



Norwegian University of  
Science and Technology

# Why Do Non-Investment Grade Rated Companies Issue Convertible Bonds Instead of Bonds in Norway?

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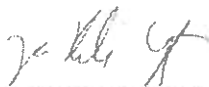
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Partene er gjort kjent med avtalens vilkår, samt kapitlene i studiehåndboken om generelle regler og aktuell studieplan for masterstudiet.

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Sted og dato



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Hovedveileder

## **Preface**

This thesis is written as the conclusion of the Master Program in Industrial Economics and Technology Management at the Norwegian University of Science and Technology (NTNU) during the spring of 2011. I have specialized in Financial Engineering, and chosen to write about Convertible Bonds within the field of Capital Structure due to personal as well as academic interest. It has been both interesting and educational to work on this thesis and gain new knowledge related to why companies choose to issue Convertible Bonds.

The Master Thesis has been edited in Microsoft Office. Text and tables has been produced in Microsoft Word, while Microsoft Excel has been used in numerical and graphical analysis. The regression analysis has been performed in STATA; an integrated statistical package software. The Master Thesis is written in the form of an article and follows the style guidelines of Financial Management.

I would like to thank my academic supervisor Associate Professor Stein Frydenberg in the Department of Industrial Economics and Technology Management at NTNU for valuable guidelines and discussions. I would also like to thank Thomas Eitzen at SEB Enskilda for helpful comments and Ole Helliesen at J.P. Morgan for assistance in the data collection process. The author takes responsibility for any error in this Master Thesis.

Trondheim, June 14<sup>th</sup> 2011



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Jan Henrik Getz



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# Why Do Non-Investment Grade Rated Companies Issue Convertible Bonds Instead of Bonds in Norway? ☆

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## **Abstract**

I find non-investment graded companies' motives for issuing convertible bonds in the Norwegian market by evaluating logistic regression results from a two-step security choice model from samples of 28 convertible bond-, 102 bond- and 229 equity issuances from 2005 to 2011. The findings indicate that companies in the Norwegian market substitute convertibles for bonds if they have valuable investment opportunities at hand and are associated with risk and uncertainty. This paper argues that the issuers of convertible bonds substitute convertibles for bonds to mitigate the asset substitution problem and mitigate debt-related financing costs under the asymmetric information theory. I further deduce that convertibles are used as a debt-instrument in the Norwegian market, different from the US market and more similar to the Western European market. Finding the issuers' motives for issuing convertibles in Norway extend current academic research, and can be a fundament for investors' when evaluating different convertible bond investment opportunities.

*Keywords:* convertible bonds, high-yield bonds, security choice model

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☆ The author would like to thank Associate Professor Stein Frydenberg in the Department of Industrial Economics and Technology Management at the Norwegian University of Science and Technology, for valuable guidance and discussions. The author would also like to thank Thomas Eitzen at SEB Enskilda for helpful inputs and Ole Helliesen at J.P. Morgan for assistance in the data collecting process. The author takes full responsibility for any error in this paper.

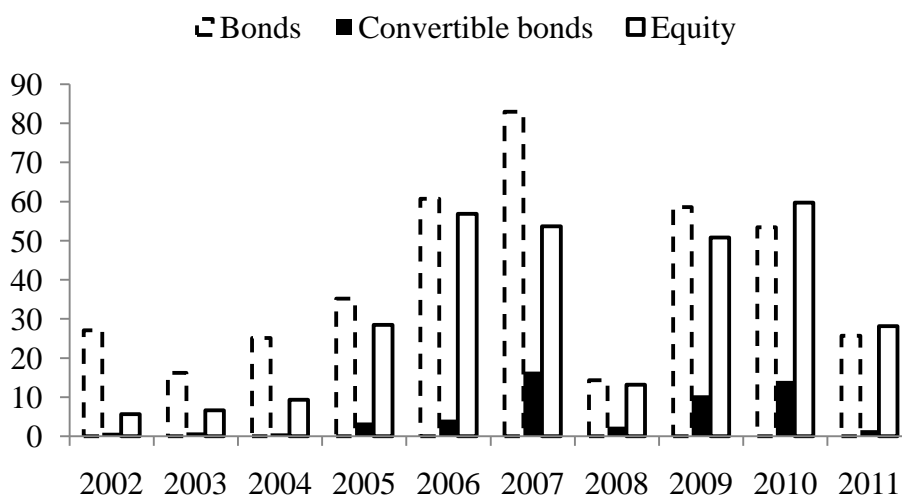
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## 1. Introduction

The Norwegian convertible bond market was close to non-existing for a long time, but has grown in recent years. As figure 1 shows, the market is still much smaller than the bond and equity markets. Its hybrid nature makes convertibles more complex than the standard securities bonds and equity, demanding more from both issuers and investors. For example Seadrill Ltd. has raised approximately NOK 12.6bn through three offerings over the last four years - and forced early conversion of two of the convertibles for a total of NOK 8.8bn - to finance its rapid growth. Others, such as Bergen Group, apparently use it as an instrument for investors to become majority shareholders. However, only a limited number of companies choose this financing source compared to bonds. Observing the popularity of the Western European and US convertible bond markets I find it interesting to investigate the disparity of the Norwegian market.

### Figure 1. Overview of Issuance Volumes I

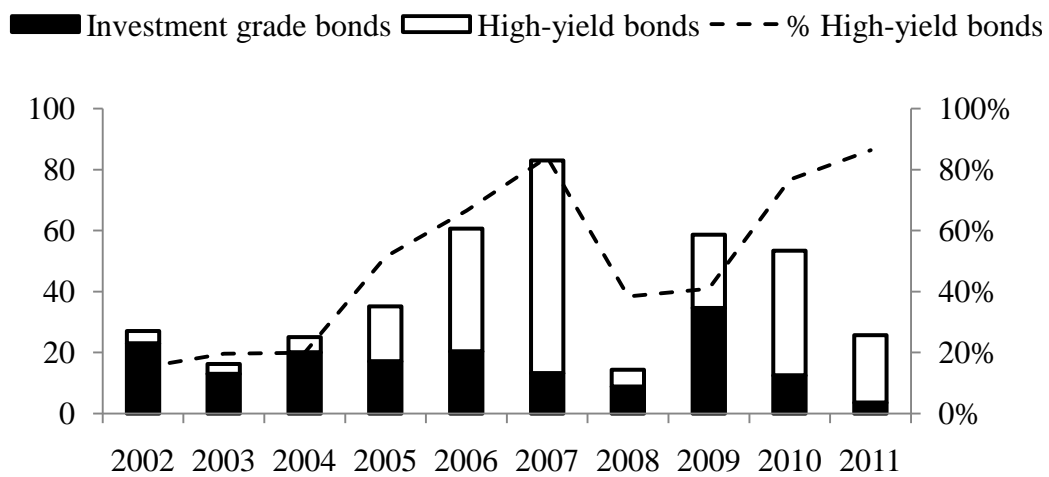
The figure shows bond, convertible bond and equity issuance volume in NOKbn for both investment grade and non-investment grade rated companies, and covers the time period 01.01.2002 to 01.05.2011. The bond data is from SEB Enskilda, the convertible bond data is from Norsk Tillitsmann and the equity data is from the Oslo Stock Exchange. The bond (number not available) and 131 convertible bond issuances include privately and publicly held companies, and the 1 898 equity issuances include all types of issuances. International companies' issuances in Norway are included.



This paper aims to figure out why non-investment grade rated companies choose to issue convertible bonds instead of high-yield<sup>1</sup> bonds in the Norwegian market. I have limited the scope of this paper to non-investment grade rated companies because the convertible bond sample only consists of companies with such a rating. In the increasingly global and competitive economy financing choices are becoming more and more pivotal; it is interesting to identify factors affecting the companies’ financing decisions in the Norwegian market. Traditional US-based theory predicts that companies facing high agency costs or asymmetric information will substitute convertibles for either debt or equity, but findings from the US-market and the Western European market differs. I believe my findings can place Norwegian convertibles among previous geographical findings, and reveal new information regarding issuers’ motives for academics as well as potential issuers and investors.

**Figure 2. Overview of Issuance Volumes II**

The figure shows investment-grade and high-yield bond issuance volumes in NOKbn, and covers the time period 01.01.2002 to 01.05.2011. The bond data is from SEB Enskilda, and the bond issuances (number not available) include privately and publicly held companies.



<sup>1</sup> A “high-yield bond” is a well used term for a bond issued by a non-investment grade rated company

To analyse non-investment grade rated companies financing choice I have used two different methods. The first method is the two-step security-choice model introduced by Lewis et al. (1999), and later used by Dutordoir and Van de Gucht (2009). Through this model I identify different factors' significance in affecting companies' financing choices. The factors are based upon the agency cost theories and the asymmetric information theories, and enables confirmation or rejection of the different theories. Current research on security choices in the Norwegian market is not comprehensive; Holba's (2006) work on investment grade and non-investment grade rated bonds is probably the closest paper to mine. Several empirical studies and surveys have identified reasons in the US and Western European markets for all rated companies, with different results. I extend current research by using samples of 28 bond-, 102 convertible bond- and 229 equity issuances by non-investment grade rated companies in the Norwegian market. The second method is a quantitative survey. The survey consists of a series of multiple choice questions, disclosing the companies' own motivation for issuing convertible bonds.

I find the logit regression to have explanatory power for issuance of convertible bonds by non-investment grade rated companies. The convertibles in the Norwegian market are designed as debt-like securities, more like the Western European convertibles than the US convertibles. I find companies to issue equity-like securities if they are risky and have valuable investment opportunities at hand, following good equity market performance and in high interest rate environments. Further I find companies to substitute convertibles for bonds if they are risky and have valuable investment opportunities at hand, but I do not find companies to substitute convertibles for bonds because they want to get delayed equity. The results from the survey is not significant due to the low number of respondents (nine), but the main findings also indicate support for the use of convertibles as a debt-like security in the Norwegian market. My findings further support that convertibles mitigate the asset substitution problem and mitigate debt related financing costs under the asymmetric information theory, which predicts that investors require a premium to invest in risky companies. However, I do not find any support for the use of convertibles to reduce the equity-related financing costs under the asymmetric information theory.

This paper examines companies' financing choices regarding convertible bonds. I identify companies' motives for issuing convertibles through both a two-step security model and a quantitative survey. The paper makes a complementary contribution to the convertible bond literature and is important to academic researchers who want to understand why non-investment grade rated companies issue convertible bonds in the Norwegian market. The findings in this paper can be of interest for investors already investing or considering investing in convertibles in the Norwegian market. By understanding why companies issue convertibles investors have a better fundament for evaluating different convertible bond investment opportunities. The findings enable investors to potentially identify good and bad investment opportunities

The paper is structured with Section 2 reviewing theoretical arguments for capital structure, issuance of bonds, issuance of convertible bonds and empirical findings regarding both bonds and convertible bonds. Section 3 describes my data samples with descriptive statistics, and critics of the samples. Further, section 4 explains the logistic regression model and gives detailed descriptions of the variables. In section 5 I present the results from the security choice model and discuss the implications of my findings against theory and previous results. Section 6 concludes the paper.

## 2. Literature Review

I use existing theories to define variables for the security choice regression model which can explain companies' use of convertibles against theory. This section presents selected theoretical papers with respect to the use of high-yield bonds and convertibles, and a discussion related to why companies substitute convertibles for bonds. Further I present selected empirical findings.

