UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Master Degree Project in Finance

Optimal Capital Structure of Start-Ups

A field study in the venture capital market

Jonas Winberg and Viktor Stensson

Supervisor: Einar Bakke
Master Degree Project No. 2015:95
Graduate School

Abstract

Convertible financing is on the rise as a common method to finance an early stage company. Lots of previous research has been done for later stages of corporate financing and the authors of this thesis want to investigate if such findings also apply in earlier stages. Research among 51 IT-companies in Sweden shows inconclusive results regarding the superiority of a convertible as a financing method. The terms for the convertible are an important factor to consider if faced with a choice of equity or convertible financing. No magical formula for successful financing was found in the study. However the background of the entrepreneur can serve as an indication in determining the risk of bankruptcy. Other conclusions such as the more need for a second round of capital gathering can also be drawn for the research. The final conclusion is however that it is the entrepreneurs that create the value for the firm and the form of financing is less important in the earlier stages. This leads us to both confirming and contradiction of current research and theories. Finally the trend is clear among IT- companies, the convertible is increasing in popularity and is here to stay.

Table of contents

1.0 Introduction

Extensive research has been conducted about the convertible debt and its implications. A clear majority of these papers are focusing on how larger corporations and organizations either issue convertibles or equity. Other research has also been made on specific markets but documented research covering the early stages of corporate financing that highlights the differences among different entrepreneurs has not yet been well explored.

Bascha and Walz found in 2001 that the German venture capital market has had a significant growth in the past years. Additionally they concluded increasing favour for the convertible as an instrument for early stage financing. The results indicated this instrument to be the most preferable for all parties.

For the purpose of this study data from 51 technology companies in Gothenburg was collected and analysed to spot patterns and differences between different entrepreneurs and forms of financing. All firms in the sample were eligible to receive 250 00 SEK in investments either as equity with a firm value of 3,125 MSEK or an exotic convertible instrument with 5% interest and a lower conversion limit at 6%. The entrepreneurs in the dataset were either experienced professionals or students straight from university and thus the profile outcome was also analysed.

With constant improvement in the high-tech business areas and with increasingly more complex products entering the market the understanding of the potential and the entrepreneur's capacity to implement is an increasing challenge for investors. This may lead to severe information asymmetry problems that could lead to a wide range of correlated problems, such as moral hazard and agency problems. If the market fails to provide a solution to this problem the demand and supply in the venture capital market may end up out of sync greatly limiting the economic growth.

Form the data several interesting findings occurred that both confirmed and contradicted traditional theories and gave rise to several interesting additional questions for future research. One may as an example find that many early stage firms either struggle to survive or grow rapidly thus generating hard investment decisions regarding valuations and proper instruments to ensure mutual benefits and firm development.

Differences between the groups were thoroughly investigated to find group specific preferences and the consequences connected to such choices. Analysis regarding the actual financing choices were plotted in order to find potential winners within the groups and recommendations for the entrepreneurs future choices in this question of equity or convertible financing.

The well-known and recognized paper by Modigliani and Miller (1958) states that with no expense for information gathering, no bankruptcy cost and with the absence of taxes the funding and capital structure of a company does not influence the value of the company, i.e. we have a perfect capital market. This is however infamous for not being in agreement with how the real markets around the world really operate and it only really serve as a reference point or a special state. This becomes especially evident if the company in question is highly complicated or if the company is newly established as the cost for information gathering may be of significant proportion. These kinds of expenses are most common for rapidly growing start-up firms. This in turn put a high pressure on the capital market that has given the market the option of using venture capital as an alternative to the use of conservative banks.

Because of the existence of inefficient capital markets, the capital structure and venture capitalists add value to the firm by carefully planning the capital structure and by that the overall structure of the company as well. Chan (1983) argue that an investor gather the resources and knowledge needed to make the best of out of the company and thereafter monitoring the company closely, by Chan argued to be of big importance. Raising the capital is not the only problem entrepreneurs and investors may face but the role of information asymmetry and agency problems also has its effect.

1.1 Venture capital financing

A summary of venture capital financing research made by George Triantis (2001) informs the reader that financing activities done by running companies, start-ups and venture companies does not differ considerably. A noticeable amount of new instrument was designed to satisfy the increasing demand in alternatives for financing company activities. They only difference found was the intensity of usage of convertibles that is more common for venture companies. Triantis also argues that a significant proportion of deals done in a company's early stage are often highly inefficient. The inefficiency is not a difference in information set but rather the difference in bargaining power between the two parties. The reason behind many of the inefficient agreements can be traced to the small and inefficient markets where the entrepreneur gathered its venture capital. This further supports the difference in intensity of the usage of convertibles as a consequence of the urgency of finding alternative financing for inefficient market as markets tends to move towards equilibrium. Due to the fact that bigger market for capital gathering is assumed to be more efficient the higher concentration of various financial arrangement in smaller markets can be explained. We believe that the market would see an increase in financial arrangements can be explained by the development of more open and bigger worldwide markets which is further confirmed by Robert Krol (2001).

1.2 How does confidence/overconfidence play its role

The willingness to delay equity is also a sign that the entrepreneur is confident that the value of his company is likely to increase. However, the question whether the entrepreneur is overly confident or not still needs to be addressed. Malmendier and Tate (2005) found that there is a correlation between CEO's being overly confident in their investment decisions if the cash flow of the company are considerably high. They also learned that being too confident matters even more if the company is dependent upon equity as a source of financing

De la Rosa, Leonidas E. (2007) wrote about the overconfident dilemma but with a moral hazard point of view. The principal agent problem later discussed is a widely spread dilemma and De la Rosa tries to explain how overconfidence may increase with the moral hazard problem. Akerlof and Dickens (1982) give more attention to this along with their explanation that agents in many cases underestimate the risk and thus the likeness of negative outcomes. This could give more incentives to the investors to choose the safer convertible, however the reward of choosing convertible is less profitable.

1.3 purpose of thesis

The purpose of this thesis is to gain a deeper understanding about how the convertible as a financial instrument performs in the venture capital market. If there are specific groups of people, students or professionals, that succeed better than others in building up a value of a firm and if the financing method determine success will be examined. Also, the different outcome as a direct result of a different choice of financial instrument will be investigated as the convertible as an instrument has risen in popularity in recent years.

1.4 Research questions

The first question in this thesis is how the decision of using either equity or convertible financing affects the future performance of the firm.

Secondly, the difference among the entrepreneurial groups and adjoining preferences will be examined to spot potential patterns and group specific characteristics.

