gender, the life stage of the firm and its size, the ownership structure, the profitability, the potential growth, and the provision of collateral are found to affect SMEs capital structure (e.g. Cassar, 2004, Cassar & Holmes, 2003, Chaganti, et al. 1995, Frielinghaus, et al., 2005, mac an Bhaird & Lucey, in press). All in all, traditional financial models developed for large listed corporations can hardly be applied to SMEs (Chaganti, et al., 1995).

This paper, at variance with previous approaches, suggests working out the expected return of the entrepreneur and then the cost of capital and its structure by modeling the entrepreneur's financial decision as that of a peculiar provider of funds (in fact, a very peculiar kind of lender). Typically, lenders measure the risk they incur by lending to the borrower according to the probability of default of the borrower and the potential loss the lender might incur in case of default (i.e. the amount of

money the borrower will not be able to pay back). Then, they decide whether to lend and the interest rate premium to charge the borrower. Similarly entrepreneurs and owner/managers who invest their personal wealth in the venture can evaluate the risk they incur by checking the probability that their venture might go bust and the impact that such a potential adverse outcome would have on their personal wealth. Then, they have to work out the minimum expected return as that required to compensate for the risk they incur. Clearly, the impact of an adverse outcome on entrepreneurs' personal wealth is expected to be particularly high: entrepreneurs are typically very concentrated (e.g. Heaton & Lucas, 2000) and capable of accepting high levels of risk (e.g. Moskowitz & Vissing-Jørgenssen, 2002).

Before moving forward to illustrate the model, an additional explanation is due: the model illustrated is applicable to those who invest in a firm with shares not traded in a liquid stock market. Thus, the words "entrepreneurial firm" and "SME" are to be considered interchangeable as well as the words "entrepreneur" and "owner-manager".

The paper is structured as follows: Section 2 explains the model's underpinnings examining why previous solutions do not solve the problem of the return on equity for the entrepreneur and do not provide a useful model to build up the capital structure of the entrepreneurial firm. Section 3 presents the probabilistic approach to work out the expected return while Section 4 illustrates how to work out the weighted cost of capital according to the model. In Section 5 we present three simulations linked to different levels of probability of bankruptcy. Section 6 comments on some implications of the model while Section 7 concludes.

2 Model Underpinnings

The capital structure of firms is often defined as a "puzzle". The metaphor shows effectively how difficult it is to find the ideal financing structure for firms and projects. Fundamental finance literature considers theoretical modeling of the optimal capital structure for corporations and is based on Modigliani & Miller's (1958) seminal work. Later research investigates the role of taxes (Boyce & Kalotay, 1979 and Brick & Ravid, 1985), the impact of refinancing costs (Jun & Jen, 2003) and the probability of going bankrupt (Philosophov & Philosophov, 2005). Further research addresses agency costs and the moral hazard risk (Myers, 1977). The role of the cost of financing the firm is the key factor in pecking order theory (Myers & Majluf, 1984). This stream of research traditionally works out the expected return of the investor according to the capital asset pricing model (Sharpe, 1963, 1964).

Research on SMEs' capital structure points out that SMEs are peculiar since they are characterized by a mix between personal and firm's wealth (Avery, Bostic & Samolyk, 1998), by a short life expectancy, by the importance of personal relationships, by a great potential for making mistakes, by inter-generational issues (Ang, 1992), and by lack of separation between business and personal risk (Ang, Wuh Lin & Tyler, 1995). SMEs' capital structure is found to be affected by management values and goals, by the optimistic/pessimistic vision of the future for the firm, by the access to finance and to human capital, by the gender (women typically face major problems in accessing credit), by entrepreneur preference for risk and the related strategy (Chaganti, et al., 1995). The life stage of the firm affects the capital structure since younger firms face bigger problems in accessing finance (Frielinghaus, et al., 2005). SMEs size, ownership structure, profitability, historical and prospective growth and the capability to provide collateral are also found to influence the SMEs capital structure (Cassar, 2004, Cassar & Holmes, 2003, Chaganti, et al. 1995, Mac an Bhaird & Lucey, in press). Capital structure is country specific (Hall, et al. 2004) and is linked to the industry the firm belongs to since different industries exhibit different average debt levels, which is in line with the trade-off theory (Degryse, et al. in press). There is substantial intra-industry heterogeneity, suggesting that industry competition, agency conflicts, and the heterogeneity in employed technology are also important drivers of capital structure (Degryse, et al. in press). Furthermore, grants, credit cards, and earnings from a salaried job are among the most important sources of funds. They affect entrepreneurs' decision to start up a firm and implicitly affect the capital structure of the firm at least in the early stage of its life. In fact, wealth appears to have a positive impact on the probability of starting up a firm (Elston & Audretsch, in press).

In SMEs, financing decisions are also hampered, since raising arm's length finance is subject to constraints for small opaque firms that suffer from big information asymmetries (Berger, et al., 2001): only when firms become older, larger and more informationally transparent, can they access public equity funding as well as public debt (Gregory et al., 2005).

All in all, entrepreneurs' decision to invest, their expected return on investments, the cost of capital and then the capital structure of the small unlisted firms are affected by many variables. However, it is essential for the entrepreneur to work out the return on their investment and thus the overall cost of capital and the capital structure. Traditionally, there are two possibilities to figure out the return of their investment: the accounting figures and the market.

Accounting approach

A possible solution is to look at the value of the firm as reported in the balance sheet and then work out the expected return accordingly. In fact, in an ideal world, the expected return on equity would match the real return and financial statements should provide the ex-act representation of the firm's wealth. Do financial statements provide a meaningful figure for the value of equity and hence the cost of equity? Originally, the primary role of the financial statements was that of stewardship; keeping track of what had been done with the financial resources entrusted to the enterprise's managers. There is no suggestion that the balance sheet 'shareholders funds' figure represents the economic value (the net present value of future cash flows) of the enterprise. In fact, financial statements are typically transaction based - i.e. based on historical cost rather than on market values. Even in the absence of general inflation, it is key to the operation of a market economy that relative prices change in response to demand and supply conditions. Therefore, use of historical cost accounting will not reflect current asset values. In addition, firms typically have many assets and liabilities that do not appear on their balance sheets but that have a major impact on future cash flows: loyal customers, superior management, motivated employees, access to distribution channels, patents and trademarks and so on. In conclusion, despite the usefulness of financial statements for other purposes, they are not a useful source of information for determining the cost of equity. Thus,

P1: *The return on the investment for the entrepreneur cannot be ascertained from the financial report.*

Market Value and Portfolio Diversification

Efficient Market Hypothesis suggests that market provides the correct value of the firms (Fama, 1970). Moreover, if markets are perfect, the current value of firm's shares matches the expected return of the shareholders (Sharpe, 1964). Investors can build up their optimal portfolio by looking for the mix of shares that maximize the return minimizing the risk thanks to diversification (Markowitz, 1952).

However, scholars stress that entrepreneurs hold a portfolio that is necessarily under-diversified and, thus, inefficient (Markowitz, 1952). Indeed, entrepreneurs are exposed to a high idiosyncratic risk. Thus, previous research tries to work out the premium the entrepreneurs gain because of such under-diversification in the portfolio compared

to that of the shareholders (investors) of a optimally diversified portfolio of shares (see for instance, Heaton & Lucas, 2000, Moskowitz & Vissing-Jorgenssen, 2002, Kerins et al., 2004, Haney & Holmes, 2008, Müller, 2011). Indeed, Kerins et al. (2004) state that, since the entrepreneurs typically do not hold a diversified portfolio of investments, their risk is much higher than that of a diversified investor. According to their findings, the return for an under-diversified entrepreneur/investor is two to four times higher of that of a well-diversified investor. Müller (2011) focuses on the fact that the entrepreneurs suffer from high idiosyncratic risk and that they are under-diversified: she calculates that for each 10% increase in the concentration there is an increase of about 15% in the return on the invested funds. On the contrary, Moskowitz & Vissing-Jørgenssen, (2002) do not find any significant difference in the return on investment between investing in non-traded shares and the traditional investment in a portfolio of traded shares. Thus, the empirical findings are not conclusive, raising the question of whether such an approach is the right one for figuring out expected return on equity for shareholders of unlisted firms.