### 2.1 Capital Structure Theory

The modern thinking on capital structure was formed by Modigliani and Miller (1958), who argued that a company's value is not affected by its capital structure in a perfect market – the *capital structure irrelevance theorem*. Their theorem states that with: i) no arbitrage, ii) no transaction costs and iii) consistent management in investment decision criteria, it does not matter if the company finances its operations with retained earnings, debt or equity. These are strict theoretical assumptions that do not hold in the real world, as shown by Jensen and Meckling (1976). They argued that an agent in a principle-agent relationship do not always act in the principal's interest, generating agency costs. In contrast to Modigliani and Miller, they argued that the capital structure will be based on minimizing agency costs, and that the management will invest accordingly. Hart and Moore (1995) further found management to overinvest if the amount of long-term debt was small, and under invest if the amount was large, supporting Jensen and Meckling's agency costs theory.

In their follow-up article Modigliani and Miller (1963) extended their theorem to take tax-shields into consideration. They found leverage to increase the value of the company, and laid the foundation for one of the two extended theories on capital structure. Based on the tax-shield theorem Kraus and Litzenberger (1973) introduced the *trade-off theory*. In the trade-off theory the optimal capital structure is found by optimizing the tax shield benefits against bankruptcy costs, where bankruptcy costs will increase with leverage. By eliminating one of Modigliani and Miller's assumptions, they contradicted previous studies by arguing that the value of a company as a function of its leverage is not necessary concave. A contrast to this mathematical theory was introduced by Myers and Majluf (1984) who argued that a company will choose to issue safe securities before risky securities in their *pecking-order theory*. The riskiness is based on the assumptions that managers know more about the company than investors, i.e. asymmetric

information. A company will chose to finance investments internally with retained earnings, and will prefer to issue straight debt to equity if it needs external financing, because the company will reveal negative information about the company by issuing equity.

Several empirical studies have compared the two theories. Shyam-Sunder and Myers (1999) found the pecking-order theory to explain more than the trade-off theory in their study of companies' debt/equity choices. Frank and Goyal (2002) on the other hand, found no empirical support for either theory. The pecking-order failed where it should hold: for small companies where asymmetric information is presumably a problem.

### ***2.2 Theoretical Motives for the Use of High-Yield Bonds***

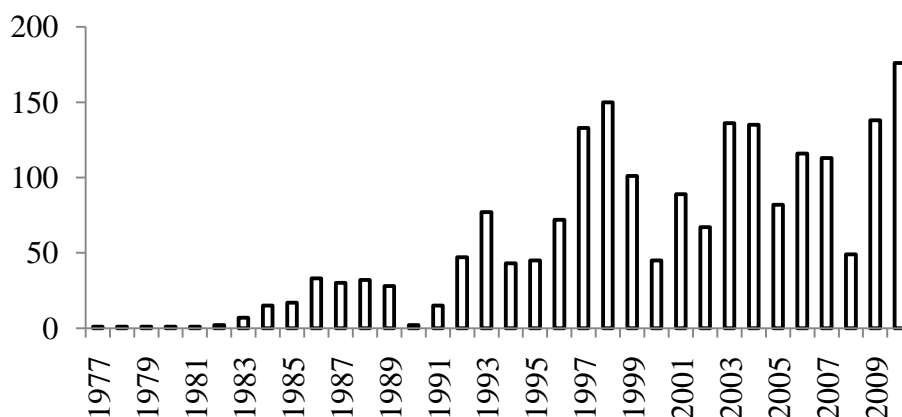
When I examine companies' motives for issuing high-yield bonds it is natural to compare the motives to the use of straight bank debt. This was the main substitute when the US high-yield market started its rapid growth - illustrated in figure 3 - in the late 1970s, and continued its growth after the fall of Drexel Burnham Lambert. For non-investment grade rated companies traditional bank debt had several shortcomings: i) it had many, and often strict, covenants reducing the companies' financial flexibility, ii) it took time to negotiate terms with the bank, iii) due to the companies' limited credit history and "riskiness" they were stuck with their current bank and a high coupon rate, and iv) bank debt did not allow enough leverage to control management.

Gilson and Warner (1997) documented that high-yield bonds have fewer and less restrictive covenants. They argued that strict covenants can prevent companies from taking on net positive value (NPV) projects, preventing them from maintain financial flexibility. They further found high-yield bonds to have longer maturities than bank debt, enhancing the companies' ability to finance long-lived projects. Taggart and Perry (1988) also found high-yield bonds to have fewer restrictive covenants than bank debt. They argued that investors are willing to accept fewer restrictive covenants in the presence of a liquid secondary market.

As the competitive environment and the financing needs changed rapidly in the 1980s, companies were in need for flexible financing sources (Taggart and Perry, 1988). Taggart and

### Figure 3. Overview of Issuance Volumes III

The figure shows high-yield bond issuance volume in the US-market in USDbn, and covers the time period 1977 to 2010. The data is from Credit Suisse. The number of issuances is not available.



Perry argued companies were attracted to high-yield bonds because high-yield bonds allowed them to raise larger amounts of capital faster than possible from negotiated sources such as bank debt. This was made possible due to investors' appreciation of a liquid secondary market and the investors' growing ability to monitor the performance of smaller companies, according to Jefferis (1990). The importance of the ability to raise funds quickly is underlined by the high-yield's popularity as financing source in leveraged buyouts (LBO) and management buyouts (MBO) in the 1980's in the US market.

By borrowing straight from the investors, high-yield bonds became a cheaper source of financing than bank debt due to increased regulatory costs for banks (Melnik and Plaut, 1990). They further argued that tighter regulation of banks will increase the use of high-yield, possibly explaining why the US high-yield market is much more developed than in other Western countries. Taggart and Perry (1988) also found high-yield to be cheaper than bank debt for the issuers, and argued it was due to investors' willingness to achieve lower returns in exchange for the ability to trade the bonds in a liquid secondary market. For companies who would have to turn to the equity market to raise more capital, which often was the case for the non-investment grade rated companies, high-yield bonds was also a cheaper financing source. According to Molyneux (1990) equity investors require 20% return, while high-yield investors require 14% return.



Due to bank's strict lending policies low-rated companies were not always able to utilize leverage fully. Joseph (1990) argued that the introduction of high-yield bonds enabled companies to get enough leverage to ensure the management do not overinvest, or in other ways do not focus enough on operations. This has been, and still is, one of the main arguments used by the promoters of LBOs and MBOs.

### ***2.3 Theoretical Motives for the Use of Convertible Bonds***

Several theoretical and empirical studies have covered convertible bond issuances, without being able to find conclusive motives for companies to issue convertible bonds. Loncarski et al. (2006) reviewed theory and empirical evidence and concluded: "The literature shows a large discrepancy between theory and practice." However, "...there exist some findings, which are common to all empirical research." Stein's (1992) delayed equity theory has support, Green's (1984) risk shifting hypothesis has some support, while Brennan and Kraus' (1987) and Brennan and Schwartz's (1988) risk estimation explanation have limited support.

When Jensen and Meckling (1976) argued that an agent will not always act in the interest of the principal, they introduced one of the main theories about companies' motivation for issuing convertibles: *agency costs*. In some cases (leveraged companies e.g.), the management might be in the position of being able to increase the shareholder value at bondholders' expense, something bondholders are aware of. According to Green (1984) convertibles can mitigate such potential conflicts by providing bondholders with a part of the equity upside, reducing the management's willingness to undertake risky projects because of a reduced upside. Green built a model solving financing and incentive problems through a convertible bond, reducing distortionary incentives engendered by risky debt. However, this model does not remove all agency problems such as the management – shareholder problem. Isagawa (2000) looked at the latter *risk-shifting* problem, and found convertibles to control management opportunism due to its ability to restrict overinvestment and prevent under investment.

Brennan and Kraus (1987) argued that convertibles can allow companies to finance profitable investments, which could not be carried out with costly straight debt. This theory builds on the

costs of *asymmetric information* in the light of Myers and Majluf's (1984) pecking-order theory, where the uncertainty about an investment's return is great and investors require a premium. The option in the convertible bond offset this premium, and enables the issuer to finance its operations at an affordable price (i.e. coupon rate). Brennan and Schwartz (1988) further argued that the convertibles' relative insensitivity to the issuers' riskiness enables risky companies to raise capital at the same terms as less risky companies. They pointed out companies who would have to pay a high coupon on straight debt, such as companies perceived as risky, with assets hard to assess, or without consistent investment policies to be likely to issue convertibles. They also pointed out that the "cheap debt *and* equity at a premium" – explanation does not hold, the only reason investors accept a low coupon is that they are granted a valuable option.

While Green (1984), Isagawa (2000), Brennan and Kraus (1987) and Brennan and Schwartz (1988) consider convertibles as substitute for straight debt, Stein (1991) and Mayers (1998) consider convertibles as a substitute for equity. Stein argued that informational asymmetries make convertibles an attractive way to raise equity through forced conversion for medium companies, due to high alternate costs of debt and equity: the *backdoor equity theory*. This builds on Myers and Majluf (1984), who argued that companies with high asymmetric information would experience high financing costs and dilution from an equity offering. Stein's model is built on the issuers' ability to call the convertible and high financial distress costs. Mayers (1998) model is close to Stein's, but is based on uncertainty about future investment opportunities' profitability and not asymmetric information. Convertibles can solve the sequential offering problem<sup>2</sup> and mitigate the agency costs associated with investment opportunities, due to the issuer's ability to call the convertible if the investment is profitable.

#### ***2.4 Convertible Bonds as a Substitute for Bonds***

High-yield bonds and convertible bonds have several equal qualities as financing sources, which cannot explain the motivation to issue convertibles instead of high-yield bonds. They are both fast and flexible financing sources. The speed of the issuance process can be affected by the investor base. Highly professional investors – who are mainly the investor base for convertibles

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<sup>2</sup>The sequential offering problem involves an investment option with a future maturity date. To provide financing up front for both the initial project and the investment option sets up an overinvestment conflict

– like hedge funds, do often not require prospectus, shortening the process significantly. The flexibility is demonstrated by Gilson and Warner (1997) and Lewis et al. (1999), with regards to high-yield bonds and convertibles respectively. Both financing sources are also driven by liquid secondary markets, enabling investors to enter or exit positions quickly if required.

The major difference relates to the issuer's financing costs. Melnik and Plaut (1990) and Molyneux (1990) argued that high-yield bonds are cheaper than bank and equity financing respectively, while convertibles are cheaper in terms of coupon rate than high-yield. As mentioned this is due to the valuable option, in the longer run the convertible bond can turn out to be more expensive than high-yield due to equity dilution. Fridson (1994) argued that convertibles are a more appealing way to invest in risky companies than high-yield bonds in his paper on the US high-yield bond market, supporting Brennan and Kraus' (1987) and Brennan and Schwartz's (1988) asymmetric information theories. Bondholders will only get downside protection from companies with steady cash flow and recovery values if default, characteristics not suitable for risky companies. Therefore risky companies cannot afford high-yield, and have to issue convertibles. Jen et al. (1997) even claimed that some issuers of convertibles would not have been able to issue high-yield bonds.

The financing costs can also be lower for convertibles than high-yield bonds due to uncertainty about managements' actions and possible agency costs. Even though Joseph (1990) argued high-yield bonds can control for management overinvestment, it cannot control for the management's willingness to invest in risky projects like convertibles, as explained by Green (1984).

Finally convertibles can be chosen as financing source instead of high-yield bonds because the issuer intends to force conversion and increase its equity. For highly leveraged companies high-yield bonds can be a suitable financing source to refinance its debt, demonstrated by Gilson and Warner (1997). However, highly leveraged companies planning to invest in growth opportunities, as explained by Stein (1992) and Mayers (1998), will find convertibles more suitable than bonds and equity. The debt can be converted to equity and decrease the leverage once the investment opportunity turns out to be profitable.