Lastly an analysis regarding the actual outcome of the different choices among the groups will be conducted to see if there is any preferred solution within the sample dataset.

In order to fully address these questions, several other financial concepts and theories has to be examined to fully understand the underlying motivations for the results. This includes elaboration on theories regarding asymmetric information, adverse selection, incentive contracting, overconfidence and moral hazard.

1.5 Main results

We made several interesting findings about the initial financing form among Swedish start-ups. These results both confirm and contradict previous research and models. With the used dataset one may even argue whether the traditional theories of financing and capital structure are still valid for an early stage company. There were no clear winners in the data set despite the fact that professionals to some extent have less bankruptcy than students. Among the financing forms there were equal amount of firms that did a correct choice of financing as there were that failed in this decision. Perhaps a new instrument adapted for the rapid hit or miss environment currently seen in the economic industry would be best to please all parties. We did not find any overconfidence issue regarding the choice of instrument.

The most noticeable finding was the fact that to a high extent it was the actual entrepreneur that had the greatest effect on the value of the firm. In the data set, it is evident that it is the experienced professionals that have the best overall performance. However, there is no statistical evidence or firm patterns providing evidence regarding the effect of the chosen capital structure. None of the two groups of entrepreneurs were any experts in selecting the right type of financial structure for their respective firms. Overall the results in this thesis indicate that the traditional frameworks may be used to some extent, but one must always remember that every start-up is unique and that is the actual entrepreneur that creates the value of the firm and not the capital structure or form of financing.

2.0 Theories, concepts and models

2.1 Convertibles

The concept of convertibles is that it works like a hybrid between debt and equity finance. It starts out in the shape of a loan but can later on be converted into equity. This makes the potential upside of the investment much larger and consequently leads to a higher acceptance for lower coupon payments on the debt. The terms can be structured in many different shapes depending on the situation and recently lots of start-ups have raised its first capital with this method. As the convertible is a leverage instrument there are some risks involved and potential up and downsides for both the investors and the entrepreneur. With the presence of agency problems and moral hazard, recent research promotes the use of convertibles instead of equity.

2.2 Why do firms use convertible debt?

Studies made by Brigham (1966), Pilcher (1955), and Hoffmeister (1977) tried by the use of public-opinion polls to find the reason to why firms issue convertible bonds in the first place. They found that the main explanation is that they indirectly want to add equity to the capital structure. The reason why start-ups issues convertibles rather than equity is because of the managers' willingness to delay the equity position to the lender as of the entrepreneurs believe that the company's stock price would increase with time. By the issuing of convertibles instead of equity the company could obtain payment beyond the actual price for the stock. This creates "delayed" equity with the intention of increasing stock prices that causes less dilution according to Brigham that is desirable for both the entrepreneur and also the manager.

The authors previously mentioned also found that the second most important reason for the convertibles is that it can be seen as a "Sweeten debt". The meaning of this is that the convertibles require lesser coupons that a straight bond. The explanation rate with these two reasons was never below 77% in the research. Such findings from these three independent researches clearly state the reason for using a convertible.

The theorem from Miller and Modigliani (1958) that says that capital structure do not matter also argue convertible debt cannot be cheaper than straight debt or equity. This leads the researcher to the conclusion that the market lack of information asymmetry either by the mean of returns or by the managements encouragement to impact the risk in the returns. These two reasons can be explained by the delay of equity and the sweetener. Delaying the equity explains the market returns asymmetry problem and the sweetener is more useful to explain the influence the management has on the risk of the total returns.

2.2 Pecking order theory, asymmetric information and principal agent problem

The pecking order theory suggest that companies prefer to use internal finance as a primary source for financing themselves and equity in the other end as a last resort solution with straight debt, convertibles and other financial instruments in the middle. The reason behind this is the asymmetric information problem. The asymmetric information dilemma is a well-known phenomenon that is created due to that different people in different positions has different information sets. In the regular case, the management of the company has more information than the stockowners, this theory was presented by Donaldson, (1961) and later modified by Myers and Majluf (1984).

This advantage can be used in the purpose of self-interest that can later lead to selfish behaviour and it creates need for stockowners to invest contracts or constraints, and incentives that works against the interest of the stockowner. It also creates needs for higher return as of the information transferred might not be complete and the risk of the investment might increase. Therefore, the company owners chooses the equity alternative as a last resort and prefers the cheapest alternative, internal financing. Theory suggests that this makes the equity alternative the most expensive for the entrepreneur. However, since this known in markets alternative methods is created in purpose to eliminate these effects so the theory is not explaining the fully market mechanism. A great description of all these mechanisms are described in the book The Theory of Corporate Finance written by Tirole (2006).

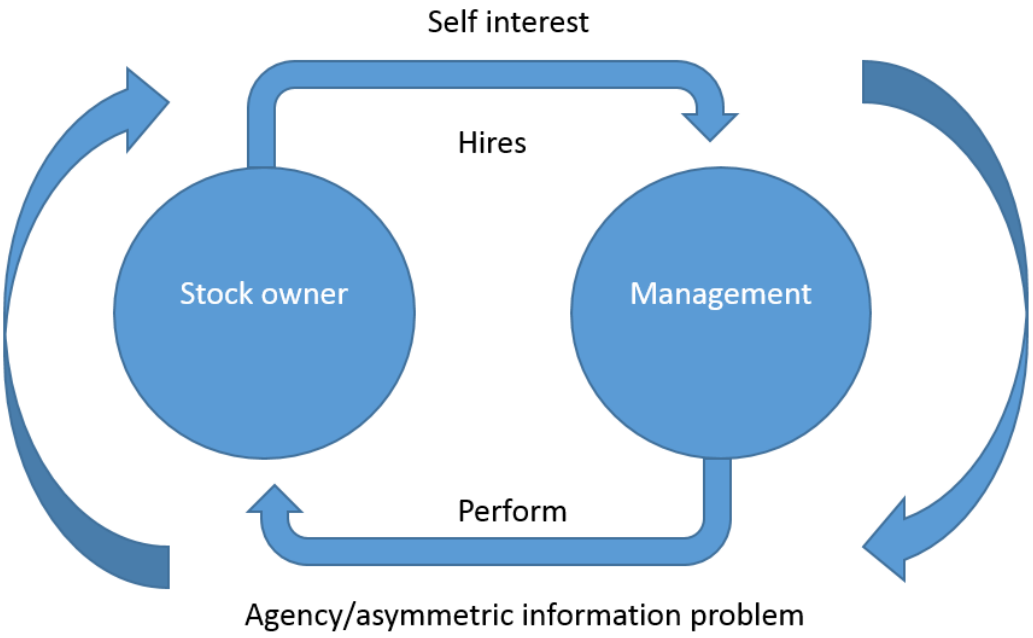


Figure 1.This illustration explains in a simple manner the overall components of the dilemma presented above

2.2 1 Adverse selection

The adverse selection concepts go hand in hand with the asymmetric information problem. The concept, elaborated on by George Akerlof (1970), states that it happens when either the buyer or seller has information that the others don't which makes either part take poor decision even though they think they take a good one.