In fact, this stream of research considers that entrepreneurs' decision to invest mirrors that of the investors, i.e. the entrepreneurs are simply interested in maximizing their investments. Implicitly, they accept the point that entrepreneurs can easily sell the stake they hold in the venture when they are unhappy with their firm's performance. Thus, the return provided by the firm (profit and capital gain) represents the expected return for the entrepreneur. In fact, at variance with the shares of firms listed in stock markets that can be easily sold, entrepreneurial firms are very illiquid and entrepreneurs can hardly sell their shareholding if they are not happy with firm's performance. Even when firms are listed on regulated markets, there can be some problems in selling shares because of restrictions imposed by contracts in initial public offerings (IPOs), those imposed as a consequence of a mergers and acquisitions as well as legal restrictions (e.g. Kahl et al. 2003). When an SME is run by a family, shareholders can face additional problems since, according to Romano, Tanewski & Smyrnios (2000), the desire of the owners and entrepreneurs to maintain control of the firm is a very important determinant in avoiding sale of their shareholding. Indeed, LaPorta, de Silanes & Schleifer (1999) looking at large corporations find that often the entrepreneurs/families hold a large majority of the shares and their possibility of selling the shareholding is reduced.

Moreover, the very existence of the entrepreneurial firm is linked to the entrepreneur and, often, it is impossible to think about the firm without the entrepreneur. In other words, the value of the firm is definitely linked to the entrepreneurial and managerial

competences of the entrepreneur. Thus, the entrepreneur often cannot exit the shareholding without compromising the value of the firm.

All in all, illiquidity of shares, legal and contractual restrictions, ownership structure as well as the peculiar role of the entrepreneur can constrain the real value of the shares as modeled by Kahl, Liu & Longstaff (2003). Consequently, linking the return of the investment with that expected by the investor is correct when we look at the investor in liquid stock market (where investors can "vote with their feet" by simply selling the shares when the return they are enjoying from the firm they have invested in does not match the return they expect from such an investment). Linking the return on the investment with that expected by the entrepreneur is not correct when we look at the entrepreneur who has a stake in an illiquid firm (and no or only very limited possibility of "voting with their feet"). The consequence is that

P2: *The expected return of the entrepreneur cannot be derived from the return generated by the shares of the small firm.*

Drivers of Entrepreneurs' Investment Decision

In fact, what drives entrepreneurs in their decision to invest in the venture is mainly the business idea the entrepreneurs have and the opinion that no one else is as capable of exploiting it as they are. They hope to maximize the pecuniary and non-pecuniary return on that idea (and this irrespective of the amount of money invested in the venture and the effort put into it). In fact, entrepreneurs and SMEs shareholders involved in the management of the firm either directly (as managers) or indirectly (as relatives or friends of the management), have a broad view of the benefit provided by their investment. Literature on entrepreneurship stresses their desire for independence (Delmar, 2000), the prestige, the desire to be free to take decisions, (Hamilton, 2000) and the fact that the entrepreneurs enjoy non-pecuniary benefits as high as 20% of their investment (Moskowitz & Vissing-Jørgenssen, 2002). In addition, entrepreneurs are less affected by moral hazard than a traditional investor because of the control they can exert on the firm and they often have a higher risk tolerance than a traditional investor in listed shares: they can accept higher variance in the return, i.e. lower mean return but higher maximum possible return on invested equity (Moskowitz & Vissing-Jørgenssen, 2002). Interestingly, these psychological and social benefits are uncorrelated with the amount of money invested in the venture. These aspects add an additional layer of complexity to work out the expected financial return on equity for the entrepreneur. As a consequence, it is no surprise that SME entrepreneurs and

SME shareholders have difficulties in stating their expected return on their investment.

Entrepreneurs' different perspective

Entrepreneurs invest a large chunk of their personal wealth in the venture and they are legitimately entitled to expect remuneration for this investment. In fact, when entrepreneurs act as providers of funds, they are mirroring the role of lenders even if they are a very peculiar lenders, in the sense that they are willing to accept very high levels of risk and will receive remuneration that is linked to the profitability of the business (and there-fore highly uncertain).

Lenders decide whether to finance a venture and how to charge it according to the riskiness of the venture. They figure out the riskiness of the venture by using the probability of default of the prospective borrower. The probability of default is then used firstly to decide whether the borrower is sufficiently meritorious to be provided with funds, and then to price the loan. Similarly, Cheung (1999) suggests to use the probability of bankruptcy of the industry where the firm operates as a way to measure the firm riskiness from the entrepreneur point of view and then work out the expected return accordingly. The argument is that entrepreneurs can evaluate their decision to invest by looking at the probability that the venture in which they are investing their personal wealth could go bankrupt. Cheung (1999) suggests a simple way to determine venture riskiness by looking at the average survival rate of the cluster of firms the venture/project belongs to (i.e.: the age, the industry in which they operate, the dimension, etc.). In fact, Cheung (1999) on one hand models the probability of bankruptcy simply as the average market survival rate (thus, he does not consider entrepreneurs' specific skills, capabilities and success); on the other hand he does not address the problem of the loss in the case of bankruptcy.

When lenders evaluate the risk they incur in lending to a specific borrower, they assess also the loss at default they could potentially incur if the borrower is incapable of paying back the loan. Similarly, entrepreneurs have to consider how their personal wealth could be adversely affected if their venture enters the liquidation stage: the greater the stake at risk in the venture, the higher the risk incurred in the venture, all else being equal. Typically, entrepreneurs are more concentrated than a traditional portfolio of loans provided by a lender (e.g. Müller, 2011). Thus, their loss in case of liquidation might impact heavily on their personal wealth and therefore the risk related to the loss of personal wealth in case of bankruptcy is particularly important for them.

P3: *The risk entrepreneurs incur is the probability of bankruptcy of the venture weighted for the impact that the loss at bankruptcy has on the entrepreneur's personal wealth.*

The remuneration in a venture is a function of the risk incurred. In fact, lenders charge a premium on risk-free interest rate that is a function of the risk they incur (that is the probability of default of the borrower and the loss in case of default). Entrepreneurs can use the same logic in order to work out their return: they have to receive the remuneration on the invested funds proportional to the probability that their venture could go bankrupt weighting such a probability for the impact the venture's liquidation would have on their personal wealth. This remuneration is expected to compensate for the risk incurred by the entrepreneurs, irrespective of their propensity to risk. Thus, this remuneration can be defined as the "minimum" return for the risk entrepreneurs incur when they provide funds to the venture.

Definition: *The "minimum" rate of return on the funds provided by an entrepreneur is the remuneration that compensates for the risk of bankruptcy of the venture in which the entrepreneur has invested, weighted for the impact the loss at liquidation would have on the entrepreneur's personal wealth.*

Interestingly, the "minimum" rate of return is independent from any personal valuation made by the entrepreneur and therefore it is unaffected by the overconfidence that characterizes entrepreneurs (Landier & Thesmar, 2009) as well as by any other benefit the entrepreneur may enjoy (Hamilton, 2000, Moskowitz & Vissing-Jorgenssen, 2002): it does not necessarily represent the expected return of the specific entrepreneur. It represents what the entrepreneurs have to require from their investment because of the risk they incur.