## ***2.5 Empirical Evidences***

### *Issuers' Characteristics*

In his risk and return study of convertible bonds, Altman (1989) found high-yield convertible bond issuers' default loss to be greater than high-yield bond issuers', and called for more research on convertible bond issuers. Several studies have covered high-yield bonds and convertibles, enabling a comparison of the issuers' characteristics.

Both Fridson (1994) and Gramatovich (2010) referred to the high-yield bond issuers in the US market as medium to large companies. When it comes to convertible bonds Fridson (1994), Essig (1991) and Lewis et al. (1999) all found issuers in the US market to be small companies. However, the findings in Europe differ. Dutordoir and Van de Gucht (2009), Burlacu (2000) and Bancel and Mittoo (2004) all found issuers to be medium to large companies in Western Europe, France and Europe respectively, while Getz (2011) found issuers to be small companies in Norway. Fridson argued that the high-yield bond investors only had a downside and were more secured by larger, mature companies. The smaller and more risky companies attracted convertible investors due to the equity upside. Dutordoir and Van de Gucht argued that convertibles are an equity play in the US market, while European investors consider convertibles as an extension of the debt market.

Jefferis (1990) found high-yield bond issuers to have sales growth of 9%, higher than other companies' 3% sales growth. Other studies have used the market-to-book ratio as a proxy for the value of companies' future growth opportunities, and as a measure for riskiness due to the uncertainty of future growth. Convertible issuers are found to be growth companies with high market-to-book ratios by Brennan and Krauss (1987), Essig (1991), Getz (2011) and Lewis et al. (1999), who also found the convertible issuers to have significant higher market-to-book ratios than straight debt issuers.

When looking at debt capacity Gilson and Warner (1997) found high-yield bond issuers to have limited debt capacity. Stein (1991), Jen et al. (1997) and Getz (2011) found the same result for convertible issuers, while Dutordoir and Van de Gucht (2009) found the debt capacity to be similar to issuers of other securities. Lewis et al. (1999) found convertibles to have debt capacity,

but less than straight debt issuers. Both high-yield bond and convertible issuers are found to have a high asset base on their balance sheets by respectively Taggart and Perry (1988) and Getz (2011).

#### *Quantitative Surveys on Convertible Issuers' Motivation*

Billingsley and Smith (1996) surveyed the US market to figure out companies' motives for issuing convertibles. They found sweetened debt (35.3%) and delayed equity (37.2%) to be equally important according to management, but the primary influence by far was low coupon (48.3%). Managements further responded that straight debt is the chief alternative to convertibles (35.8%), and characterized themselves as undervalued (46.4%) at issuance of convertible bonds.

A survey on capital budgeting, including convertibles, was conducted by Graham and Harvey (2001). They found financial flexibility and earnings dilution to be some key consideration when choosing financing. They found convertibles to be popular when the companies feel they are undervalued, especially among growth companies, supporting the asymmetric information framework. The survey only found moderate evidence that companies consider transaction costs and found delayed equity to be preferred to sweetened debt.

While Billingsley and Smith (1996) looked at the US market, Bancel and Mittoo (2004) surveyed the European market to figure out companies motives for issuing convertibles. They found companies to issue debt as either delayed equity (85.7%) or sweetened debt (72.4%), but the reasons for issuing convertibles varied a lot. Evidence suggest that convertibles are attractive due to the flexible nature of the security, leaving companies with the possibility to tailor it to its needs, but also that convertibles are issued due to investors' appetite for it. Evidence further supported straight debt as the best alternative to convertibles (70%), underlined by the importance of low coupon (60%).

#### *A Closer Look at the Market Makers and Investors*

Many of the rationales for companies to issue bonds are built on the liquidity of the secondary market. This liquidity can affect the demand, and thereof the financing terms companies can achieve in the market. History has shown how investment banks have been able to affect the

liquidity and the companies financing choices, such as in the case of high-yield bonds in the US market. The secondary market was “created” by Michael Milken<sup>3</sup> from the investment bank Drexel Burnham Lambert (“Drexel”) in the late 1970’s. Milken foresaw the attractiveness of underwriting high-yield bonds (only 6% of corporate America was investment grade in 1986) for investment banks and established capabilities of acting as a secondary market-maker and a network of investors searching for higher yield (Taggart, 1988). The investors’ appetite for high-yield made Drexel send executives to companies with high leverage and stable cash flows to pitch high-yield bonds (Gilson and Warner, 1997).

The liquidity is, as pointed out, also affected by investors demand for securities. The high-yield bond investors are primarily institutional investors, holding 80-90% of outstanding high-yield bonds according to Taggart (1988). The investors have been attracted by the high yield and the liquid secondary market, enabling them to enter and exit positions. The convertible bond investor base varies more according to Bancel and Mittoo (2004). They found institutional investors to be the largest investor, followed by hedge funds. Norwegian investment bankers also mention an additional type of investors in Norway: private investors gambling on equity conversion in risky issuances while enjoying high-yield. The convertibles investors, except the private investors, are highly professional investors, who require a certain offering size and a liquid stock.

The institutional investors are long in the security, and achieve stock exposure with downside protection. Hedge funds on the other hand delta-hedge the stock exposure by going short in the underlying stock, and make money on the volatility. This strategy depends on a liquid stock and availability of stock borrowing, and is executed by neutralizing the position when the stock price fluctuates. According to Bancel and Mittoo (2004), the demand for convertible bonds has been as important as the supply of convertible bonds in contributing to the growth of the convertible bond market in Europe. The demand has also affected the financing terms in convertible offerings, such as the Ship Finance convertible bond issuance in February 2011. High demand resulted in a pricing where Ship Finance achieved the lowest coupon rate and highest conversion premium from the indicated intervals, the most favourable terms they could achieve.

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<sup>3</sup> Michael Milken pled guilty to six securities violation during an insider trading investigation in 1990, and was sentenced to ten years in prison

*Risk and Return: a Comparison of High-Yield and Convertible Bonds*

A high demand for a security should indicate that the security delivered superior return compared to other securities, when adjusting for risk. Over the last decades high-yield bonds have proven to be good investments for investors trailing excess return. Altman (1998) found high-yield bonds' total return to outperform Ten-Year US Treasuries for the period 1978-1997 with 226 basis points, defaults taken into calculation. Gramatovich (2010) found similar results for the period 1987-2009 where high-yield bonds' return outperformed Five-Year US Treasuries with 600 basis points, defaults not taken into consideration. A possible reason for the spread disparity is the financial turmoil in 1990, 2002 and 2008 where the spreads reached extremely high levels<sup>4</sup>. Convertibles are on the other hand outperformed by both US Treasuries and high-yield bonds according to Altman (1989), but outperforming the NYSE Index.

**Table 1. Risk and Reward Studies of the US Market**

Altman used arithmetic annual mean total return and Ten-year US Treasuries in both his studies. The 1989 study only covered the period 1980-1987 (except return which covered 1983-1987), while the 1998 study covered 1978-1997. Gramatovich used Five-year US Treasuries and covered the period 1977-2010 (except return, which covered 1987-2009).

Security	Altman (1989)			Altman (1998)			Gramatovich (2010)		
	Return	Default rate	Recovery rate	Return	Default rate	Recovery rate	Return	Default rate	Recovery rate
US Treasuries	14.0%			10.1%					
Bonds		0.32%	43%						
High-Yield Bonds	14.7%	2.15%		12.4%	2.85%	43%	3.27%	42%	
Convertible Bonds	13.5%	1.24%	36%						
High-Yield Convertible Bonds		3.09%							
NYSE Index	11.7%								

<sup>4</sup> 70% of the time the spread was below 600 basis points

These findings do not support the previously discussed pecking order theory. According to the pecking order theory companies will choose to issue safe before risky securities, because investors will require higher returns to cover the additional risk. A low return for convertibles indicates that fewer bonds than investors expected were converted. That means issuers might have utilized a window of opportunity to issue a convertible bond with lower coupon than a straight bond, because they did not anticipate a conversion with equity dilution.



#### Figure 4. Overview of Convertible Theories with Related Empirical- and Survey Research

Key findings underlining the support from the empirical research are listed below each paper.

Theories and main contribution	Papers	Empirical support	Survey support		
			B&S (1996)	G&H (2001)	B&M (2004)
<i>Agency costs</i>					
Mitigate the asset substitution <sup>5</sup> problem	Green (1984)	+ Lewis et al. (1999) Convertibles issuers have higher MTB ratios, lower CF, higher volatility, higher leverage and are smaller than debt issuers + Dutordoir and Van de Gucht (2009) Convertible issuers have higher volatility and market-to-book ratio, and is smaller than debt issuers	-	-	-
Mitigate the overinvestment problem	Mayers (1998)	+ Mayers (1998) Increased investment activities at the time of calls of convertibles + Dutordoir and Van de Gucht (2009) Convertible issuers have higher volatility and market-to-book ratio, and is smaller than debt issuers		+	+
<i>Asymmetric information</i>					
Mitigate investment inefficiencies	Brennan and Kraus (1987)	+ Dutordoir and Van de Gucht (2009) Convertible issuers have higher volatility and market-to-book ratio, and is smaller than debt issuers		+	o
Mitigate risk uncertainty	Brennan and Schwartz (1988)	+ Dutordoir and Van de Gucht (2009) Convertible issuers have higher volatility and market-to-book ratio, and is smaller than debt issuers		+	o
Mitigate asymmetric information	Stein (1992)	+ Lewis et al. (1999) Higher adverse selection costs (more slack, higher risk and high stock runup) for convertible- than equity issuers - Dutordoir and Van de Gucht (2009) Convertible- do not have higher equity-related financing costs than equity issuers	-	+	+
+ Support - No support o Mixed support					

<sup>5</sup> The “assets substitution problem” is sometimes referred to as the “risk-shifting hypothesis”

### **3. Sample and Descriptive Statistics**

The data for my study are obtained from several sources. The bond and convertible bond samples are collected from Norsk Tillitsmann. Norsk Tillitsmann is a financial-agreement trustee provider in the Norwegian financial market, and covers bonds of interest for – not originated in – the Norwegian market. For example convertible bonds issued by Petrominerales are handled by Norsk Tillitsmann, due to the Norwegian investment bank ABG Sundal Collier's role as financial advisor to Petrominerales. The convertibles' announcement date, conversion price and conversion premium are collected from NewsWeb and press releases from the companies' website. The equity issuance sample is collected from Oslo Stock Exchange (OSE) and consists of equity issuances by companies listed on the Oslo Stock Exchange All Share Index (OSEAX).

All financial company data is collected from Factset, a provider of financial information and analytic software for investment professionals. The financials are Reuters Historical Financials, and recognized for being accurate by leading investment banks. The data samples are modified by elimination of outliers clearly influencing the results negatively; including equalizing financials close to zero to zero. The samples do only include non-investment grade rated companies. Credit ratings are obtained from Moody's and Standard & Poor's, and shadow ratings on companies not covered by the mentioned agencies are obtained from Norwegian investment banks. Companies without rating or shadow rating are expected to be non-investment grade.