2.2.2 Moral hazard

Moral hazard problems has been around for over two centuries (Dembe and Boden, 2000) and occurs when both parties in a contract do not work for the greater good of each other and instead enjoys private benefits. One of the main problems is that the investor lack capacity to control or monitor the entrepreneur in such way that the moral hazard problem does not occur. Venture capitalists are often active in the top management of the firm once invested to support the founders. This potentially creates a double moral hazard problem where both the entrepreneur and the venture capitalist enjoy private benefits instead of working for the firm.

Basha & Walz (2001) concluded a convertible is the preferred method for solving such moral hazard problem as both parties are bound to the firms' long-term development. The entrepreneur has to meet the payments for the convertible and the investor wants to raise its payoff to more than the fixed amount of the convertible. The more severe the moral hazard problem is the more suitable is a convertible instrument. For entrepreneurs and investors with long term plans and potential IPO mind-set a convertible may be a viable start.

2.2.3 Window dressing

Window dressing is a strategy where the entrepreneur signals high probability of success or to good numbers to the investors to increase the valuation. Such problems can be resolved by issuing a convertible as the actual equity transaction is postponed until the conversion of the convertible. The reputation aspect of the moral hazard dilemma also plays its role. If the entrepreneur is known for these kinds of activities, later IPOs will be much harder and more questioned. This leads Bascha and Walz (2001) to the conclusion that the venture capital market is to see a rise in the use of convertibles as initial financing.

2.3 Agency theory, incentives, equity multiplier

Jean Tirole presents the financing problem and challenges in his book The Theory of Corporate finance in reasonable way. The entrepreneur can either work hard with possibility PH or don't put in the effort and receive the private benefit B with possibility PL. The investor than have to make sure that (1) the project has to generate positive results. (2) The entrepreneur must put in the high effort, which gives him the pledgeable income (3). The entrepreneur will then be able to take in capital according to (6) and (7).

(1) $P_H * R \geq I$

(2) $P_H * R_b \geq P_l * R_b + B$

(3) $Pledgeable\ income \geq P_h\left(R - \frac{B}{P_h - P_l}\right)$

(4) $P_h\left(R - \frac{B}{P_h - P_l}\right) \geq I - A$

(5) $P_H * (RI - R_b) \geq I - A$

(6) $k * A \geq I$

(7) $k = \frac{1}{1 - p_h(R - \frac{B}{p_h - p_l})} > 1$

(8) $P_h\left(R^S * I - R_b^S\right) + (1 - P_h)(R^F * I - R_b^F \geq I - A$

(9) $I = \frac{A}{1 - (p_h(R - \frac{B}{p_h - p_l} + R^F)}$

The conclusions that can be drawn from his theories is that:

1. "Firms with lower agency costs borrow more"
2. "The investors 'holding safe debt plus some equity maximizes the entrepreneurs stake in the project and thereby her incentives"
3. "Credit rationing is more binding for firms with less tangible assets or assets that have a lower value in liquidation"
4. Since k>1 the borrower can lever her wealth k times.
5. "The multiplier is smaller, the higher the private benefit (B) and the lower the likelihood ratio"

All of these conclusions draw from Tirole (2006) are in favour for the convertible alternative as a source of financing as it then increases the incentives for the entrepreneur. Within our study such incentives comes in the form of less released equity to the incubator when using a convertible and successfully increasing the value of the firm.

2.4 Agency problems importance to the choice of capital structure

Bascha and Walz (2001) found that the bigger the agency and information asymmetry problem is, the more likely is the choice for convertibles as well as other financial instruments. The other way around was concluded as well and companies are more likely to choose regular straight debt financing if the severity of the problem less. Evidence of higher concentration for convertibles and other complex financial instruments was also found in companies that had high hope of an IPO offer. This could be explained from the simple reasoning that the higher the valuation is in the exit step for the entrepreneur the more profitable is the usage of convertibles in comparison to equity. Evidently, the valuation has a cut of point where the equity will be a more preferable option for the initial entrepreneur. This will be further investigated in the empirical parts.

2.5 Capital structure

According to Modigliani & Miller (1958) the capital structure of a firm in a world with perfect capital markets does not affect the valuation of the firm. The choice between either equity or convertible (debt) financing is according to Modigliani & Miller irrelevant for valuation of the firm, however the different methods have different implications. In a small firm with scarce resources the difference between debt and equity financing is in reality the interest to be paid to the debt holders. One may then argue the risk with a leveraged firm increases but in case of a success one must remember interest payments are deductible and dividends not. In smaller firms managerial preferences are often the one determining the chosen method of financing and consequently the capital structure. Such preferences can in some cases be based on limited knowledge regarding the different instruments and thus this report will not in depth analyse the different implications regarding capital structure and implied instrument valuation.

3.0 Data description

3.1 Introduction

An Incubator in western Sweden is the main source of data used for the purpose of this thesis. For secrecy reasons all data has to be anonymized, however all firms in the sample operates in roughly the same sector (technology) and we judged it to be valid for the purpose of this study. The data contains 51 observations and all firms in the sample were given the opportunity to pick the investment form, either direct equity or a convertible. The standard investment is a fixed amount of 250 000 SEK. The convertible is an exotic version as the instrument has no predetermined conversion rate and is capped to a lower limit of 6% of the company upon conversion even if the actual valuation is far beyond that level. However as can be interpreted not all firms accept a full 250 000SEK investment and others also include other investors in the first round. Such deviations were not accessible within the dataset and will thus not be elaborated any future.

3.2 The data set & research methodology

The data set consisted of, value at first round with date, value at the second round with date, the decision of equity or convertible, if the entrepreneur are a professional or a student and if the company has declared bankruptcy. With this data the following dummy variables were created, Convertible (1), Professional (1), Bankruptcy (1) and Second round (1)..