3 The Model

The previous reasoning clearly indicates that the "minimum return" mirrors the logic behind the interest premium charged by lenders: lenders look at the probability of default of a loan; entrepreneurs should look at the probability of bankruptcy. Lenders pay attention to the loss at default of the loan; entrepreneurs concentrate on the loss they incur in the case of the venture faces the liquidation. What differentiates entrepreneurs from lenders is the fact that if the former consider the risk too high, there is no venture at all; when entrepreneurs decide to start the venture they always

accept (and cope with) high level of risk. However, entrepreneurs are risk adverse, they are rational and their decision to invest in a venture is not a gamble. Indeed, they decide to invest in a venture if and only if the expected reward gained in the outcome of a positive event (associated with a probability) at least compensates for the loss incurred in case of an adverse outcome (also associated with a probability). In fact, one can accept the risk only if the potential remuneration linked to favorable outcomes at least compensates for the number of events in which a loss will occur: otherwise they will be worse off.
The overall risk a venture faces, that is the probability of un-success, can be decomposed into two components, a cluster risk and a firm specific risk: different cluster of firms (characterised by industry, age, market in which operate, etc.) are characterised by different survival rates and, thus, different probabilities of failure; entrepreneurs are characterised by different capabilities and competences in running their business and by different histories of success/unsuccess. Thus, prospectively different entrepreneurs are characterised by different probabilities of un-success.

We define the overall probability of un-success as the product of the cluster probability of failure and the entrepreneur's probability of un-success. We define this overall probability as p.

Let us start by working out the *cluster risk*. In line with Cheung (1999), let us define $t = 1, \ldots, T$ as the t^{th} time period, and $i = 1, \ldots, N_t$ as the i^{th} firm belonging to a specific cluster, where N_t denotes the number of firms in the cluster at time t.[1] This cluster is characterized by a specific level of risk, which represents the probability, P_t^B, that the average firm in the cluster goes bankrupt in a specific period $t+1$. Let $\mathbf{P}_{t+1}$ be the vector containing the probabilities that the average firm in the cluster goes/goes not bankrupt in a specific period $t+1$.

$$\mathbf{P}_{t+1} = \begin{pmatrix} p_{t+1}^{NB} \\ p_{t+1}^{B} \end{pmatrix},$$

where $\{B, NB\}$ stand for bankrupt and not bankrupt. We assume for example that the probability p_{t+1}^B can be either derived as the number of firms in a specific cluster that goes bankrupt in a specific period $t+1$ divided by the overall number of firms in the cluster in period $t+1$ or by some index reflecting the overall state of the cluster.

We can now turn our attention to the *firm specific risk* that is the risk attached to poor

[1] A cluster is characterized by age, the market in which the firm operates the product/service it delivers, size, etc.

entrepreneurial performance. Let us assume that firms/entrepreneurs have a previous history of running projects. Some of them were successful ones, other unsuccessful. However, the unsuccessful ones did not compromise the entrepreneurial activity of the entrepreneur. Thus, we consider the unsuccessful projects as those that generate a loss but that did not drive the entrepreneur into the liquidation stage: the entrepreneur survived all previous projects irrespective of their success. However, more capable entrepreneurs have a higher level of success (that is have more projects that produce profits) than less capable ones. Let us measure the entrepreneur's i performance through their firm's performance in period t, as $PERF_{i,t} = EBITDA_{i,t}$. Since EBITDA considers the earnings before interest, taxation, depreciation and amortization, it is not affected by the financing policy as well as by taxation strategy carried on by the firm. It is also only weakly affected by depreciation/amortization strategy. Finally, EBITDA is a good proxy of the capability of the venture to generate cash from on-going operations. Previous success can be measured by verifying whether $PERF_{i,t}$ is above zero or below zero. Let $\mathbf{P}_{i,t+1}$ be the vector containing the probabilities that the firm i is successful/unsucessful in a specific period $t+1$.

$$\mathbf{P}_{i,t+1} = \begin{pmatrix} p^S_{i,t+1} \\ p^U_{i,t+1} \end{pmatrix},$$

where $\{S, U\}$ stand for successful and unsuccessful.

Assume that the cluster risk, $\mathbf{P}_{t+1}$, and the entrepreneur's i risk, $\mathbf{P}_{i,t+1}$, are related through the following transition matrix $\Pi_{i,t+1}$

$$\begin{aligned} \mathbf{P}_{i,t+1} &= \Pi'_{i,t+1}\mathbf{P}_{t+1}, \\ \text{where} \quad \Pi'_{i,t+1} &= \begin{pmatrix} \pi^{SS}_{i,t+1} & \pi^{SU}_{i,t+1} \\ \pi^{US}_{i,t+1} & \pi^{UU}_{i,t+1} \end{pmatrix}, \end{aligned}$$

where S and U denote the two states of the world, the successful, in which the entrepreneur was successful in running the firm and the unsuccessful one, in which the entrepreneur wasn't. $\pi^{SS}_{i,t+1}$, resp. $\pi^{UU}_{i,t+1}$, is the transition probability that the project of the i's company is successful, resp. unsuccessful, in $t+1$ given that the cluster to which the company belongs to is a successful, resp. bad/unsuccessful, one in $t+1$. The transition probabilities on the off-diagonal indicate that the project of the i's company is successful, resp. unsuccessful, in $t+1$ given that the cluster to which the firm belongs to is unsuccessful, resp. successful is $t+1$.[2] Consequently, using the performance measure, $PERF_{i,t}$, introduced above, the transition probabilities can be

[2]Note that the sum of a column is equal to one by definition.

rewritten as

$$\begin{aligned}
\pi_{i,t+1}^{SS} &= \Pr\left[PERF_{i,t+1} > 0 | p_{t+1}^{S}\right] \\
\pi_{i,t+1}^{SU} &= \Pr\left[PERF_{i,t+1} > 0 | p_{t+1}^{U}\right] \\
\pi_{i,t+1}^{US} &= \Pr\left[PERF_{i,t+1} < 0 | p_{t+1}^{S}\right] \\
\pi_{i,t+1}^{UU} &= \Pr\left[PERF_{i,t+1} < 0 | p_{t+1}^{U}\right].
\end{aligned}$$

This means that the probability that the firm i is successful/unsuccessful in $t+1$ can be written as

$$\begin{aligned}
p_{i,t+1}^{S} &= \pi_{i,t+1}^{SS} \times p_{t+1}^{S} + \pi_{i,t+1}^{SU} \times p_{t+1}^{U} \\
p_{i,t+1}^{U} &= \pi_{i,t+1}^{US} \times p_{t+1}^{S} + \pi_{i,t+1}^{UU} \times p_{t+1}^{U}.
\end{aligned}$$