#### ***3.1 The Convertible Bond Data Sample***

The original data sample has a population of 94 convertible bonds from 2005 to 11.02.2011. First I exclude utilities and banking companies due to the industries' heavily regulated nature. To be included in the final sample, observations must further be non-investment grade rated publicly traded companies today, have available financial data from Factset and available security-related data (e.g. conversion premium) at NewsWeb. After applying these filters the sample is reduced to 28 convertible bond issuances of a total of NOK 35.9bn offered by 21 companies. The reduction of observations limits the significance of my results, but only to an extent as the final data sample represent 67.9% of the original data sample measured by volume.

### ***3.2 The Bond Data Sample***

The original data sample has a population of 1527 bonds from 2005 to 11.02.2011. This is excluded government and municipality bonds due to their ownership. Further I exclude bonds issued by utility and banking companies. Finally the issuers have to be non-investment grade rated publicly traded companies on OSEAX, have available financial data from Factset and issuances larger than NOK 50m. This reduces the final sample to 102 bond issuances of a total of NOK 48.9bn offered by 43 companies.

### ***3.3 The Equity Data Sample***

The original data sample has a population of 836 equity issuances from 2005 to 30.09.2010. IPOs and Employment Placements are excluded because they are carried out under different circumstances and other terms than regular right issues. Further I have excluded non-investment grade rated companies, utility and banking companies, companies no longer listed on OSEAX, issuers without available financial data from Factset and issuances smaller than NOK 50m. The final sample consists of 229 equity issuances of a total of NOK 102.0bn offered by 80 companies.

**Table 2. Overview of the Data Samples I**

Composition of the data samples by year, number of issuers and number of issuances.

Year	Bonds		Convertible Bonds		Equity	
	Companies	Issuances	Companies	Issuances	Companies	Issuances
2005	3	6			17	27
2006	14	18	3	3	26	47
2007	14	16	7	7	39	53
2008	4	9	1	1	19	25
2009	20	26	9	9	36	51
2010	17	26	6	6	20	26
2011	1	1	2	2		
Total	43	102	21	28	80	229

**Table 3. Overview of the Data Samples II**

Composition of the data samples by industries. The industries cover for 81%, 86% and 79% by number of issuances respectively, out of 102, 28 and 229 observations. Size is measured in Total Assets.

Industry	Bonds			Convertible Bonds			Equity		
	#	Mean size	Mean issuance	#	Mean size	Mean issuance	#	Mean size	Mean issuance
Oil Well Services & Equipment	35	19 378	612	12	22 368	1 740	68	10 163	671
Oil & Gas Operations	23	10 233	444	5	6 067	1 543	42	3 688	263
Water transportation	18	12 875	386	4	11 523	825	24	6 990	517
Food Processing	3	5 566	367	3	8 220	659	17	5 279	887
Software & Programming							13	301	116
Construction Services							10	2 153	189
Gold & Silver	4	13 802	207				7	2 446	346
<b>Total</b>	<b>102</b>	<b>12 365</b>	<b>479</b>	<b>28</b>	<b>14 422</b>	<b>1 282</b>	<b>229</b>	<b>6 184</b>	<b>524</b>

### 3.4 Descriptive Statistics

Table 2, 3 and 4 present some descriptive statistics for the data samples. Table 2 shows that the activity in the convertible bond market has been, and is, limited compared to the bond and equity markets. The trend is however positive and the average issuance size returned to the high levels of 2007 in 2010, with NOK 1 731m. This is higher than both the straight bond and equity market, with NOK 487m and NOK 652m respectively. Table 3 shows that the oil-industry represents the majority of issuances within all securities, followed by the shipping industry. The oil-industry accounts for 64.7% of the bonds, 79.7% of the convertible bonds and 47.2% of the equity issuances by issuance volume. This is understandable, due to OSE's high "oil-factor". The oil-industry consists of the largest companies, and has the largest issuances on average.

Table 4 shows that the convertible bond issuers are larger than the ones of straight bonds and equity in terms of market capitalization. The equity issuers are also the least profitable, with the convertible bond issuers being the most profitable measure by both EBITDA margin and ROA.

The bond issuers' revenues are higher than the convertible issuers, while the convertible issuers' market capitalization is twice the size. This indicates that the bond issuers are more mature companies, while the convertible issuers have growth opportunities at hand.

#### Table 4. Overview of the Data Samples III

The table shows selected financial data for the samples, 102, 28 and 229 observations respectively. All numbers in NOKm.

Year	Bonds		Convertible Bonds		Equity	
	Mean	Median	Mean	Median	Mean	Median
Revenues	5 778	1 320	5 012	2 781	2 108	762
Market capitalization	6 356	3 325	14 107	10 177	4 183	1 630
EBITDA margin	14.7%	12.9%	20.8%	19.3%	11.8%	11.7%
ROA	-0.5%	1.1%	-0.1%	2.7 %	-1.0%	0.4%

Sample characteristics are presented in table 5, with significance test results presented in table 6. The amount issued in convertible bond offerings is significantly larger than both straight bonds and equity offerings. Of the convertible bond offerings the debt-like convertibles are the largest. In terms of proportion of market capitalization issued, the equity issuances are significantly larger than convertibles, which are also significantly larger than the bonds issuances. The convertible and bond issuers have the same dividend yield, higher than the equity issuers.

The stock runup shows large disparity between mean and median, indicating large variances within the different samples, and i do not find any significant differences. The bond issuers have the same financial slack as the equity issuers, both significantly larger than the convertible issuers. Leverage is fairly similar, with bond issuances being significantly more leveraged than the convertible issuers. All samples have negative cash flow on average, with convertible issuers and bond issuers being significantly more profitable than the equity issuers. The equity issuers are significantly more volatile than the bond issuers, but have similar volatility as the convertible issuers. Bond issuers do not pay more taxes than equity issuers, but the convertible bond issuers pay significantly more taxes than both bond- and equity issuers.

As expected the convertible issuers' market-to-book ratio is significantly greater than the bond issuers, but the equity issuers have the same ratio as the convertible issuers. The typical issuer of

convertible bonds is the same size as the bond issuers in terms of total assets, and significantly larger than equity issuers.

### *3.5 Critics of the Data Samples*

The major critique against the samples is the small amount of convertible bonds. 28 observations might not give an accurate description of the average issuer, and the large spread between mean and median in company characteristics underlines this. The 28 observations are much fewer than both Lewis et al. (1999) with 203 convertible offerings<sup>6</sup> and Dutordoir and Van de Gucht (2009) with 179 convertible offerings<sup>7</sup>. To increase the number of observations I could have extended the time period beyond 2005, but due to the market's development I find the issuances in recent times to be most appropriate for my study. In addition, 92.3% of the convertibles issuances since 2000 - by volume - have been issued since 2005. With development I refer to investor demand and secondary market liquidity. In addition we have experienced a broad range of economic conditions in the time period, from high growth in 2006 to recession in 2008 and uncertain positivity in 2010. This makes the sample more robust. When evaluating sources Norsk Tillitsmann should be covering all convertibles in the Norwegian market, but there might be convertibles not covered by their statistics and therefore not included in this paper.

I present both mean and median to illustrate the large disparity within the data samples. While the mean shows the actual average, the median on the other hand correct for outliers and present the value in the middle. In addition the median is better in describing samples with few observations than the mean. Even though the convertible bond sample consists of few observations I prefer to evaluate the mean numbers, because I find the outliers to be of interest for the characteristics.

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<sup>6</sup> From 1977 to 1984

<sup>7</sup> From 1994 to 2004

**Table 5. Descriptive Statistics**

Characteristics of 102 high-yield offerings, 28 convertible bonds offerings - where 21 are debt-like and 7 are equity-like - and 229 equity issuances. All numbers in NOKm. The dependable variable, DEPVAR, takes the value 1 for equity issuances, 0 for bond issuances and a value equal to the risk-neutral probability that the convertible debt is converted into equity for convertible bonds. PROCNOK is issuance size. DY is dividend yield. EXRET is the issuer excess return over the Oslo Stock Exchange Benchmark Index (OBX) 12 months prior to issuance. SLACK is the sum of cash and cash equivalents divided by total assets. LEV is long term debt divided by total assets. PROF is operating cash flow divided by total assets. VOL denotes the standard annual volatility of the stock return estimated over trading days -240 to -40 days prior to issuance. TAX is tax payable divided by total assets. MTB is calculated as (market capitalization of equity + total assets - book value of equity) divided by total assets. PROC is proceeds divided by market capitalization. SIZE is total assets.

Year	Bonds		Debt-Like Convertibles		All Convertible Bonds		Equity-Like Convertibles		Equity	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
DEPVAR	0	0	20.1%	22.7%	24.1%	24.1%	36.0%	33.0%	1	1
PROCNOK	479	382	1 358	1 313	1 282	859	1 054	122	524	204
DY	1.3%	0.0%	1.7%	0.0%	1.3%	0.0%	0.0%	0.0%	0.6%	0.0%
EXRET	16.2%	3.4%	37.4%	8.8%	24.2%	4.3%	-15.6%	-11.6%	27.8%	-2.7%
SLACK	15.7%	11.3%	6.5%	6.1%	10.0%	6.9%	20.4%	8.3%	15.2%	13.2%
LEV	31.6%	34.0%	26.4%	22.9%	23.6%	18.9%	15.3%	7.5%	28.7%	28.4%
PROF	-13.2%	-9.4%	-8.7%	-3.1%	-10.4%	-8.6%	-15.6%	-15.2%	-17.7%	-13.7%
VOL	41.4%	36.6%	50.2%	45.8%	46.6%	39.8%	35.7%	32.5%	44.9%	39.0%
TAX	0.2%	0.2%	1.8%	1.2%	1.5%	0.7%	0.4%	0.0%	0.2%	0.1%
MTB	1.58	1.24	2.17	1.41	2.10	1.55	1.89	1.79	2.26	1.50
PROC	12.5%	5.7%	17.8%	5.8%	18.3%	7.5%	19.9%	13.9%	33.2%	13.2%
SIZE	12 365	5 379	16 310	8 526	14 422	6 602	8 758	3 139	6 184	2 179
# of observations	102	102	21	21	28	28	7	7	229	229

**Table 6. Significance Test of the Descriptive Statistics**

t-test of the mean values of the sample characteristics. A positive sign indicates that the prior security has higher values, while a negative sign indicates that the latter security has higher values within each comparison column.