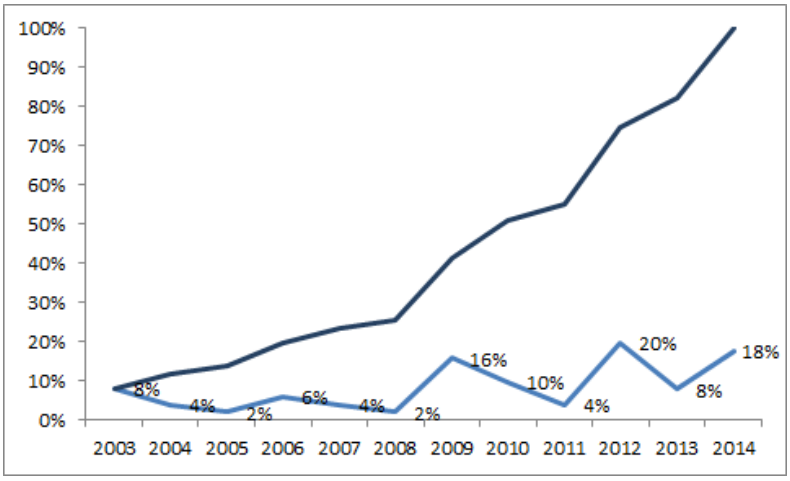


Figure 2. Describing the yearly cumulative investment and the percentage of investments done per year

The data set represents an investment period of 11 years with increasing number of investments in some of the later years. It can also be seen that the investment intensity is more variable during the later period of the data set. After constructing these variables, regressions using OLS with different dependent and independent variables. The reasons for using OLS is due to its simplicity of interpretation and the model is used despite some potential limitations when regressing binary data in smaller samples. Visual representations and tabulations were also performed in purpose of finding relevant patterns in the data set. Findings from these regressions and other patterns will be presented in the next chapter.

This figure summarizes the basics of the data set

Variable	Max	Min	Median	Count
Value round 1	30.000.000	100.000	3 125 000	51
Value round 2	100.000.000	100.000	8 000 000	36
Time between rounds (days)	2.663	81	328	36

Dummy variables	1 (Yes)	0 (No)	%
Professionals	31	20	61%
Convertibles	15	36	29%
Bankruptcy	11	40	22%
Second round	35	16	69%

As can be seen in the table above there is some spread in all of the variables but this is mainly due to some outliers and the majority of the data set is concentrated around the median. There are two groups of entrepreneurs, students and professionals, in depth elaborated under chapter 5.2.1. Convertible financing is chosen 29% of the times and the bankruptcy rate is relatively low at 22% considering the firms all work with modern start-up values where fast failures are praised. A majority, 69% of the firms undertake a second round of financing and relatively few firms manages to generate sufficient cash flows from the initial investment to survive in the market. Noteworthy is the fact that the average time between rounds is highly affected by some outliers as the average time is around 42 months however the median as presented in the table is 328 days. Even the latest investment has once the data was collected passed this median time between rounds for a fair comparison.

3.2.1 Two groups of entrepreneurs

The dataset consists of two groups of entrepreneurs, students and experienced professionals. Roughly 60% of the entrepreneurs are experienced professionals that join the incubator and the other 40% is students from the university that manages to secure an investment. The different group of people is believed to have different life situations where the experienced professionals have higher fixed costs and potentially also higher assets, house, car etc. Students are believed to have less fixed costs and less assets. Such assumptions serve as a foundation for reasoning regarding alternative costs and potential personal borrowings to finance the company.

The financing preferences among the groups differ to some extent where professionals are the ones with the highest appetite for convertible financing. 80% of all convertibles issued are undertaken by professionals compared to a 60% if the appetite between the two groups were equal. This is somewhat interesting as the experienced professionals are the ones most likely to be eligible for a loan at a regular bank if financing without equity is the goal.

Not only has the preferred method of financing differed between the groups, bankruptcy rates and tendency to require additional financing also differ among the groups. Professionals only have a bankruptcy rate around 10% whereas the students reach less flattering 40%. Students are also the group with the highest probability for a second round of financing. This is partly explained by the characteristics in the dataset where equity financed firms tend to have higher probability of additional financing rounds and the student's preferences to use equity financing.

3.3 The Convertible

The entrepreneur is the one in charge of the pick between equity and convertible financing. The standard valuation for equity is an 8% stake in the firm valuing the firm at 3,125MSEK that will also serve as a benchmark in this study. The face value of the convertible is like the equity infusion 250 000 SEK written as a perpetuity at 5% annual interest. The convertible is however not a convertible in traditional sense, rather an exotic instrument as it in contrast to traditional convertibles lacks a fixed price for conversion and instead has a floating conversion at a discount of 30% once converted in the next round. The exotic instrument is capped to a lower limit of 6% of the firm once converted. This gives the instrument relatively small leverage opportunity knowing that the initial equity stake is only 8% seen in the figure below presenting conversion stake at different firm valuations.

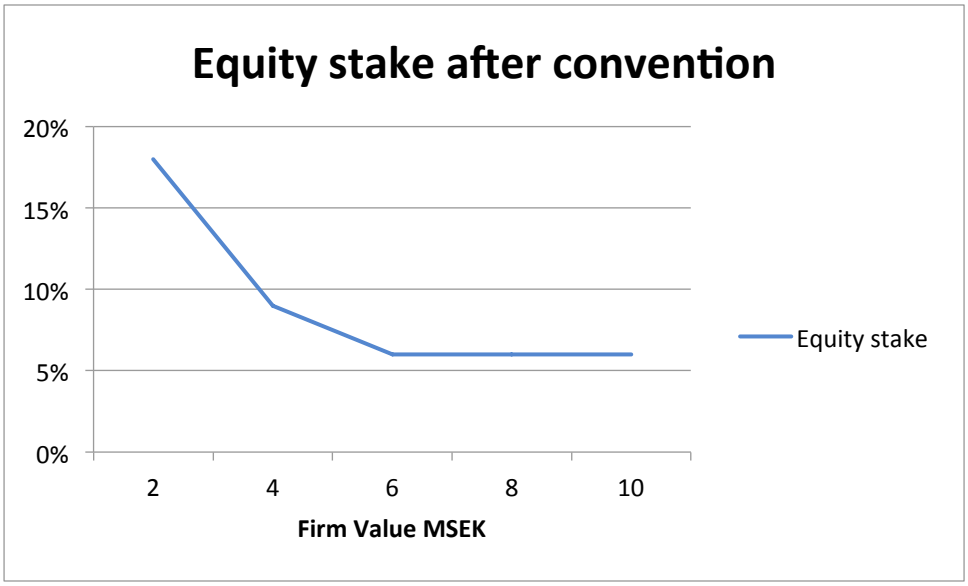


Figure 3 The equity stake after convention

The Convertible is also one way optional meaning the entrepreneur has no right to pay it back in case of sufficient future cash flows or capital infusion from other sources. One may thus judge the instrument to be a delayed equity like Brigham suggests in its paper "An analysis of convertible debentures". In this case there is also a limit to the leverage provided by the convertible as of the cap limit set by the incubator. Brigham also argue convertibles to be seen as sweetened debt as the interest rate is less than market rates offered by banks.