Given that the sum of the transition probabilities in a column are equal to one, we only need to model and estimate two probabilities out of the four. In order to model the transition probabilities, we use a logit model given by[3]

$$\pi_{i,t+1}^{SU} = \frac{\exp(\Lambda_{i,t+1}^{SU})}{\exp(\Lambda_{i,t+1}^{SU}) + \exp(\Lambda_{i,t+1}^{UU})} \tag{1}$$

$$\pi_{i,t+1}^{US} = \frac{\exp(\Lambda_{i,t+1}^{US})}{\exp(\Lambda_{i,t+1}^{US}) + \exp(\Lambda_{i,t+1}^{SS})}\,, \tag{2}$$

where the log-odds ratio $\Lambda_{i,t+1}^{SU}, \Lambda_{i,t+1}^{US}\Lambda_{i,t+1}^{SS}, \Lambda_{i,t+1}^{UU}$, will be specified below. As normalization constraint, we use as the reference category the no transition category, i.e. $\Lambda_{i,t+1}^{SS} = 0$ and $\Lambda_{i,t+1}^{UU} = 0$, such that the odds ratios are defined as the quotient of a given transition probability to the probability of no transition. Note that we only need 1 equation to describe a variable with 2 categories, so that the choice of the reference category does not matter. It can always be obtained from the other category using a back transformation. For example, in our case, using $\Lambda_{i,t+1}^{SS}$ as the reference category leads to

$$\begin{aligned}
\pi_{i,t+1}^{US} &= \frac{\exp(\Lambda_{i,t+1}^{US})}{1 + \exp(\Lambda_{i,t+1}^{US})} \\
\pi_{i,t+1}^{SS} &= \frac{1}{1 + \exp(\Lambda_{i,t+1}^{US})}\,.
\end{aligned}$$

The log-odds ratios given by

$$\Lambda_{i,t+1}^{SU} = \ln\left[\frac{\pi_{i,t+h}^{SU}}{\pi_{i,t+h}^{UU}}\right] \quad \text{and} \quad \Lambda_{i,t+1}^{US} = \ln\left[\frac{\pi_{i,t+h}^{US}}{\pi_{i,t+h}^{SS}}\right]$$

[3]Note that given the specification of our model, it can be easily extended to one containing a transition matrix with more states of the world. In this case, the transition probabilities can be modeled with a multinomial logit model and estimated in the same way with maximum likelihood.

are then specified through a multivariate linear form. This specification will allow us to introduce explanatory variables which are firm specific, like a dummy representing previous success of the entrepreneur for example and explanatory variables being cluster specific.

The transition probabilities can be expressed as the sum of the transition matrix and the probabilities at the cluster level, and can easily be estimated by maximum likelihood. This leads to a log likelihood function, $\ln \mathcal{L}$, of the form

$$\ln \mathcal{L} = \sum_{t=1}^{T} \sum_{i=1}^{N} \sum_{l=1}^{L} \mathbb{1}_{\{\tilde{Y}_{l,t+1|\mathcal{F}_{it}}=1\}} \ln \mathbf{P}_{it+1,l}, \tag{3}$$

where $\mathbf{P}_{it+1,l} = \sum_{k=1}^{K} \pi_{it+1}^{kl} \cdot \mathbf{P}_{t+1,k}$, where $k, l \in \{S, U\}$.

Entrepreneurs invest in the firm part of their personal wealth in different forms. In fact, very often the entrepreneurs provide to the firm both equity and personal collateral in order to gain credit from the bank. When entrepreneurs provide the bank with personal collateral they implicitly increase their stake in the venture since they increase the quota of personal wealth invested in the venture. In this case, the bank is actually transforming entrepreneurs' assets that are not liquid (such as properties) into liquid assets, preventing the entrepreneur from selling them to finance the firm. The case of adverse outcome will wipe out the equity invested in the venture and the personal wealth that has been used as collateral less the amount of firm's assets that can be used to repay the collateralized debt. Thus, the impact on personal wealth of the adverse outcome is

$$L_B = \frac{E + Dc - Ab}{T_{pw}} \tag{4}$$

where E is the equity provided, Dc is the bank debt which is collateralized with personal assets, Ab is the value of firm's assets in bad state (that is in liquidation) that can be used to pay back the bank debt hedged by personal collateral and (hopefully) the equity invested by the entrepreneur. T_{pw} is the total wealth of the entrepreneur. Indeed, in the case of liquidation, the bank will firstly be paid back by using the firm's assets. Thus, what is at risk is the difference between the equity invested in the venture, the amount of debt that is collateralized with personal assets Dc on one hand and the value of firm's assets that can be used to pay back the bank Ab.

We assume $T_{pw} \geq Dc + E$ since the entrepreneurs can as a maximum allocate their entire personal wealth as equity and personal collateral. In fact, from the entrepreneur's point of view any situation $T_{pw} \leq Dc + E$ (i.e. the total invested wealth is smaller than

the equity and the collateral provided) generates the same adverse impact as $T_{pw} = Dc + E$. As a consequence $0 \leq \frac{E+Dc-Ab}{T_{pw}} \leq 1$ where the wealth at risk is constrained to 0 when $Ab \geq E + Dc$ that is when the firm's assets can be used to repay the entire bank debt and the equity invested and 1 when $T_{pw} = Dc + E - Ab$ that is when the entrepreneurs lose their en-tire wealth in bad state liquidation. Consequently, given the overall probability of unsuccess p as defined above, the overall minimum average expected premium required by the entrepreneur weighted by the amount of personal wealth invested in the venture can be worked out simply as

$$\mathrm{Re}_{\pi} = \frac{p}{1-p} \cdot \frac{E + Dc - Ab}{T_{pw}}, \tag{5}$$

and the minimum weighted return expected by the entrepreneur

$$\mathrm{Re} = \mathrm{Re}_{free} + \frac{p}{1-p} \cdot \frac{E + Dc - Ab}{T_{pw}}, \tag{6}$$

where Re_{free} denotes the risk free rate.
Given that $0 \leq p \leq 1$ and $0 \leq E + Dc - Ab \leq T_{pw}$, equation (6) is always positive. Indeed, there is no venture with a negative weighted probability of bankruptcy.

The curve represented by equation (6) has domain 0, 1 and an asymptote when the probability of bankruptcy equals 1 ($Re = \infty$). In fact, the curve is truncated somewhere on the right earlier than the asymptote since the entrepreneur would hardly accept investing in a very high-risk venture mainly because a high-risk venture could hardly provide a return that would compensate for the risk incurred. Clearly, the truncation depends on the remuneration capability of the project.

What is worked out mathematically above is the minimum average weighted return the entrepreneur has to demand to the venture in order to avoid being worse off. In fact, any return below the value worked out with the suggested formula does not compensate for the risk of bankruptcy and the damage to personal wealth that the entrepreneur incurs by invest-ing in the venture. In other words, the reward gained does not compensate for the probability of facing a negative outcome. Any average return above that worked out according to the provided formula, gives an extra reward with respect to the minimal reward that compensates for the probability of an adverse outcome.

4 Working out the Weighted Average Cost of Capital

The minimum average expected return as worked out above contains two components: entrepreneurs' remuneration for the equity and entrepreneurs' remuneration for the collateralized debt. It is easy to split the above formula into the two components.
The remuneration for the invested equity will be the remuneration for the risk of ad-verse outcome weighted for the impact that loosing the equity has on the entrepreneurs' total wealth. Thus, it will be

$$\mathrm{Re} = \mathrm{Re}_{free} + \frac{p}{1-p} \cdot \frac{E}{T_{pw}} \tag{7}$$

In fact, in this case, the probability of bankruptcy has to be weighted only for the impact that loosing the invested equity has on the entrepreneur personal wealth.