Year	Bonds vs. Debt-Like		Bonds vs. Convertibles		Equity vs. Convertibles		Equity vs. Equity-Like Convertibles		Bonds vs. Equity	
	Diff.	t-test	Diff.	t-test	Diff.	t-test	Diff.	t-test	Diff.	t-test
PROCNOK	-879	-6.24 <sup>***</sup>	-803	-5.10 <sup>***</sup>	-758	-3.75 <sup>***</sup>	-530	-1.39 <sup>*</sup>	-45	-0.47
DY	-0.4%	-1.26	0.0%	-0.45	-0.7%	-2.14 <sup>**</sup>	0.6%	0.70	0.7%	2.84 <sup>***</sup>
EXRET	-21.2%	-0.93	-8.0%	-0.40	3.6%	0.16	43.4%	0.98	-11.6%	-0.89
SLACK	9.2%	3.31 <sup>***</sup>	5.7%	2.09 <sup>**</sup>	5.2%	1.54 <sup>*</sup>	-5.2%	-0.79	0.5%	0.26
LEV	5.2%	1.17	8.0%	2.01 <sup>**</sup>	5.1%	1.24	13.4%	1.71 <sup>**</sup>	2.9%	1.26
PROF	-4.5%	-1.06	-2.8%	0.63	-7.3%	-1.63 <sup>*</sup>	-2.1%	-0.25	4.5%	1.79 <sup>**</sup>
VOL	-8.8%	-1.82 <sup>**</sup>	-5.2%	-1.21	-1.7%	-0.37	9.2%	1.05	-3.5%	-1.33 <sup>*</sup>
TAX	-1.6%	-2.43 <sup>**</sup>	-1.3%	-2.13 <sup>**</sup>	-1.3%	-1.30 <sup>*</sup>	-0.2%	-0.11	0.0%	-0.03
MTB	-0.59	-1.83 <sup>**</sup>	-0.52	-1.86 <sup>**</sup>	0.16	0.36	0.37	0.42	-0.68	-2.87 <sup>***</sup>
PROC	-5.3%	-1.41 <sup>**</sup>	-5.8%	-1.74 <sup>**</sup>	14.9%	1.35 <sup>*</sup>	13.3%	0.61	-20.7%	-3.57 <sup>***</sup>
SIZE	-3 945	-0.93	-2 057	-0.55	-8 238	-3.34 <sup>***</sup>	-2 574	-0.62	-6 181	4.11

<sup>\*\*\*</sup> indicates significance at the 0.01 level

<sup>\*\*</sup> indicates significance at the 0.05 level

<sup>\*</sup> indicates significance at the 0.1 level



#### 4. Methodology

My study is based on the work of Lewis et al. (1999). By using a two-step security choice model including logistic regression Lewis et al. predicted what type of security a company is expected to use in the US market. Later Dutordoir and Van de Gucht (200) used the same model with some additional variables in the Western European market. In addition I have conducted a qualitative survey among the companies in my convertible bond sample. The survey is based on the surveys of Billingsley and Smith (1996) and Bancel and Mittoo (2004), investigating issuers' motives for issuing convertibles. However, the results from the survey were not significant due to a low number of respondents (nine). The survey will be attached in Appendix F.

##### 4.1 Research Design

I model convertible debt issuance decision of companies in the Norwegian market with the two-step security choice model presented by Lewis et al. (1999). The model includes convertible bonds, bonds and common equity issuances, because managers choose to issue convertible bonds over the other standard financing securities. In the first step the companies choose to issue a debt-like security or equity-like security, while in the second step the companies choose within each security group to issue convertibles over bonds or equity.

The first-step analysis consists of a logistic regression model with the dependent variable being continuous on the interval [0, 1]. The dependent variable, DEP, is the probability of conversion of the security to equity at maturity; bonds will get the value 0, equity will get 1 and convertible bonds will get the risk-neutralized probability of conversion. The probability is calculated with  $N(d_2)$  where  $N(\cdot)$  is the cumulative probability under a standard distribution function, based on Black-Scholes assumptions. Thereof,  $d_2$  is determined as follow:

$$d_2 = \frac{\ln\frac{S}{X} + \left(r - \delta - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}} \quad (1)$$

In equation (1)  $S$  is stock price at announcement,  $X$  is the original conversion price;  $r$  is the continuously compounded yield on a 5-year Norwegian Government Bond at issuance;  $\delta$  is the dividend yield for the fiscal year-end preceding announcement;  $\sigma$  is the standard deviation of the equity return calculated over the period 240 to 40 days prior to issuance; and  $T$  is maturity at issuance in years.

In certain circumstances the conversion price is adjusted if the issuer pay dividend to the shareholders. In those occasions the dividends yield should be excluded from equation 1. By excluding the dividend yield the probability for conversion will increase making the convertible more equity-like. I have chosen to keep the original equation as used by Lewis et al. (1999) and Dutordoir and Van de Gucht (2009), however this might make the convertible sample's dependable variables more debt-like than they are in reality.

In the second-step analysis however, the dependable variable is a binary variable. Within the debt-like security group the debt-like convertibles are given the value 1, while in the equity-like security group the equity-like convertibles are given the value 0.

I find the mean (median) probability of conversion in my sample to be 24.1 (24.1)%. The results are lower than the mean (median) probability of 28.0 (27.2)% in Western Europe found by Dutordoir and Van de Gucht (2009) and substantially lower than the median probability of 50.0% in the US market found by Lewis et al. (1999). This indicates that convertibles in the Norwegian market are structured very debt-like. This is similar to Western Europe where the convertible offerings are debt-like, and unlike the US market where they are equity-like.

Lewis et al. (1999) argued that their model offered several advantages over traditional approaches. They treated the issuance choice as a financing problem where the managers are not restricted to sole debt or equity issuances, but can choose a security consisting of both debt and equity components. This enabled Lewis et al. to recognize that subsets of issuers offer convertible debt for different reasons in their empirical tests, providing insights to managerial motivations for issuing this sophisticated financing security. This is a necessary approach looking at theory, because the use of convertibles either as delayed equity or cheap debt is connected to the issuers' motives.

The second step examines the determinants of financing choice within the debt-type (debt-like convertibles and bonds) and equity type (equity-type convertibles and equity) security group. The variables are the same as in the first-step analysis. While Lewis et al. (1999) categorized convertible offerings with probability of conversion lower than 50% as debt, Dutordoir and Van

de Gucht (2009) used a probability lower than the upper quartile (32.9%) due to the Western European convertibles more debt-like nature. Based on the debt-like nature of the Norwegian market, I choose to categorize based on the upper quartile (28.9%) and identifies 21 debt-like and 7 equity-like convertibles.

#### ***4.2 Logistic Regression***

Since the dependable variable is a continuous variable on the interval [0, 1] in the first step and a binary variable in the second step it is common to apply a logistic regression (“logit”). In problems where the outcomes are restricted, such as here, traditional Ordinary Least Square (OLS) regression does not make sense. The major problem with the OLS is that the value can be bigger than 1 and less than 0. Following is an introduction to the logit model (Wooldridge, 2006).

Consider an OLS model on the form:

$$Y_i = \beta_0 + \beta_1 x_i + \varepsilon_i \quad (2)$$

By assuming the dependent variable is the probability of an event, we can assume we have a problem on the form:

$$\Pr(x_i) = \beta_0 + \beta_1 x_i + \varepsilon_i \quad (3)$$

We further assume that the probability remains within the boundaries [0, 1], represented algebraically for some variable z by:

$$\Pr(z) = \frac{e^z}{1 + e^z} \quad (4)$$

We get the logit model by using the inverse probability and taking the natural logarithm of equation 4, and assuming that z is a linear function of x:

$$\ln\left(\frac{\Pr(x_i)}{1 - \Pr(x_i)}\right) = \beta_0 + \beta_1 x_i + \varepsilon_i \quad (5)$$

The parameters are estimated using the maximum likelihood methods, assumed to have a standard logistic distribution with mean of 0 and variance of 1.

### 4.3 Econometric Model

The following logit equations are used in the regression analysis to find the relationship between a set of variables and the security choice:

$$P(DEP_i = 1) = L(\alpha_0 + \beta_1 EXRET_i + \beta_2 SLACK_i + \beta_3 LEV_i + \beta_4 PROF_i + \beta_5 VOL_i + \beta_6 TAX_i + \beta_7 MTB_i + \beta_8 PROC_i + \beta_9 MKRET_i + \beta_{10} YIELD_i) \quad (6)$$

$$P(DEP_i = 1) = L(\alpha_0 + \beta_1 EXRET_i + \beta_2 SLACK_i + \beta_3 LEV_i + \beta_4 PROF_i + \beta_5 VOL_i + \beta_6 TAX_i + \beta_7 MTB_i + \beta_8 PROC_i + \beta_9 MKRET_i + \beta_{10} YIELD_i + \beta_{11} \ln SIZE_i) \quad (7)$$

$$P(DEP_i = 1) = L(\alpha_0 + \beta_1 EXRET_i + \beta_2 SLACK_i + \beta_3 LEV_i + \beta_4 PROF_i + \beta_5 VOL_i + \beta_6 TAX_i + \beta_7 MTB_i + \beta_8 PROC_i + \beta_9 MKRET_i + \beta_{10} YIELD_i + \beta_{12} SIZE_i) \quad (8)$$

$$P(DEP_i = 1) = L(\alpha_0 + \beta_1 EXRET_i + \beta_2 SLACK_i + \beta_3 LEV_i + \beta_4 PROF_i + \beta_5 VOL_i + \beta_6 TAX_i + \beta_7 MTB_i + \beta_8 PROC_i + \beta_9 MKRET_i + \beta_{13} BNP_i) \quad (9)$$

In the model above, P represents the probability for the convertible to be converted to equity and L represents the logit regression model. Equation 6 is the basic equation of the security choice model. In equation 7 and 8 I include the variables lnSIZE and SIZE respectively. Equation 9 is similar to equation 6, except I replace the YIELD variable with the BNP variable. The 4 different equations are all used within the 3 different regressions.

### 4.4 Explanatory Variables

I have used the same explanatory variables as Lewis et al. (1999). All variables are calculated at fiscal year-end preceding issuance date.

#### *Asymmetric information*

Asymmetric information increases the cost of external financing according to Myers and Majluf (1984). Companies are hence more likely to issue equity after large stock price increases, when the equity-related adverse selection costs are small according to Lucas and McDonald (1990).

Stock performance, EXRET, is calculated as excess returns over the 12 months prior to issuance. Lewis et al. (1999) further argued good economic conditions precede good investment projects, reducing the chances for moral hazard and increasing the probability of an equity issuance. I use 12 months forward looking GDP projections, BNP, from Statistics Norway as a proxy for economic conditions. Once each quarter they publish a report with annual GDP projections, and I weight the projections according to number of quarters left in current year and number of quarters necessary from next year at issuance.

Lewis et al. (1999) used financial slack, issue size and issuer's size as adverse selection costs. Myers and Majluf (1984) argued financial slack increases adverse selection costs due to fear of overvaluation, reducing the attractiveness of an equity issuance. The financial slack, SLACK, is calculated as cash and cash equivalents divided by total assets. Krasker (1986) argued that potential wealth loss for current shareholders increase with offering size, increasing adverse selection costs and reducing probability of equity offerings. Issuance size, PROC, is calculated as proceeds divided by market capitalization. Brennan and Schwartz (1988) assumed informational asymmetries to be negative correlated with firm size, reducing the probability of large companies to issue equity. Issuer size is calculated by both total assets (SIZE) and the natural logarithm of total assets (lnSIZE).

### *Financial risk*

Increased financial risk increases the expected costs of financial distress. Brennan and Kraus (1987) argued companies with high financial distress costs would benefit from issuing convertibles to bonds due to the reduced coupon rate. Stein (1992) also argued forced conversion of convertibles to be a cheap way to get equity. Several variables are used to measure financial risk. The first is the leverage ratio, LEV, calculated as long-term debt divided by total assets. Highly leveraged companies have higher financial distress costs due to the asset substitution risk. Next I calculate the ability to handle short-term debt. Low profitability, PROF, measured as cash flow divided by total assets, also increases financial distress costs. The last variable is the stock return volatility, VOL, calculated from 240 days to 40 days prior to issuance. High volatility increase asset substitution risk and hence financial distress costs. High leverage, low profitability and high volatility all reduce the probability of a debt offering.

*Tax considerations*

Due to the tax-deductibility of interest payments, a company's tax status can affect a company's financing choice. The benefits of adding more debt or converting debt to equity are decided based on tax paid divided on total assets. High tax paid, TAX, increases the probability of a debt offering and is measured as tax payable divided by total assets.

*Growth opportunities*

The market-to-book ratio, MTB, is often used as a proxy of the value of a company's future investment opportunities. Brennan and Schwartz (1988) argued that growth opportunities increased both the risk of the company and the asymmetric information, increasing both bond and equity related financing costs. The market-to-book ratio is calculated as market capitalization plus total assets minus book value of equity divided by total assets, and a high ratio increase the probability of an equity offering.