With current low interest rates and a negative reference rate from the central bank a 5% rate on the convertible is far from sweet considering mortgage rates around 1,2%, thus the properties of the exotic instrument in this study has to be seen as delayed equity.

3.4 Leverage analysis

The leverage provided by the delayed equity can be analysed to visualize the payoff profile for both the entrepreneur and the incubator. Both parties can potentially benefit from the convertible as the entrepreneur delays the equity and thus postpone the investment in order to have time to reach a higher valuation. The investor on the other hand gets an initial payback on its investment thanks to the interest paid on the convertible but in this case also have a potential upside in the next round if the value of the firm increases to more than the lower limit of the convertible. In such scenario the investor is eligible to receive 6% of the firm's equity and is potentially left with more equity after the second round then if equity was received upon the time for the convertible.

3.5 Entrepreneur payoff profile

To analyse the payoff profile for the entrepreneur the following factors has to be taken under consideration: Time, interest, discount & valuation in next round. The benchmark valuation in the first round is 3,125 million SEK given the 8% equity at 250 000 SEK. If the entrepreneur is not to lose equity after choosing a convertible the hypothetical scenario of an A-round the same day as the issuance of the convertible requires a valuation of 4.46 million SEK in order not to end up releasing more equity than the plain 8% due to the 30% discount. Every additional day the convertible cost interest to the firm and with liquidity as scarce resource in many start-ups such interest eat up the infused liquidity compared to an equity issuance.

As mentioned the convertible has the potential to decrease the amount of equity to be handed out from 8% down to 6%. In the figure below one can see the corridor for the cases where the entrepreneur benefits from the convertible by being valued within the corridor in the next round of financing.

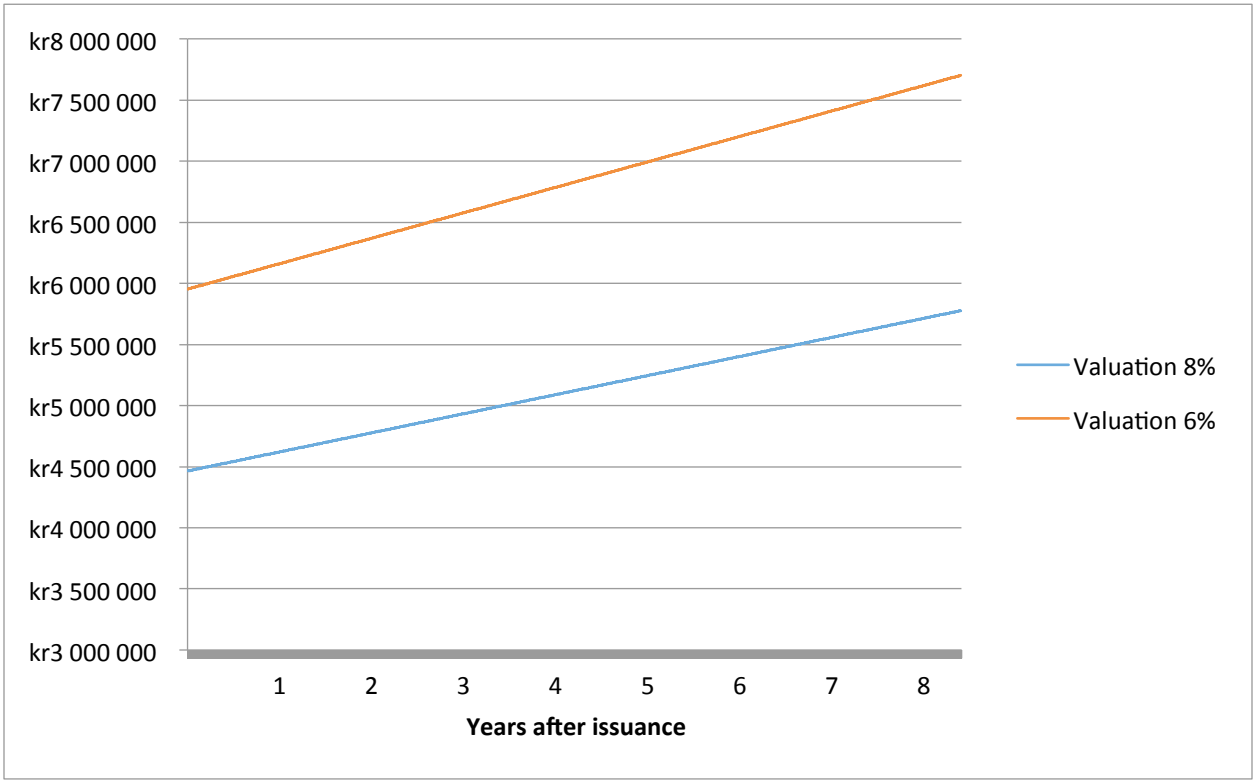


Figure 4 "The corridor for the hit and miss"

The lower limit of 6% generates a potential scenario where the entrepreneur after the second round actually lose leverage and instead end up with less equity than if both rounds were all equity rounds. In case the valuation in the second round is higher than the 6% barrier in the second round and the investor takes a stake larger than 25% the dilution of the initial 8% equity gives less than 6% stake for the incubator and thus a higher total equity stake for the entrepreneur. As previously mentioned the exact ownership distribution of the firm's equity was classified and thus an exact analysis over the success rate and who is the winner is hard to conduct. A plot of the different valuations and outcomes will however still be done in order to spot potential patterns in terms of valuations and potential benefactors.

4.0 Results and analysis

4.1 Data analysis

The results from the different regressions point out several interesting points regarding the firms' characteristics. As mentioned in the data descriptive several of the firms in the dataset has filed for bankruptcy. The regression do not point out any clear indication regarding the quality of the firms as the results do not state a clear difference between equity and convertible firms in terms of bankruptcy. This is to some extent in contradiction to the results found by Jean Tirole and the pecking order theories presented earlier. As seen in Exhibit 1 the results are far from significant and the highly insignificant indication also has very limited magnitude. Considering the fact that the entrepreneur is the one who choose the investment form the principles of the pecking order theory is to some extent not valid regarding this data.