When entrepreneurs provide private collateral for granting credit access to the firm, they have to receive the remuneration on the additional stake they are investing in the venture. Also in this case, the remuneration for the invested personal wealth will be the remuneration for the risk of adverse outcome weighted for the impact that loosing the personal wealth has on the entrepreneurs' total wealth. However, differently from the equity, in this case a quota of the collateralized debt could be repaid by the firm by selling its assets, reducing implicitly the adverse impact on personal wealth.
The cost of collateralized debt will be the remuneration for the entrepreneurs and the traditional interest rate charged by the bank

$$Ri_c = \mathrm{Re}_{free} + \frac{p}{1-p} \cdot \frac{Dc - Ab}{T_{pw}} + Ri \tag{8}$$

Finally, the cost of uncollateralized debt will be as usual simply the interest rate charged by the bank, that is

$$Ri \tag{9}$$

Consequently, by putting together equation (7), (8) and (9), it is possible to work out the average cost of capital as

$$\begin{aligned} WACC &= \left[\mathrm{Re}_{free} + \frac{p}{1-p} \cdot \frac{E}{T_{pw}}\right] \cdot \frac{E}{Dc + D + E} \\ &+ \left[\mathrm{Re}_{free} + \frac{p}{1-p} \cdot \frac{Dc - Ab}{T_{pw}} + Ri \cdot (t-1)\right] + \frac{Dc}{Dc + D + E} \\ &+ Ri \cdot (t-1) \cdot \frac{D}{Dc + D + E} \end{aligned} \tag{10}$$

where the first line represents the cost of equity, the second line the cost of collateralized debt and the third line the cost of the uncollateralized debt.

5 Simulations

In this section we figure out three different WACC for high, medium and low risk ventures. In each example, we work out the WACC for different mix of equity and collateralized debt given the overall probability of un-success of the venture (high, medium, low) and all other values needed to figure out the WACC.

We assume that in all scenarios the entrepreneur has a total personal wealth of 120, the project they would like to implement needs 100 and firm's assets that can be used to repay collateralized debt worth 30. The tax rate is 33% and the bank interest rate is 5%. Finally, the risk free rate is 2%.

The first scenario describes the changes in the WACC in a high risk venture: in this case the firm considered operates in the high technological sector and the entrepreneur has not been very successful in running their previous projects. The bankruptcy's rate of the cluster of firms the venture belongs is quite high. Table 1 and 2 report the basic statistics of the cluster and of the firms. The performance of firms in a cluster of high risk follows a normal distribution with mean 1 and standard deviation equal to 0.8. When the value is negative, we conclude that the performance of the firm was poor, and that the year was unsuccessful. The cluster risk is approximately 10%.

Year	Prob. of going Bankrupt	Prob. of going Not Bankrupt
1	0.1458	0.8541
2	0.1041	0.8958
3	0.0625	0.9375
4	0.1041	0.8958
5	0.0833	0.9166
6	0.1180	0.8819
7	0.0694	0.9305
8	0.0902	0.9097
9	0.0833	0.9166
10	0.1388	0.8611

Table 1: Simulated Cluster risk for each of the 10 years. Column 1 displays the year. Column 2 and 3 represent the probabilities that the average firm in the cluster goes/goes not bankrupt in a specific period.

Number of unsuccessful years	Number of firms
0	48
1	61
2	25
3	8
4	1
5	1
6	0

Table 2: Number of unsuccessful years over the 10 years. Column 1 displays the total number of unsuccessful years over the 10 years. Column 2 shows how many firms faced a specific number of unsuccessful years over the 10 years.

All in all, the overall probability of un-success worked out according the model explained in section 3 is 0.6.

According to pairs of equity (x axis) and collateralized debt (y axis) the model produces WACC (z axis).

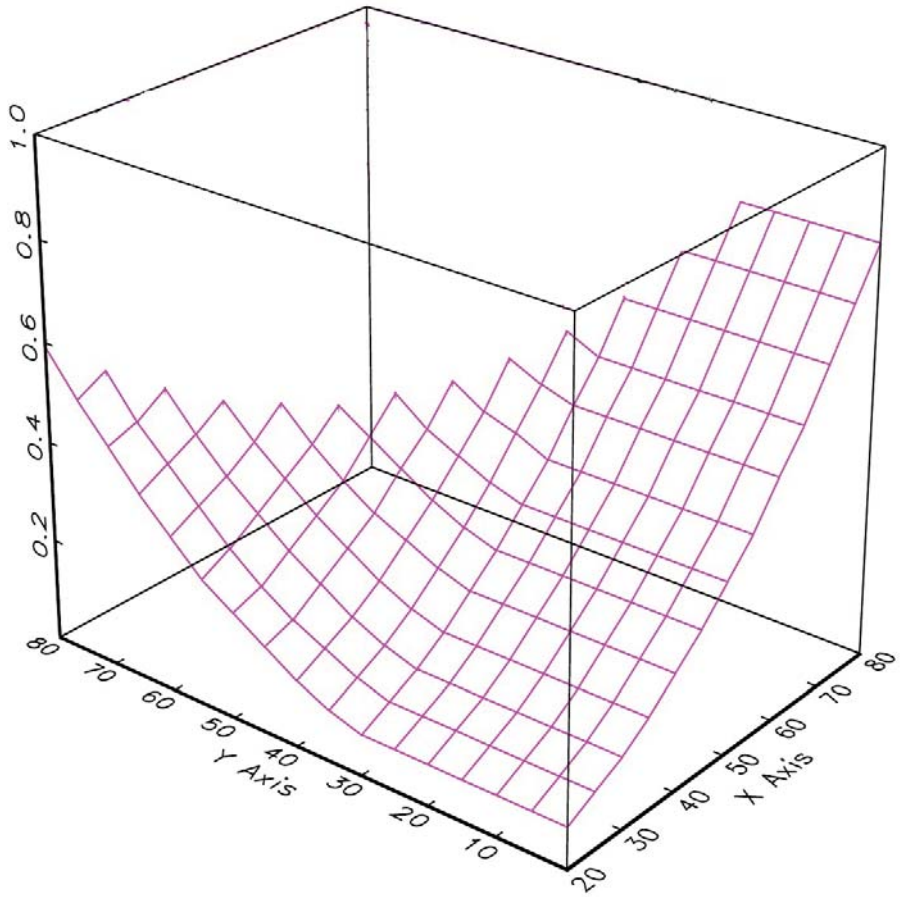

Figure 1: High Risk

The values produced in this first scenario suggest a high variability of WACC (WACC between 8.08% - when the firm relies on equity and uncollateralized debt only and 82.27% - when the firm is highly leveraged with collateralized debt). Indeed, the plan that represents the WACC for different combinations of equity and collateralized debt is quite steep. In addition, in more than 17% of the scenarios (mix of equity and collateralized debt) the weighted cost of equity is cheaper than the weighted cost of collateralized debt. The last finding has interesting implications that will be discussed in the section 6.

The second scenario considers an entrepreneurs that operates in the real estate sector and that historically has been relatively successful. Table 3 and 4 report the basic statistics of the cluster. The performance of firms in a cluster follows a normal distribution with mean 1 and standard deviation equal to 0.6. When the value is negative, we conclude that the performance of the firm was poor, and that the firm was unsuccessful. The cluster risk is approximately 5%.

Year	Prob. of going Bankrupt	Prob. of going Not Bankrupt
1	0.0694	0.9305
2	0.0763	0.9236
3	0.0208	0.9791
4	0.0486	0.9513
5	0.0486	0.9513
6	0.0555	0.9444
7	0.0347	0.9652
8	0.0347	0.9652
9	0.0277	0.9722
10	0.0486	0.9513

Table 3: Simulated Cluster risk for each of the 10 years. Column 1 displays the year. Column 2 and 3 represent the probabilities that the average firm in the cluster goes/goes not bankrupt in a specific period.

Number of unsuccessful projects	Number of firms
0	94
1	35
2	13
3	2
4	0
5	0
6	0

Table 4: Number of unsuccessful years over the 10 years. Column 1 displays the total number of unsuccessful years over the 10 years. Column 2 shows how many firms faced a specific number of unsuccessful years over the 10 years.