**4.5 Control Variables**

To control for temporal market fluctuations I have included control variables, based on Dutordoir and Van de Gucht (2009).

*Financing costs*

To control for the economy-wide level of debt-related financing costs I use the 5-year Norwegian Government Bond yield, YIELD, measured at issuance. A high yield indicates high debt-related financing costs influencing companies' ability to handle their different financing options, increasing the attractiveness of an equity issue. Choe et al. (1993) argued that adverse selection costs are reduced after a period with high market return, MKRET, on equities increasing the probability of an equity offering, hence the 3 months equity market return on the Oslo Benchmark Index (OBX) preceding issuance is used to control economy-wide equity-related financing costs.

**Figure 5. Convertible Bond Hypothesis and Explanatory Variables.**

Overview of variables with expected sign in the regression analysis according to theory. The sign is based on increased size of the variable, and a negative sign indicates the variable increase probability for a debt-like security while a positive sign indicates the variable increases the probability of an equity-like security. E indicates that the variable is an equity-related financing cost, while D indicates that the variable is a debt-related financing cost.

Hypothesis	Variables/Proxy	Name	Exp sign	Cost
Adverse selection costs	Excess returns 12 months prior to announcement	EXRET	+	E
Moral hazard	12 next months Norwegian BNP projections	BNP	+	D/E
Adverse selection costs	Financial slack Cash/Total assets	SLACK	-	E
Adverse selection costs	Issuance size Proceeds/ Market cap	PROC	-	E
Adverse selection costs	Company size Total assets	SIZE	-	D/E
	Ln(Total assets)	lnSIZE		D/E
Financial risk	Financial distress costs Long-term debt/Total assets	LEV	+	D
Financial risk	Current profitability Cash flow/Total assets	PROF	-	D
Financial risk	Stock return volatility 240-40 days prior to announcement	VOL	+	D
Capital structure	Tax deductibility Tax payable/Total assets	TAX	-	D
Investment opportunities	Market-to-book ratio (Market cap + Total assets - Book value equity)/Total assets	MTB	+	D/E
Financing cost	Market return Market returns last 3 months	MKRET	+	E
Financing cost	Financial cost 5 years Norwegian Government Bond yields	YIELD	+	D

**Table 7. Correlation Matrix**

The matrix shows correlation between the dependent variable and the explanatory variables, correlation larger than 0.400 in bold. The dependable variable takes the value 1 for equity issuances, 0 for bond issuances and a value equal to the risk-neutral probability that the convertible debt is converted into equity for convertible bonds. EXRET is the issuer excess return over the Oslo Stock Exchange Benchmark Index (OBX) 12 months prior to issuance. SLACK is the sum of cash and cash equivalents divided by total assets. LEV is long term debt divided by total assets. PROF is operating cash flow divided by total assets. VOL denotes the standard annual volatility of the stock return estimated over trading days -240 to -40 days prior to issuance. TAX is tax payable divided by total assets. MTB is calculated as (market capitalization of equity + total assets - book value of equity) divided by total assets. PROC is proceeds divided by market capitalization. MKRET is the return of the OBX 3 months prior to issuance. YIELD is the yield of 5-Year Norwegian Government Bonds. SIZE and lnSIZE is total assets and its natural logarithm. BNP is a measure for the next 12 months BNP projections, weighted based on number of quarters left of current year and necessary quarters of next year's projection.

	DEP	EXRET	SLACK	LEV	PROF	VOL	TAX	MTB	PROC	MKTRET	YIELD	lnSIZE	SIZE	BNP
DEP	1													
EXRET	0.046	1												
SLACK	0.015	0.221	1											
LEV	-0.047	-0.069	-0.321	1										
PROF	-0.113	-0.064	-0.195	-0.071	1									
VOL	0.053	-0.057	-0.216	-0.174	-0.079	1								
TAX	-0.018	0.030	0.067	-0.093	-0.003	-0.053	1							
MTB	0.147	<b>0.593</b>	0.388	-0.307	-0.315	-0.080	0.038	1						
PROC	0.198	-0.163	-0.029	-0.096	-0.005	0.285	-0.001	-0.118	1					
MKTRET	0.066	0.074	-0.032	0.016	-0.006	0.013	-0.085	0.074	-0.206	1				
YIELD	0.174	0.016	0.157	0.063	-0.063	-0.342	0.058	0.103	-0.149	-0.045	1			
lnSIZE	-0.292	-0.191	<b>-0.478</b>	<b>0.489</b>	0.289	-0.009	-0.013	<b>-0.466</b>	-0.106	0.100	-0.123	1		
SIZE	-0.226	-0.112	-0.213	0.254	0.177	-0.045	0.021	-0.223	-0.120	0.128	-0.149	<b>0.749</b>	1	
BNP	0.106	0.206	0.206	-0.009	-0.041	<b>-0.593</b>	0.115	0.296	-0.222	-0.091	<b>0.594</b>	-0.294	-0.185	1



#### ***4.6 Correlation Matrix***

The correlation matrix shows that the dependable variable is positively correlated to EXRET, BNP, SLACK, PROC, VOL, MTB, MKRET and YIELD, and negatively correlated to LEV, PROF, TAX, SIZE and lnSIZE. The signs of the variables SLACK, PROC and LEV are all opposite of the expected.

There are several strong intercorrelations between variables. The BNP and YIELD variables are as expected positively correlated, indicating that the YIELD increases when the future economic conditions are good. To avoid biasness I check the variables separately in the regression. The SIZE and lnSIZE are linear to each others, shown with the high correlation, and the variables are also used separately in the regressions. The strong positive correlation between MTB and EXRET indicates growth companies outperform the more mature companies on OSE, but I do not find it necessary to check for the variables separately.

lnSIZE is highly correlated to SLACK, LEV and MTB. The correlation with LEV (positive) and MTB (negative) is natural, because large companies tend to be more leveraged and have less growth opportunities present. SLACK is negatively correlated to lnSIZE, also natural because companies do not need to hold the same amount of total assets available when they grow larger.

## 5. Results

Overall I find the results from the regression analysis and the descriptive statistics to confirm that companies use convertibles to mitigate the asset substitution problem, and risk and uncertainty under the asymmetric information theory. The results indicate that the convertible issuers face high debt-related and equity-related financing costs, making a standard security choice unattractive due to unattractive financing terms. However, I do not find any support for the backdoor equity theory.

### *5.1 The Convertible Bond Survey*

My survey among convertible bond issuers got nine respondents, out of 21 contacted issuers. The low number of respondents denies me the opportunity to conduct statistical evaluation of the answers, but I am able to discover certain trends. 66% consider cheap debt to be an important or very important factor and 66% of the respondents consider few covenants to be important or very important when deciding financing source (question 1a and 1l). Both answers indicate that convertibles are used as a substitute for bonds. In addition 56% consider straight bonds to be the highest preferred alternate to convertibles, compared to 33% for equity (question 5). While 44% consider delayed equity to be an important or very important factor, 67% consider the ability to call the convertible important or very important factor when deciding upon issuing convertibles (question 1d and 1e). The results give mixed support for the use of convertibles as a substitute for equity. Both investments and general financing were the major beneficiary of the proceeds for 44% of the issuances (question 7), and 55% expect to use convertibles as much or more in the future (question 8). Few issuers consider agency costs when issuing convertibles, 89% of the respondents find bondholder protection to be a less- or not important factor when issuing convertibles (question 1h).

Market conditions are also important to the issuers. 77% consider high stock market volatility and low interest rates to be important or very important when considering convertibles (question 3a and 3b). When deciding upon financial advisor 100% consider placing power to be important or very important, followed by good existing relationships with 78% (question 6e and 6a). The results indicate that companies do not necessarily issue convertibles to mitigate company specific costs, but might as well issue convertibles to utilize opportunities in the financing market.

### ***5.2 The Security Choice Model Results***

The security-choice model examines why companies prefer to issue debt to equity. The results from the regression in table 8 show that the likelihood for a debt-like security increases with the *SLACK* and *lnSIZE* variables. The negative sign of the *SLACK* variable is in line with predominant views of available literature, and support the impact of adverse selection costs on companies' financing choices decisions. In addition the debt and equity issuers have the same level of leverage. This increases the importance of having financial slack to handle increased leverage. The negative sign of the *lnSIZE* variable is also as expected, and indicates that larger companies face less asymmetric information, enabling them to issue debt.

The likelihood for an equity-like security increases with the *MTB*, *PROC*, *MKRET*, *YIELD* and *BNP* variables. The *MTB* ratio's positive sign indicates that companies with valuable growth opportunities finance their operations with equity to reduce both agency costs and financing costs associated with asymmetric information, as expected. This is further supported by the equity-like issuers' lower dividend yield, a known characteristic for companies financing growth opportunities. Given that *lnSIZE* is negative, it is surprising to find that the *PROC* is positive. Large issuances of equity increase the adverse selection costs, and should lead to issuance of debt. The finding indicates that companies might not be able to issue the same amount of debt as equity if the company and their investment opportunities are risky.

The *MKRET*'s positive sign indicates that companies find equity-like offerings more attractive following a period of high stock market returns, which corresponds with theory. The correlated variables *YIELD* and *BNP* are both positive, supporting the influence of information asymmetries on financing choices decisions. High interest rates increase the debt-related financing costs, and makes equity more attractive. This indicates that companies can choose to issue convertibles to reduce their interest payments. Positive economic prospects seeds good investment opportunities, reducing the uncertainty about their profitability and the equity-related costs.

**Table 8. The Security Choice Model Regression Results**

Logistic regression results from analyzing the determinants of the security choice between 28 convertible bonds, 102 high-yield bonds and 229 equity issuances. The dependable variable takes the value 1 for equity issuances, 0 for bond issuances and a value equal to the risk-neutral probability that the convertible debt is converted into equity for convertible bonds. EXRET is the issuer excess return over the Oslo Stock Exchange Benchmark Index (OBX) 12 months prior to issuance. SLACK is the sum of cash and cash equivalents divided by total assets. LEV is long term debt divided by total assets. PROF is operating cash flow divided by total assets. VOL denotes the standard annual volatility of the stock return estimated over trading days -240 to -40 days prior to issuance. TAX is tax payable divided by total assets. MTB is calculated as (market capitalization of equity + total assets - book value of equity) divided by total assets. PROC is proceeds divided by market capitalization. MKRET is the return of the OBX 3 months prior to issuance. YIELD is the yield of 5-Year Norwegian Government Bonds. SIZE and lnSIZE is total assets and its natural logarithm. BNP is a measure for the next 12 months BNP projections, weighted based on number of quarters left of current year and necessary quarters of next year's projection.