	Exhibit 1	Exhibit 2	Exhibit 3	Exhibit 4	Exhibit 5	Exhibit 6	Exhibit 7	Exhibit 8
Conv (1)	-0,022 (-0,172)						-0,5 (-3,945)**	-3,15 (-0,390)
Prof (1)		0,237 (1,839)*	-0,303 (-2,700)**					
Prof*Conv				-0,173 (-1,269)				
Prof*Sec					-0,176 (-1,480)			
Sec						-0,05 (-0,395)		
Constant	0,222 (3,179)**	0,15 (-1,492)	0,4 (4,569)**	0,256 (3,878)**	0,281 (3,875)**	0,25 (2,387)**	0,833 (12,124)**	12,89 (4,22)**

*p<0,1 **p<0,05

If choosing a convertible can be seen as a sign of overconfidence among the managers due to the nature of the convertible as a leverage instrument. The data in the regression (Exhibit 2) indicates a 23% higher probability that the convertible taker is an experienced professional. As previously mentioned the entrepreneurs are either a student straight from University or a work life professional who decide to start their own firm. The results are significant at the 10% level and can thus be seen as a fair indicator that experienced professionals to a higher extent pick convertible financing. In contradiction to what Malmendier and Tate (2005) concluded the overconfidence is not bound to cash flows or dependency on equity financing rather the overconfidence is dependent on the personal background.

Observing Exhibit 3 one can clearly see highly significant results that experienced professionals are 30% less likely to file for bankruptcy. Such results to some extent contradicts previous paragraph regarding overconfidence as the group of experienced professionals to an high extent pick convertible financing but also to a higher extent manages to deliver surviving firms to an higher extent.

In Exhibit 4 one can however not observe any statistically significant difference that professionals with a convertible are less likely to file for bankruptcy. The regression indicates a negative impact on bankruptcy but such difference cannot within the limitations of the dataset be confirmed as statistically significant. The same goes for firms run by professionals that manage to secure a second round of financing as can be seen in Exhibit 5.

Securing a second round of financing is often seen as crucial for the survival of a start-up. Such indications is however not to be observed within this dataset as one notice in exhibit 6 the indicated difference in survival dependent on a second round of financing is relatively small and far from significant. Interestingly though one can observe in exhibit 7 that firms undertaking convertible financing is 50% less likely to undertake a second round than firms with regular equity investments. These findings indicate that firms financed with convertibles spend their money more wisely and faster reach sufficient internal cash flows to support the firm's needs or file for bankruptcy. As the firms undertaking a convertible has a fixed amount of interest to be paid to the investor each month these firms may be more prone to shut down operations if cash flows is not to appear as planned. Such scenario gives the convertible firms a higher risk profile as the firms either becomes successful or fails relatively fast.

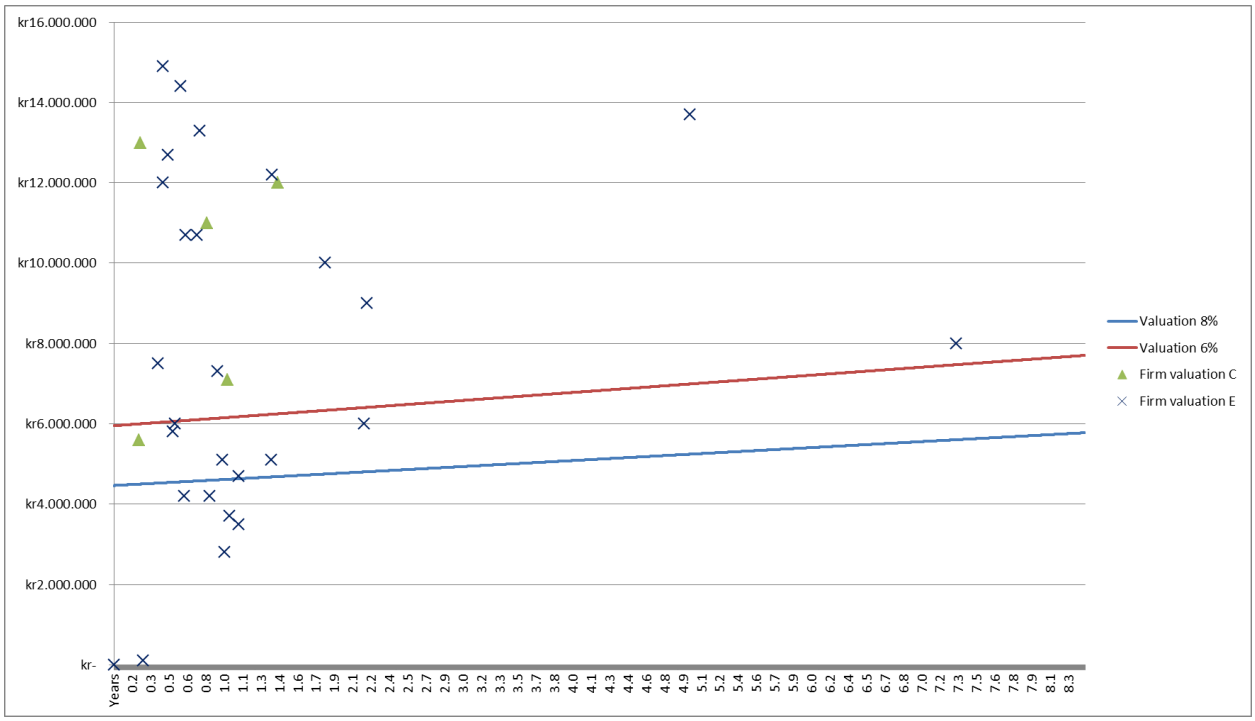
According to the results from this study initial convertible financing that delays the equity creates incentive enough for the entrepreneur to avoid the needs of additional rounds of financing. One must still note some of the convertibles are relatively young and thus may still need to undertake additional rounds of financing. Despite a status as relatively young convertibles all of them have already by far passed the median time between the first and second round derived from all other firms within the sample. Thus the indicated results can still be seen as valid and in line with the theories.