In this case, by using the the model explained in section 3, the resulting overall probability of un-success is 0.35

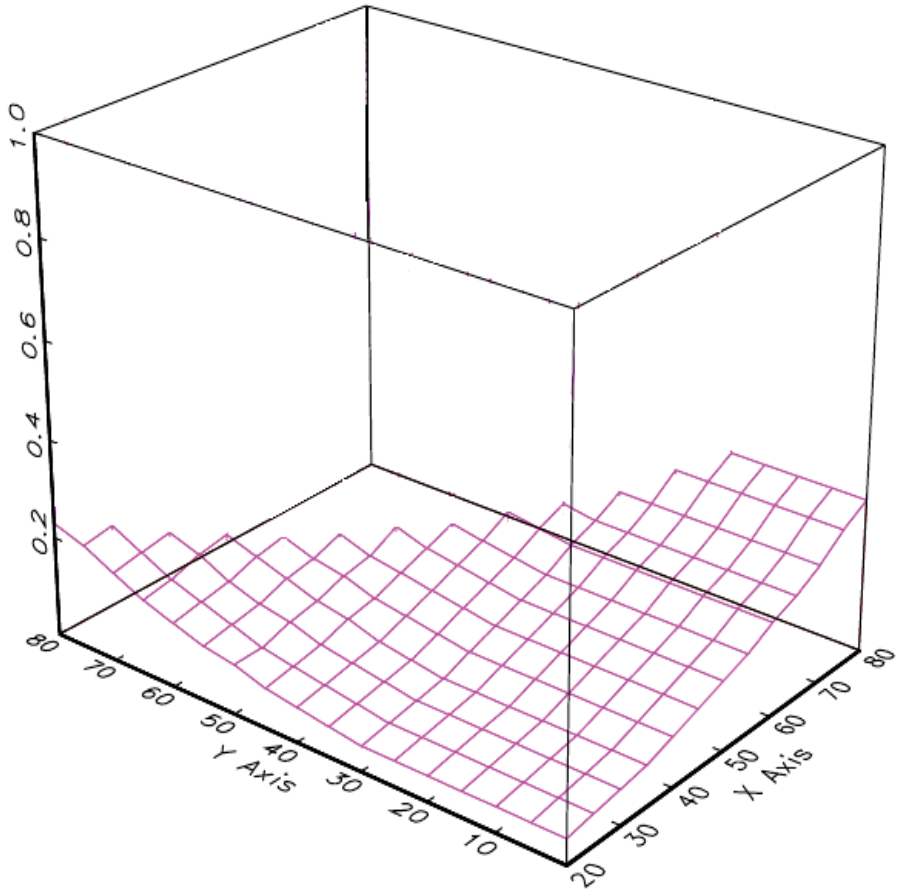

Figure 2: Medium Risk

In the case of medium risk venture, the values produced in the simulation suggest a lower variability of WACC (WACC between 4.87% and 30.39%). Indeed, the plan is

flatter than in previous scenario. In addition, in more than 19% of the scenarios the weighted cost of equity is cheaper than the weighted cost of collateralized debt.

The third and final scenario considers an entrepreneur who in the largest majority of previous project have been successful and that has been able to capitalize the knowledge linked to mistakes occurred in the past. In addition, he operates in the trade sector (that traditionally has a quite high survival rate). Table 5 and 6 report the basic statistics of this cluster of firms and of the entrepreneur. The performance of firms in a cluster follows a normal distribution with mean 1 and standard deviation equal to 0.4. When the value is negative, we conclude that the performance of the firm was poor, and that the firm was unsuccessful. The cluster risk is approximately 1%.

Year	Prob. of going Bankrupt	Prob. of going Not Bankrupt
1	0.0069	0.9930
2	0.0069	0.9930
3	0.0000	1.0000
4	0.0138	0.9861
5	0.0000	1.0000
6	0.0138	0.9861
7	0.0000	1.0000
8	0.0069	0.9930
9	0.0138	0.9861
10	0.0069	0.9930

Table 5: Simulated Cluster risk for each of the 10 years. Column 1 displays the year. Column 2 and 3 represent the probabilities that the average firm in the cluster goes/goes not bankrupt in a specific period.

Number of unsuccessful projects	Number of firms
0	134
1	10
2	0
3	0
4	0
5	0
6	0

Table 6: Number of unsuccessful years over the 10 years. Column 1 displays the total number of unsuccessful years over the 10 years. Column 2 shows how many firms faced a specific number of unsuccessful years over the 10 years.

In this case, by using the the model explained in section 3, the resulting overall probability of un-success is 0.21

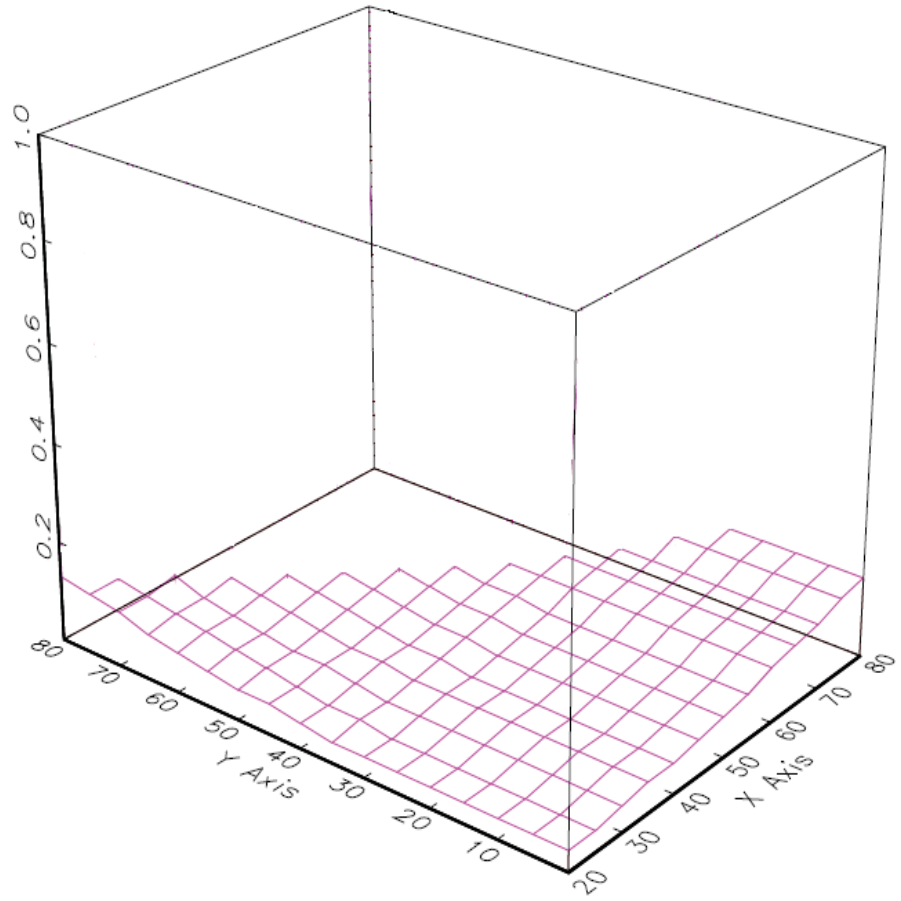

Figure 3: Low Risk

In the case of low risk venture, the values produced in the scenario suggest a very limited variability of WACC - very flat plan (WACC between 3.97% and 16.45%). In addition, in more than 20% of the scenarios the weighted cost of equity is cheaper than the weighted cost of collateralized debt.
The scenarios presented here have some intriguing implications of the model illustrated in section 3 and 4.