Independent Variable	Regression Model			
	(1)	(2)	(3)	(4)
Intercept	-2.92 <sup>***</sup>	0.38	-2.65 <sup>***</sup>	-0.96
EXRET	-0.09	-0.06	-0.10	-0.15
SLACK	-3.32 <sup>***</sup>	-3.97 <sup>***</sup>	-3.36 <sup>***</sup>	-2.96 <sup>***</sup>
LEV	-0.39	0.49	-0.23	-0.12
PROF	0.15	0.55	0.23	0.10
VOL	0.63	0.61	0.58	0.86
TAX	-0.17	1.29	-0.20	0.02
MTB	0.48 <sup>**</sup>	0.35 <sup>**</sup>	0.46 <sup>***</sup>	0.49 <sup>***</sup>
PROC	3.64 <sup>***</sup>	3.03 <sup>***</sup>	3.46 <sup>***</sup>	3.60 <sup>***</sup>
MKRET	2.00 <sup>**</sup>	2.34 <sup>**</sup>	2.15 <sup>**</sup>	1.99 <sup>**</sup>
YIELD	69.32 <sup>***</sup>	65.35 <sup>***</sup>	66.09 <sup>***</sup>	
lnSIZE		-0.36 <sup>***</sup>		
SIZE			-0.00	
BNP				0.23 <sup>*</sup>
Pseudo R <sup>2</sup>	0.15	0.18	0.16	0.13
Log likelihood	-181.07	-176.47	-180.36	-186.22
Likelihood ratio		0.010	0.492	1.000
Prob>chi2	0.008	0.011	0.003	0.012
AIC	382.14	374.94	382.72	392.44

<sup>\*\*\*</sup> indicates significance at the 0.01 level

<sup>\*\*</sup> indicates significance at the 0.05 level

<sup>\*</sup> indicates significance at the 0.1 level

When I compare my findings to Lewis et al. (1999) and Dutordoir and Van de Gucht (2009) I find SLACK to be of greater importance in security choices in Norway than both US and Western Europe. Another difference is the PROC's positive sign. Dutordoir and Van de Gucht (2009) found a negative sign, but no significance, while Lewis et al. (1999) found a significant negative sign. The results indicate that it is harder for companies to enter the bond market in Norway, because they need available cash on the balance sheets and are not able to issue large amounts with bonds. lnSIZE is significantly negative in all markets, underlining size's ability to reduce asymmetric information.

When I include the lnSIZE variable the MTB variable's significance decreases from a 0.01 level to a 0.05 level. This indicates that the size of the company can adjust for some of the uncertainty associated with growth opportunities, and allow for a more debt-like security. The significance of the MKRET variable also increases from a 0.1 level to a 0.05 level when lnSIZE is included. According to theory size reduces asymmetric information; it is therefore surprising to find increased significance of the MKRET variable, which also reduces asymmetric information.

When I test for specification errors, the results indicate that I have chosen meaningful predictors, but also that there exist specification errors in the logistic regressions. However, this can be mitigated with high pseudoR<sup>2</sup>. The regression model's pseudo R<sup>2</sup> is in line with Lewis et al. (1999), but beneath Dutordoir and Van de Gucht (2009). In addition the Hosmer and Lemeshow's tests (goodness-of-fit test), gives low p-values as seen in the line prob>chi2. Models with good fit should achieve high p-values. Overall I find some weaknesses in the model. When I include lnSIZE the model fit is significantly improved, but that is not the case when I include SIZE and BNP.

### ***5.3 Convertible Bonds as a Substitute For Bonds***

This section evaluates the financing choice between convertible bonds and bonds within the debt-like security group. The logit regression shows that the LEV, PROF, VOL, TAX and MTB variables increase the likelihood for convertibles, while the SLACK variable increases the likelihood for bonds.

**Table 9. The Debt-Like Security Group Regression Results**

Logistic regression results from analyzing the determinants of the security choice between 21 debt-like convertible bonds and 102 high-yield bonds. The dependable variable takes the value 1 for debt-like convertible bond issuances and 0 for bond issuances. EXRET is the issuer excess return over the Oslo Stock Exchange Benchmark Index (OBX) 12 months prior to issuance. SLACK is the sum of cash and cash equivalents divided by total assets. LEV is long term debt divided by total assets. PROF is operating cash flow divided by total assets. TAX is tax payable divided by total assets. MTB is calculated as (market capitalization of equity + total assets - book value of equity) divided by total assets. PROC is proceeds divided by market capitalization. MKRET is the return of the OBX 3 months prior to issuance. YIELD is the yield of 5-Year Norwegian Government Bonds. SIZE and lnSIZE is total assets and its natural logarithm. BNP is a measure for the next 12 months BNP projections, weighted based on number of quarters left of current year and necessary quarters of next year's projection.

Independent Variable	Regression Model			
	(5)	(6)	(7)	(8)
Intercept	-7.68**	-9.06**	-8.00**	-5.88***
EXRET	0.13	0.15	0.11	0.06
SLACK	-24.10***	-23.36**	-23.52***	-24.48***
LEV	4.96*	4.63*	4.41	4.49*
PROF	6.80*	6.64**	6.79**	6.23**
VOL	4.57**	5.66**	4.74**	4.48**
TAX	46.18**	44.59**	45.32**	42.45**
MTB	2.00***	1.92***	1.92***	2.10***
PROC	-2.23	-1.54	-1.43	-2.93
MKRET	2.08	1.91	1.56	1.85
YIELD	51.78	54.89	57.36	
lnSIZE		0.15		
SIZE			0.00	
BNP				0.11
Pseudo R2	0.45	0.44	0.45	0.43
Log likelihood	-31.52	-31.40	-31.15	-31.87
Likelihood ratio		0.887	0.691	1.000
Prob>chi2	0.130	0.158	0.119	0.210
AIC	83.04	84.80	84.30	83.74

\*\*\* indicates significance at the 0.01 level

\*\* indicates significance at the 0.05 level

\* indicates significance at the 0.1 level

The significance of the MTB variable confirms that risk is an important aspect when deciding financing source. The positive sign of the MTB variable indicates that the convertible issuers have more valuable investment opportunities at hand. Volatility is an indicator of risk and uncertainty, and the VOL variable's significance shows that companies financing decision is also affected by this. The positive significance of the PROF variable reduces some uncertainty and contradicts the other variables. However, achieved profitability is not necessary easy transferred to new investment opportunities. Overall the discussed variables make it easier to expropriate the assets of bondholders, increasing the probability of asset substitution. On the other hand, the survey gives contradicting results with 66% considering reduction of agency costs to be of little or no interest. With the market-to-book ratio indicating convertible issuers have growth opportunities at hand, I would expect the dividend yield to be lower than debt issuers to underline this indication. However, I find the dividend yield to be alike. According to the agency cost theory the riskiness of the company's investment opportunities is the central aspect affecting companies' financing choices decision. Investors fear management with risky investment opportunities at hand will issue securities that enhance their values at the investors' expense. As previously discussed the MTB and the VOL variables are indications of risk, and even though the profitability increase the probability of convertible issuers, I find enough support to confirm the view that companies issue convertibles to control for asset substitution under the agency cost theory.

The significance of the SLACK variable indicates that the financing choice is affected by the company's ability to take on and handle new debt, as literature states. The convertible issuers have less cash available, making them potentially less able to handle new debt and thereof more risky. Risk increases with volatility, and I find the convertible issuers to have higher volatility than bond issuers. According to theory this is an important aspect of the convertible, because the value of the option increases with volatility, reducing the necessary coupon rate to be paid. Brennan and Kraus (1987) and Brennan and Schwartz (1988) both assess that riskiness of the issuer is the key consideration when discussing the issuers' motives for issuing convertibles. My findings indicate that the convertible issuers can be classified as risky companies, based on their market-to-book ratio, cash available and volatility. A company's volatility is among others affected by the stock market's volatility, and the issuers should be expected to take the stock

market volatility into consideration. The results from the survey also indicate that the issuers are influenced by the stock market volatility. I find my results to support Brennan and Kraus (1987) and Brennan and Schwartz (1988) under the asymmetric information theory.

I find a positive sign for the TAX variable, indicating that the convertible issuers pay more taxes than the bond issuers. A rationale for companies to issue convertibles could be less tax deductibility opportunities. The convertibles' lower coupon rate increases the amount of debt the company could issue without reducing the tax deductibility benefits. My findings reject this rationale.

I do not find the equity related variables PROC and EXRET to be significant in my regression results. However, the descriptive statistics show that the convertibles issuances are larger divided by market capitalization than the debt issuances. The convertible issuances' larger size when divided by market capitalization increases the adverse selection costs according to theory, and reduces the attractiveness of an equity issue. At the same time the stock runup is the same for the convertibles issuers and the bonds issuers, increasing the adverse selection costs associated with an equity issue. My findings indicate that companies face high equity-related costs, without giving them strong consideration when deciding between convertibles and bonds.

When I compare my findings to Lewis et al. (1999) and Dutordoir and Van de Gucht (2009) I find the same risk characteristic of the convertible issuers as they did. However, both found the size of the issuers to be significantly negative variable, while size is not a significant variable in my results. This can be related to my sample of non-investment grade rated companies, which will be smaller by size than investment-grade rated companies. While the size of the convertible issuers in the US market is approximately USD 1.0bn, the size of the issuers in Western Europe and Norway is approximately USD 6.0bn and USD 2.6bn<sup>8</sup> respectively. Size is important in the debt market, and the size of the Norwegian issuers indicates they can operate in a more debt-like market. In addition, both Lewis et al. and Van de Gucht found EXRET to be a significant variable when deciding financing source, indicating companies choose convertibles after excess return. I did not find the variable to be significant, but the result from the survey indicates it is

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<sup>8</sup> Used FX of 5.5 NOK/USD



important in Norway as well. 66% of the respondents considered a high current stock price that locked in a favourable premium to be very important or important when deciding to issue convertibles.

As seen in the security choice model, the significance of the MTB variable decreases from a 0.05 level to a 0.1 level when I include the  $\ln\text{SIZE}$  and the  $\text{SIZE}$  variables in the debt-like security group. Again, this indicates that the size of the company can adjust for some of the uncertainty associated with growth opportunities, and allow for a more debt-like security.

Again, the results indicate that I have chosen meaningful predictors, but with specification errors present when I test for specification errors in the logistic regressions. The regression model's pseudo  $R^2$  is higher than Dutordoir and Van de Gucht (2009). In addition the Hosmer and Lemeshow's tests (goodness-of-fit test) gives low p-values as seen in the line  $\text{prob} > \chi^2$ . However, the p-values are higher than for the security choice model. Overall I find some weaknesses in the model. The model fit is not improved when I include  $\ln\text{SIZE}$ ,  $\text{SIZE}$  and  $\text{BNP}$ .

#### ***5.4 Convertible Bonds as a Substitute for Equity***

This section evaluates the financing choice between convertible bonds and equity within the equity-like security group. The logit regression shows that the  $\text{LEV}$  variable increases the likelihood for equity, while  $\ln\text{SIZE}$  increase the likelihood for convertibles.

The asymmetric information increases for the equity issuers with the  $\ln\text{SIZE}$  variable, indicating that companies facing asymmetric information issue equity in Norway. In addition the  $\text{LEV}$  variable indicates that leveraged companies choose to issue equity. Stein's (1992) backdoor equity theory states that companies will choose convertibles as financing source if the companies are facing high information asymmetries and high financial distress costs. My findings reject the backdoor equity theory in the Norwegian convertible bond market. Lewis et al. (1999) found support for the delayed equity theory, while it is rejected by both Dutordoir and Van de Gucht (2009) and me. This can be seen in light of the equity-like convertibles in the US market, and the debt-like convertibles in the Western European and the Norwegian market categorized by the dependable variable.

**Table 10. The Equity-Like Security Group Regression Results.**

Logistic regression results from analyzing the determinants of the security choice between 7 equity-like convertible bonds and 229 equity issuances. The dependable variable takes the value 1 for equity issuances and 0 for equity-like convertible bond issuances. EXRET is the issuer excess return over the Oslo Stock Exchange Benchmark Index (OBX) 12 months prior to issuance. SLACK is the sum of cash and cash equivalents divided by total assets. LEV is long term debt divided by total assets. PROF is operating cash flow divided by total assets. TAX is tax payable divided by total assets. MTB is calculated as (market capitalization of equity + total assets – book value of equity) divided by total assets. PROC is proceeds divided by market capitalization. MKRET is the return of the OBX 3 months prior to issuance. YIELD is the yield of 5-Year Norwegian Government Bonds. SIZE and lnSIZE is total assets and its natural logarithm. BNP is a measure for the next 12 months BNP projections, weighted based on number of quarters left of current year and necessary quarters of next year's projection.