4.2 Return Analysis

Observing the returns for the entrepreneurs dependent on their respective form of financing can be done by adding them to the return corridor presented on the next page. From this analysis one can spot that several of the firms would have benefited from the convertible compared to initial equity finance. Given that the firms in the sample all were offered the standard deal with 8% equity or a convertible capped at 6%, 18% of the firms in the sample that picked equity in the first round was guaranteed to benefit from a convertible. As their second round was valued within the certain benefit corridor of the entrepreneur a convertible would have lowered the amount of equity released by the entrepreneur.

Interestingly though one can also observe that 18% of the equity financed firms would lose equity if they had undertaken a convertible in the first round. Such firms were valued below the equity barrier in their second round and a convertible would then have been forced to release more than the initial 8% equity stake. Interestingly 83% of these firms were run by students. These indications from a smaller dataset may be a sign that the experience among professionals makes them better in increasing the value of the firm. Such results indicate the previously suspected overconfidence among professionals for choosing convertible financing partly has to be ruled out as they rightfully believe to deliver higher values to the firm.

80% of the firms that financed with a convertible and have undertaken a second round of financing were valued above the 6% bar. Thus the convertible instrument hit its minimum value and makes the investor eligible to receive 6% equity in the firm even if the valuation of the firm is exceeding such amounts. As we lack data for the second round regarding the actual amount of cash invested and at what stake a conclusion on who were to win or lose on the convertible cannot be stated. It may still be noted that the valuations is not extremely high above the 6% bar and as long as the entrepreneur has to give away less than 25% in this round a convertible is still preferable. Professionals ran 75% of the firms that exceeded the bar and such results also contradict previous assumptions regarding overconfidence within the group.



64% of the firms that financed with equity are in the same situation. They could potentially have benefited from a convertible, as they were valued above the corridor in the second round. As mentioned in the previous paragraph the actual cap table is needed to firmly conclude that but there is a chance that some of these firms would have been better of with convertible financing. With no statistical difference in valuation between convertible and equity financed firms in the second round (Exhibit 8**)** one cannot either state that one way of financing is better than the other within this dataset.

4.3 Possible drawbacks

The nature of the dataset as small and relatively limited is the main source for potential biases for this thesis. Results presented have however been thoroughly analysed and compared tor results in similar previous research. Many of the insignificant regressions could potentially have been solved by a larger sample size but considering the weakness of the results larger samples is not a guarantee for significance. The absence of equity stakes in the data set makes the analysis on actual benefactors somewhat scarce and access also to classified emission agreements would greatly benefit the analysis within this area of the thesis.

5.0 Summary

5.1 Conclusions

This study regarding early stage financing found several interesting indications that both confirm and contradicts previous research and models. One may even argue that traditional theories regarding financing and capital structure is not valid for early stage financing with regards to IT start-ups. One of the main findings is the fact that firms initially financed with a convertible to a higher extent tend to be in less need of initial financing than equity financed firms. So far the results are well in line with pecking order theories and to some extent also theories regarding moral hazard.

Considering overconfidence one may think the results to be the reverse as overconfident managers want to finance with a convertible as they believe they can leverage the firm with a convertible and raise money at a higher valuation in the next round. As an extra dimension to this the convertible in the sample is capped to a lower limit. That generates a scenario where the entrepreneur may actually lose equity when using the convertible. If the valuation in the second round is far higher than the limit and thus the dilution of an initial direct equity infusion would give more of the firm's equity to the entrepreneur. As such a high amount of the cases were in this state it is highly inconclusive on who is to benefit the most from a convertible and if convertible or equity is to be preferred when financing a start-up.

In the sample 14% of the convertibles were to benefit from the leverage once undertaking a second round, the rest were inconclusive as they were valued above the 6% bar and thus may end up releasing more equity after the second round. For firms financed with equity the results are equally inconclusive as 23% of the firms would have lost equity by taking a convertible in the first round. On the other hand 20% of the firms would have benefited from initial convertible financing and the rest is valued above the 6% bar that unfortunately makes a firm answer impossible within the data set.

The lower rate of second rounds among convertible firms may be seen as a sign that such firms are less capital intensive and less likely to bankruptcy but no statistical evidence can be found to back such statements.

The by far most important finding is however the fact that it is to a high extent the actual entrepreneur that creates the value for the firm. Experienced professionals are the ones that perform the best overall in the dataset. There is however no statistical evidence regarding the capital structure and success among these professionals. Noteworthy is though that even entrepreneurs in this group were no experts on picking the right type of financial structure for their firms.

Overall the results of this thesis indicate that traditional frameworks can be used to some extent but one must always remember every start up is unique and the entrepreneur is the one who creates value, not the capital structure. The terms of the convertible is not to be underestimated as a determinant of potential success and it is not a universal solution for every case even if this form of financing is recommended by recent research. We favour the use of a convertible but depending on the type of business situation and personal financial situation one may finance the firm in other ways.

Perhaps a new instrument adapted for the nature of the rapid hit or miss environment currently seen in this industry would be the best to please all parties. We leave this up to others to investigate.

5.2 Further research

It would be of great interest to look at the same sample in three to five years in order to see if the trend of increasing use of convertibles makes any differences. Comparing different incubators and Venture Capitalists with different convertible terms would also greatly benefit the start-up community in order to find an optimum initial financing solution. Lastly, one of the more interesting points to in depth investigate is the background of the entrepreneurs in order to spot important characteristics for success. As this study finds the entrepreneur itself to be the main factor of success such characteristic would greatly improve the odds for VCs when picking investment opportunities.

References

Akerlof, George (1970) The Market for "Lemons": Quality Uncertainty and the Market Mechanism *The Quarterly Journal of Economics* Vol. 84, No. 3 (Aug., 1970), pp. 488-500

Akerlof, G.A., Dickens, W.T., 1982. The economic consequences of cognitive dissonance. Amer. Econ. Rev. 72 (3), 307–319.

Bascha Andreas, Walz Uwe (2001) Financing Practices in the German Venture Capital Industry An Empirical Assessment

Brigham, E. (1966) An analysis of convertible debentures: theory and some empirical evidence, *Journal of Finance,* 21, 35-54

Chan, Yuk-Shee (1983), On the positive role of financial intermediation in allocation of

Venture capital in a market with imperfect information, Journal of Finance 38: 1543-

1568.

De la Rosa, Leonidas E. (2007) *"Overconfidence and Moral Hazard,"* Economics Working Paper No. 2007-8, School of Economics and Management, University of Aarhus

Dembe, A and Boden, L I (2000) "Moral Hazard: A Question of Morality?", New Solutions 10(3). 257-79

Donaldson, C., (1961), "Corporate debt capacity" Harvard University.