Firstly, the lower the risk of the firm (probability of un-success of the venture) the lower the variability of the WACC: this finding is quite sensible. Indeed, if WACC should compensate for the risk incurred, the lower the probability of adverse outcome the smaller the need to compensate for the risk when the venture's financial structure is more leveraged (and therefore riskier).
Secondly, the lower the risk of the firm (probability of un-success of the venture) the

higher the probability that the cost of collateralized debt is bigger than the cost of equity: this finding is very interesting. Indeed, it suggests that entrepreneurs/cluster of firms that are less risky should avoid to leverage too much collateralized debt. In fact, they should use either more equity or uncollateralized debt to finance their venture. Alternatively, they can find that trade credit is more convenient than collateralized debt and, therefore, incresase the amount of trade credit used (this topic will be discussed in detail in the following secton).
Finally, according to data not reported here, collateralized debt is more expensive than equity when the firm relies heavily on collateralized debt (highly leveraged).

6 Model Implication

Present model provides a threshold for taking decision about prospective projects: running a project that remunerates the entrepreneurs less than the minimum average return is not sensible since the return will not compensate for risk incurred by the entrepreneur. Additional monetary and non-monetary remuneration have to be over and above the suggested minimum average return. The model illustrated here has some interesting characteristics and implications.

Irrespective of the mathematical description (that can be perceived as complex), the model is easy to apply. Whoever would like to use this model needs just two inputs: the survival rate of the cluster the venture belongs to; the history of entrepreneur's previous success measured simply as the periods (t) with a positive EBITDA. The former input is in the public domain and can be easily accessed in the local chamber of commerce; the latter input can be easily accessed by the entrepreneurs by looking at the historical performance of their venture or previous projects: in fact EBITDA is a value that can be easily figured out both at firm and at project level. Interestingly enough, the model can also be used by banks in order to decide whether the project the entrepreneur is interested to pursue is worth financing or not. In fact, also the banks can easily access the survival rate of the cluster the venture belongs to. Moreover, they can quite easily access information about previous performance of the entrepreneur (that is the EBITDA) in particular when they have an established relationship with the entrepreneur.

It is worth noting that all the additional information needed in order to work out the WACC is also accessible and known by the entrepreneur: the amount of personal wealth, the amount of equity, collateralized and uncollateralized debt that will be invested in the project, as well as tax and interest rate charged by the bank. Interest-

ingly enough, this information can quite easily be accessed also by the bank, especially when it has an established relationship with the entrepreneur.

The most interesting and relevant implication of the model is that equity is not necessarily the most expensive source of finance as clearly shown in the simulation. This finding is at variance with pecking order theory as explained by Myers & Majluf (1984). This happens simply because the collateralized debt has to remunerate both the bank and the entrepreneur. In fact, the additional stake at risk linked to grant the bank with personal collateral can be very relevant for the entrepreneur. This depends on two elements: firstly the value of the firm assets since the lower the value of firm's assets that can be used to repay the collateralized debt, the bigger the additional stake at risk. All other things equal, in case of adverse outcome, the entrepreneur will have to use a higher amount of personal wealth to repay firm's debt if the value of firm's assets is very low and they can hardly be used to repay the collateralized debt; secondly, the amount of personal wealth since the greater the percentage of personal wealth that is indirectly invested in the venture via personal collateral, the greater the negative impact the entrepreneur will suffer in the case of adverse outcome. In fact, the entrepreneur should be compensated for the additional negative impact that their personal wealth can suffer (that is for the additional concentration in their investment). Such compensation is transferred as a higher cost of funding for the venture.

Interestingly, the suggested model has additional implication in terms of financial structure of the venture since it provides additional explanation about the use of trade credit. Previous research finds that trade credit is widely used by SMEs, since it is easily accessible and is considered also to be a signalling device about the firm, its products and future prospects (Paul & Wilson, 2006). Cuñat (2006) stresses that trade credit can be a two or one part contract. In the former case, the customer is entitled to receive a discount if they pay immediately; in the latter case, the customer does not receive any discount if they pay cash. For the two parts contract, the cost of trade credit is defined as the discount received by the customer when they pay cash. Previous research provides strong evidence that, in the case of two part contracts, the cost of trade credit is very high (Huygherbaert et al. 2007, Cuñat, 2006, Petersen & Rajan, 1994). However, irrespective of the cost, firms rely on trade credit because it is the easiest source of finance - definitely easier to obtain than bank finance (Petersen & Rajan, 1997). Suppliers are typically more supportive to customers when they need extended credit than banks are (Howorth & Reber, 2003) by supplying additional services/goods (Cuñat, 2006). Such additional extended trade credit is costless since suppliers do not charge extra fees to the customers. In fact, suppliers are in a better

position than banks to evaluate the credit quality of the customer, they have more tools to enforce proper behavior in the customer and therefore have greater control over the credit provided (Cuñat, 2006). Thus, Cuñat (2006) concludes, arguing that the high price of trade credit incorporates an insurance premium that customers pay in order to be sure of obtaining (non-bank) credit when other sources of finance (typically banks) dry up.

However, according to our model, an additional explanation can be provided about why firm rely on trade credit when it apeares to be so expensive. In fact, when the cost of the collateralized debt is higher than the cost of trade credit because of the personal collateral asked by the bank in order to guarantee short term credit, it could be sensible for entrepreneurs to opt for trade credit instead of bank credit (or at least switch part of funding on to trade credit). It is worth noting that in our scenarios the maximum difference between the cost of collateralized debt and the cost of uncollateralized debt is 63.33% - uncollateralized debt net cost: 3.35%; collateralized debt net cost: 66.68% (in the case of high risk firm). Interestingly, the discount of 3% on cash payments on a 60 days trade credit (quite common) implies an annual interest rate of higher than 20%. Thus, by just looking at the cost of finance and without taking in any consideration about constraints such as the fact that the accessible trade credit depends on the amount of service and raw materials that are bought, in the case of the high risk simulation, in more than 60% of the cases, the trade credit is cheaper than the collateralized debt. However, the percentage drops dramatically in the case of medium risk while for the low risk firms the cost of collateralized debt is always lower than the cost of trade credit. Thus, for riskier ventures it is sensible to use trade credit also because it is cheaper than the collateralized debt.

7 Conclusion

This paper presents a model for the minimum expected return on equity invested in a venture by entrepreneurs. The existing finance literature is incomplete with respect to the capital structure of SMEs and more specifically to the expected return of entrepreneurs. In fact, previous literature tends to model the behavior of entrepreneurs according to that of investors. This paper suggests viewing entrepreneurs as mainly providers of funds who require a return for the risk they incur by investing in the venture: the risk that the venture may go bust and the impact that such an adverse event would have on entrepreneurs' personal wealth. Thus, it is suggested that entrepreneurs should demand a "minimum" return worked out as the return that compensates for the probability of bankruptcy of the venture weighting it by the loss at liquidation

entrepreneurs might incur. Such a return represents the border between the return that can be accepted by the entrepreneur and that that cannot.

The suggested model is considered a step ahead in supporting the analysis of investment for SMEs. Even if the suggested model does not provide the "real" expected return for the entrepreneur, it provides a "minimum" one that can be useful when firms need to evaluate a project.

This paper opens into at least two streams of research. The first stream could consider the development and improvement of measurement of the probability of bankruptcy that is suggested in the present model. The second could test the model empirically.

However, despite the limitations, the proposed model indicates that the return of equity for entrepreneurs and, more specifically, for a specific venture in a specific context can be worked out. Thus, this research extends the scope for and effective application of present value techniques in SME project evaluation.

References

Ang, J. (1992): "On the Theory of Finance for Privately Held Firms," *Journal of Small Business Finance*, 4, 197–210.

Ang, J., J. W. Lin, & F. Tyler (1995): "Evidence of the Lack of Separation Between Business and Personal Risk Among Small Business," *Journal of Small Business Finance*, 1, 185–203.

Avery, R., R. Bostic, & K. Samolyk (2001): "The Role of Personal Wealth in Small Business Finance," *Journal of Banking and Finance*, 22, 1019–1061.

Berger, A., L. Klapper, & G. Udell (2001): "The Ability of Bank to Lend to Informationally Opaque Small Business," *Journal of Banking and Finance*, 25, 2127–2167.

Boyce, W. & J. Kalotay (1979): "Tax Differentials and Callable Bonds," *The Journal of Finance*, 34, 825–838.

Brick, I. & S. Ravid (1985): "On the Relevance of Debt Maturity Structure," *The Journal of Finance*, 40, 1423–1437.

Cassar, G. (2004): "The Financing of Business Start Up," *Journal of Business Venturing*, 19, 261–283.

Cassar, G. & S. Holmes (2003): "Capital structure and financing of SMEs: Australian evidence," *Accounting and Finance*, 43, 123–147.

Chaganti, R., D. DeCarolis, & D. Deeds (1995): "Predictors of Capital Structure in Small Ventures," *Entrepreneurship Theory and Practice*, Winter 1995, 7–18.

Cheung, J. (1999): "A Probability Based Approach to Estimating Costs of Capital for Small Business," *Small Business Economics*, 12, 331–336.

Cuñat, V. (2006): "Trade Credit: Suppliers and Debt Collectors and Insurance Providers," *Review of Financial Studies*, 20, 491–527.

Degryse, P., P. de Goeij, & P. Kappert (in press): "The Impact of firm and industry characteristics on small firms' capital structure," *Small Business Economics*, DOI 10.1007/s11187-010-9281-8.

Delmar, F. (2000): "The Psychology of the Entrepreneur," *in:* S, S. C. & D. Jones-Evans, eds., "Enterprise and Small Business," Prentice Hall - Harlow;, pp. 132–154.

Ebben, J. & A. Johnson (2006): "Bootstrapping in Small Firms: An Empirical Analysis of Change of Time," *Journal of Business Venturing*, 21, 851–865.

Elston, J. & D. Audretsch (in press): "Financing the Entrepreneurial Decision: An Empirical Approach Using Experimental Data on Risk Attitudes," *in Small Business Economics*, DOI 10.1007/s11187-009-9219-x.

Fama, E. F. (1970): "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance*, 25 , 383–417.

Frielinghaus, A., B. Mostert, & C. Firer (2005): "Capital Structure and the Firm's Life Stage," *South African Journal of Business Management*, 36, 9–18.

Gregory, B., M. Rutherford, S. Oswald, & L. Gardiner (2005): "An Empirical Investigation of the Growth Cycle Theory of Small Firm Financing," *Journal of Small Business Management*, 43, 382–392.

Hall, G., P. Hutchinson, & N. Michaelas (2004): "Determinants of the Capital Structures of European SMEs," *Journal of Business Finance & Accounting*, 31, 711–728.

Hamilton, B. (2000): "Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment," *Journal of Political Economy*, 108, 604–630.

Haney, R. & M. Holmes (2008): "Family Ownership and the Cost of Underdiversification," *Applied Financial Economics*, 18, 1721–1737.

Heaton, J. & D. Lucas (2000): "Portfolio Choice and Asset Prices: The Importance of Entrepreneurial Risk," *The Journal of Finance*, 55, 1163–1198.

Howorth, C. & B. Reber (2003): "Habitual Late Payment of Trade Credit: An Empirical Examina-tion of UK Small Firms," *Managerial and Decision Economics*, 24, 417–482.

Huygherbaert, N., L. V. de Gucht, & C. V. Hule (2007): "The Choice Between Bank Debt and Trade Credit in Business Start Ups," *Small Business Economics*, 29, 435–452.

Jun, S. & F. Jen (2003): "Trade off Model of Debt Maturity Structure," *Review of Quantitative Finance and Accounting*, 20, 5–34.

Kahl, M., J. Liu, & F. Longstaff (2003): "Paper Millionaires: How Valuable is the Stock to a Stockholder who is Restricted from Selling it?" *Journal of Financial Economics*, 67, 385–410.

Kerins, F., J. Smith, & R. Smith (2004): "Opportunity Cost of Capital for Venture Capital Investors and Entrepreneurs," *Journal of Financial and Quantitative Analysis*, 39, 385–406.

Landier, A. & D. Thesmar (2009): "Financial Contracting with Optimistic Entrepreneurs," *Review of Financial Studies*, 22, 117–150.

LaPorta, R., F. L. de Silanes, & A. Schleifer (1999): "Corporate Ownership Around the World," *Journal of Finance*, 54, 471–517.

Mac an Bhaird, C. & B. Lucey (in press): "Determinants of capital structure in Irish SMEs," *Small Business Economics*, DOI 10.1007/s11187-008-9162-6.

Markowitz, H. (1952): "Portfolio Selection," *The Journal of Finance*, 7, 77–91.

Modigliani, F. & M. Miller (1958): "The Cost of Capital, Corporate Finance and the Theory of Investment," *American Economic Review*, 48, 261–296.

Moskowitz, T. & A. Vissing-Jorgenssen (2002): "The Returns to Entrepreneurial Investment: A Private Equity Premium Puzzle," *American Economic Review*, 92, 745–778.

Müller, E. (2011): "Returns to Private Equity - Idiosyncratic Risk Does Matter!" *Review of Finance, forthcoming*, 15, 545–574.

Myers, S. (1977): "On the Irrelevance of the Corporate Financial Policy," *American Economic Review*, 64, 851–866.

Myers, S. & N. Majluf (1984): "Corporate Financial and Investment Decisions When Firms Have Information Investors Do Not Have," *Journal of Financial Economics*, 13, 187–221.

Paul, S. & N. Wilson (2006): "Trade Credit Supply: An Empirical Investigation of Companies Level Data," *Journal of Accounting Business and Management*, 13, 85–113.

Petersen, M. & R. Rajan (1994): "The Benefits of Lending Relationships: Evidence from Small Business Data," *Journal of Finance*, 49, 3–37.

—— (1997): "Trade Credit: Theories and Evidence," *Review of Financial Studies*, 10, 661–691.

Philosophov, L. & V. Philosophov (2005): "Optimization of a Firm's Capital Structure: A Quantitative Approach Based on a Probabilistic Prognosis of Risk and Time of Bankruptcy," *International Review of Financial Analysis*, 14, 191–209.

Rodriguez-Rodriguez, O. (2006): "Trade Credit in Small and Medium Size Firms: An Application of the System Estimator with Panel Data," *Small Business Economics*, 27, 103–126.

Romano, C., G. Tanewski, & K. Smyrnios (2000): "Capital Structure Decision Making: A Model for Family Business," *Journal of Business Venturing*, 16, 285–310.

Russell, J. R. & R. F. Engle (2002): "Econometric Analysis of Discrete-Valued Irregularly-Spaced Financial Transactions Data," Revised Version of Discussion Paper 98-10, University of California, San Diego.

Sharpe, W. (1963): "A Simplified Model for Portfolio Analysis," *Management Science*, 9, 277–293.

—— (1964): "Capital Asset Prices - A Theory of Market Equilibrium Under Conditions of Risk," *Journal of Finance*, 19, 425–442.

Timmons, J. (1999): *New Venture Creation*, McGraw-Hill International Editions: Boston, MA.

Voordeckers, W. & T. Steijvers (2006): "Business Collateral and Personal Commitments in SME Lending," *Journal of Banking and Finance*, 30, 3067–3086.

Wingborg, J. & H. Landstrom (2000): "Financial Bootstrapping in Small Business: Examining Small Business Managers' Resource Acquisition Behaviour," *Journal of Business Venturing*, 16, 235–254.