George Triantis, (2001) "Financial Contract Design in the World of Venture Capital" John M. Olin Program in Law and Economics Working Paper No. 115

Hoffmeister, J.R. (1977) Use of convertible debt in the early 1970s: a reevaluation of corporate motives, *Quarterly Review of Economics and Business,* 17, 23-32.

Malmendier, U., Tate, G., 2005. CEO overconfidence and corporate investment. J. Finance 60 (6), 2661–2700.

Miller, M. and Rock, K. (1985) Dividend policy under asymmetric information, *Journal of Finance,* 40, 1031-51

Modigliani, Franco/Miller, Merton H. (1958), The Cost of Capital, Corporation Finance and the Theory of Investment, American Economic Review 48: 261-297.

Myers, Stuart & Majluf, Nicholas (1984) Corporate financing and investment decisions when firms have information that investors do not have, Journal of Financial Economics

Pilcher, C.J. (1955) Raising capital with convertible securities, Michigan business studies no. 21/2 (University of Michigan, Ann Arbor, MI).

Robert Krol, (2001) The Case for Open Global Capital Markets, CATO institute TRADE BRIEFING PAPER NO. 11

Tirole, Jean (2006). *The theory of corporate finance*. Page 129 Princeton, N. J.: Princeton University Press

Appendix

Exhibit 1

Regression Statistics	
Multiple R	0,024618298
R Square	0,000606061
Adjusted R Square	-0,019789734
Standard Error	0,419480296
Observations	51

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0,005228758	0,005228758	0,029714979	0,863848562
Residual	49	8,622222222	0,175963719		
Totalt	50	8,62745098			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0,222222222	0,069913383	3,178536264	0,002564635	0,08172602	0,362718425	0,08172602	0,362718425
Conv (1)	-0,022222222	0,128913908	-0,172380332	0,863848562	-0,281284419	0,236839975	-0,281284419	0,236839975

Do firms that use convertible have the same bankruptcy rate?

Exhibit 2

Regression Statistics	
Multiple R	0,254053165
R Square	0,064543011
Adjusted R Square	0,045452052
Standard Error	0,449599339
Observations	51

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0,683396584	0,683396584	3,380815541	0,072023882
Residual	49	9,90483871	0,202139566		
Totalt	50	10,58823529			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0,15	0,100533468	1,492040435	0,142099315	-0,052029569	0,352029569	-0,052029569	0,352029569
Prof (1)	0,237096774	0,128948088	1,838699416	0,072023882	-0,02203411	0,496227659	-0,02203411	0,496227659

Is the convertible as popular for both groups?

Exhibit 3

Regression Statistics	
Multiple R	0,359944603
R Square	0,129560117
Adjusted R Square	0,111796038
Standard Error	0,391482724
Observations	51

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1,117773561	1,117773561	7,293376457	0,009475924
Residual	49	7,509677419	0,153258723		
Totalt	50	8,62745098			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0,4	0,087538198	4,569433782	3,32653E-05	0,224085405	0,575914595	0,224085405	0,575914595
Prof (1)	-0,303225806	0,112279855	-2,700625197	0,009475924	-0,528860623	-0,07759099	-0,528860623	-0,07759099

Is it any difference between the two gropes in terms of bankruptcy rate?

Exhibit 4

Regression Statistics	
Multiple R	0,178498986
R Square	0,031861888
Adjusted R Square	0,012103967
Standard Error	0,412868613
Observations	51

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0,274886878	0,274886878	1,612613426	0,210122435
Residual	49	8,352564103	0,170460492		
Totalt	50	8,62745098			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0,256410256	0,066111889	3,878428842	0,000313461	0,123553442	0,389267071	0,123553442	0,389267071
Prof * Conv	-0,173076923	0,13629315	-1,269887171	0,210122435	-0,446968263	0,100814417	-0,446968263	0,100814417

Professionals with convertible on bankruptcy

Exhibit 5

Regression Statistics	
Multiple R	0,206873875
R Square	0,0427968
Adjusted R Square	0,023262041
Standard Error	0,410530361
Observations	51

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0,369227296	0,369227296	2,190802551	0,14523835
Residual	49	8,258223684	0,168535177		
Totalt	50	8,62745098			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0,28125	0,072572201	3,875450902	0,000316404	0,135410703	0,427089297	0,135410703	0,427089297
Prof*Sec	-0,175986842	0,118899103	-1,480135991	0,14523835	-0,414923536	0,062949852	-0,414923536	0,062949852

Professionals done a second round on bankruptcy

Exhibit 6

Regression Statistics	
Multiple R	0,056407607
R Square	0,003181818
Adjusted R Square	-0,01716141
Standard Error	0,41893938
Observations	51

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0,02745098	0,02745098	0,156406749	0,694203134
Residual	49	8,6	0,175510204		
Totalt	50	8,62745098			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0,25	0,104734845	2,386980188	0,02089138	0,039527449	0,460472551	0,039527449	0,460472551
Second round (1)	-0,05	0,126427707	-0,395482931	0,694203134	-0,304065989	0,204065989	-0,304065989	0,204065989

Second round on bankruptcy

Exhibit 7

Regression Statistics	
Multiple R	0,490990253
R Square	0,241071429
Adjusted R Square	0,22558309
Standard Error	0,412393049
Observations	51

ANOVA

	df	SS	MS	F	Significance F
Regression	1	2,647058824	2,647058824	15,56470588	0,000253985
Residual	49	8,333333333	0,170068027		
Totalt	50	10,98039216			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0,833333333	0,068732175	12,12435565	2,31116E-16	0,695210857	0,97145581	0,695210857	0,97145581
Conv (1)	-0,5	0,126735868	-3,945213034	0,000253985	-0,754685263	-0,245314737	-0,754685263	-0,245314737

Likelihood on second round dependent on convertible or equity financing.

Exhibit 8

Regression Statistics	
Multiple R	0,067699728
R Square	0,004583253
Adjusted R Square	-0,025580891
Standard Error	16,72941431
Observations	35

ANOVA

	df	SS	MS	F	Significance F
Regression	1	42,525	42,525	0,151943753	0,699189235
Residual	33	9235,819	279,873303		
Totalt	34	9278,344			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	12,89	3,054359196	4,220197813	0,000179346	6,675859491	19,10414051	6,675859491	19,10414051
Conv (1)	-3,15	8,081074849	-0,389799632	0,699189235	-19,5910704	13,2910704	-19,5910704	13,2910704

Difference in valuation in second round dependent on initial instrument

---