Independent Variable	Regression Model			
	(9)	(10)	(11)	(12)
Intercept	0.22	5.40	0.58	-0.69
EXRET	0.66	0.61	0.65	0.70
SLACK	0.29	-0.70	0.32	0.41
LEV	5.36*	9.39**	7.10**	5.42*
PROF	1.06	2.15	1.41	0.95
VOL	2.57	3.27	2.68	3.59
TAX	1.29	2.95	2.10	0.43
MTB	0.38	0.24	0.38	0.33
PROC	1.83	1.75	1.80	2.09
MKRET	0.79	0.89	0.85	0.92
YIELD	-1.55	-2.87	-9.87	
lnSIZE		-0.72*		
SIZE			0.00	
BNP				0.22
Pseudo R2	0.15	0.19	0.17	0.15
Log likelihood	-27.08	-25.56	-26.21	-26.92
Likelihood ratio		0.219	0.419	0.861
Prob>chi2	0.858	0.963	0.700	0.496
AIC	74.16	73.12	74.42	73.84

\*\*\* indicates significance at the 0.01 level

\*\* indicates significance at the 0.05 level

\* indicates significance at the 0.1 level

The specification error test results indicate that the model does not have meaningful predictors, leaving no specification errors in the logistic regressions. The regression model's pseudo  $R^2$  is also lower than Dutordoir and Van de Gucht (2009). The high p-values from the Hosmer and Lemeshow's tests (goodness-of-fit test) are not meaningful due to the misfit of the model. Overall the model's poor fit might also be affected by the low number of equity-like convertibles.

### ***5.5 Discussion***

According to Brennan and Kraus (1987) and Brennan and Schwartz (1988) asymmetric information makes convertible the preferred financing source for risky companies. The security choice model supports this view, showing that risky companies will choose a more equity-like security. In the debt-like security group I find the same results. The convertibles issuers tend to be riskier with high uncertainty regarding the value of the investment opportunities. It seems convertibles are a debt-play in Norway, where companies issue convertibles instead of bonds because they are too risky. In addition the companies will benefit from lower coupon because they have investment opportunities to finance. The survey reveals some management considerations that support the use of convertibles as a substitute for bonds, but do not reject the use of convertibles as a substitute for equity. 66% of the respondents considered convertibles as cheap debt to be an important or very important factor affecting their choice (question 1a), whereas delayed equity only received 44% (question 1d). In addition the respondents considered straight debt to be the main alternative to convertibles (question 5), just like in Billingsley and Smith (1996) and Bancel and Mittoo (2004).

Both the security choice model and the debt-like security group results showed that growth companies will choose equity-like securities. It is therefore surprising to see that the backdoor-equity theory by Stein (1992) is not supported in the equity-like security group. Leverage and asymmetric information will lead to equity offerings, indicating that the equity issuers do not have access to the convertible bond market. The convertibles' debt-like nature underlines my findings, and reveals a possible explanation for the rejection of the theory. The convertibles are designed in a way that leaves the probability of conversion low, disabling the companies from substitute convertibles for equity. Based on the similarity to the Western European convertibles,

I can only assume that the design of the convertibles is demand driven in Norway as well. The survey, on the other hand, shows that delayed, forced conversion is a consideration. 66% consider the ability to force conversion very important or important when considering convertibles (question 1e).

Figure 2 shows how the amount of - and percentage of - high-yield bonds has increased while the amount of investment-grade rated bonds have remained close to constant over the last decade. According to Holba (2006) the amount of high-yield bonds increased due to increased demand for investments with high return in a low interest rate environment in 2004-2005. This shows that increased demand can affect the investors' investment criteria. A similar increase in demand for convertibles could reduce the investors' criteria and open up the Norwegian market for more convertibles. The current situation might make it possible for suitable issuers of convertible bonds to time the market and issue convertibles not necessary because they intended to, but because they can achieve favourable funding terms. The indication of market timing is further increased by the existence of companies able to issue high-yield bonds at an affordable coupon rate who choose to issue convertibles. Seadrill Ltd. issued a high-yield bond of NOK 2.0bn with a moderate coupon rate of 6.5% (approximately 3 months NIBOR plus 385bp) 05.10.2010, and followed up with a convertible bond of NOK 3.8bn with coupon rate of 3.4% (approximately 3 months NIBOR plus 79 basis points) on 27.10.2009. Norwegian investment bankers I have spoken to also argue that issuers consider market timing and utilization of financing sources, theoretical concepts not evaluated thoroughly in current convertible bond research to my knowledge.

### ***5.6 Opportunities for Future Research***

My findings show that equity is issued by small, risky companies who issue large amount of capital when divided by market capitalization. To a certain extent this contradicts theory. I also find indications for a demand driven convertible market in Norway. It could be interesting to investigate further why the risky companies issue equity, and not convertibles. The necessary research could be conducting through interviews or qualitative surveys among investors in the Norwegian market.

I argue that both bonds and convertible bonds are fast financing sources, enabling companies to raise large amount of capital faster than with bank debt or equity. Management who find their company to perform poorer than expected next quarter will achieve better financing terms if they raise capital ahead of the quarterly presentation. It could be interesting to research further if companies that issue bonds or convertibles simply time the market and raise capital on favourable terms while they can. The hard part of this research would be to find numbers to benchmark the quarterly results pre issuance against. It could also be interesting to investigate if the fast convertibles' speed enables companies to utilize windows of opportunity to get favourable financing terms due to high demand.

## 6. Conclusion

I find the security choice between convertible bonds and bonds to be affected by both company specific and market specific factors. Valuable future investment opportunities are a central aspect characterizing the convertible issuers, and they are also less able to handle new debt measured by amount of financial slack. The risk is further underlined by the importance of volatility and leverage. However, they pay more in tax and do not use convertibles to utilize tax shields better. Outside the company the recent market performance and current interest rate environment are factors affecting the choice between a debt-like and equity-like security.

This paper argues that non-investment grade rated companies in the Norwegian market use convertible bonds as a substitute for bonds to mitigate agency costs and mitigate debt-related financing costs under the asymmetric information theory. The companies have valuable investment opportunities at hand, but the companies are associated with high risk and uncertainty. I find no indications that companies issue convertibles instead of bonds to get delayed equity. The trend line from the survey is that companies use convertibles as a debt instrument, but not to mitigate agency costs, and that they are affected by market conditions as well. The issuers' motive is reflected in the debt-like structure of the convertible bonds, with little probability of conversion to equity. These findings are in line with Dutordoir and Van de Gucht's (2009) findings in the Western European market, but differ from Lewis et al.'s (1999) findings in the US market. Hence I deduce that the Norwegian market is more similar to the Western European market.

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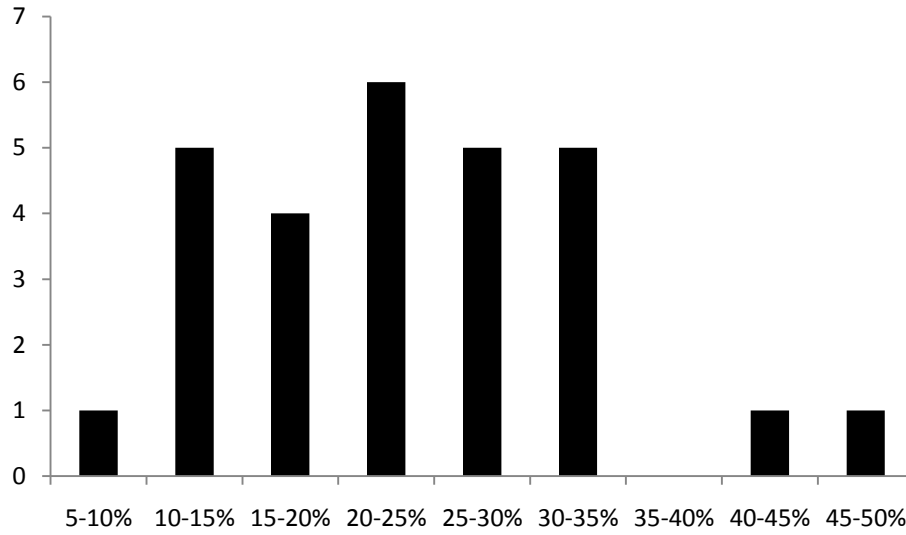
### Appendix A. Overview of the Convertible Bonds

Amounts are NOKm, FC means forced conversion by issuer and FR means forced redemption by issuer. I did not get hold of the information for the blank cells. The data is collected from Norsk Tillitsmann and the companies' website.

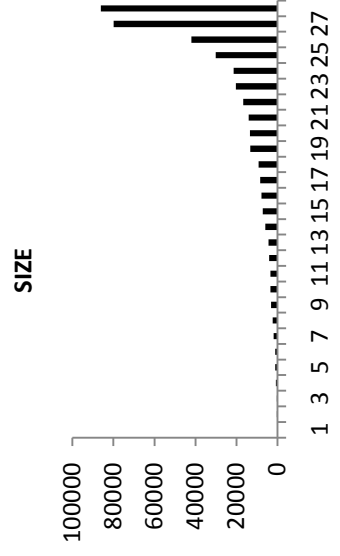
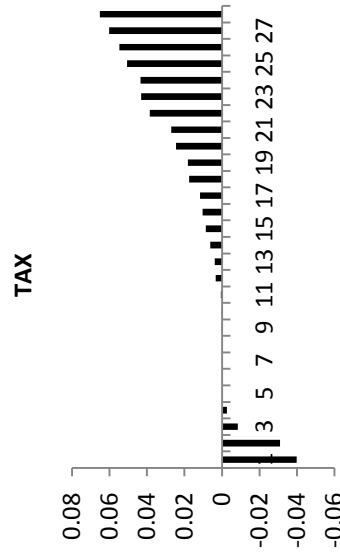
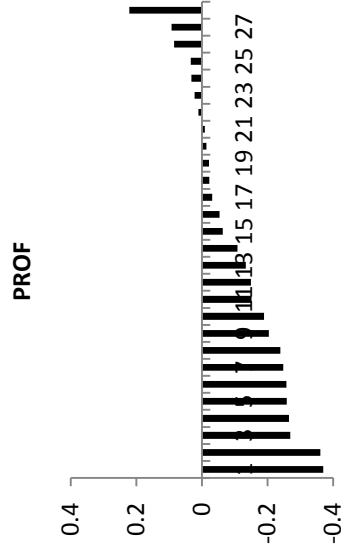
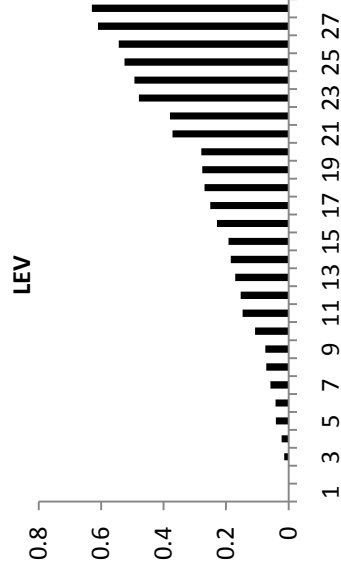
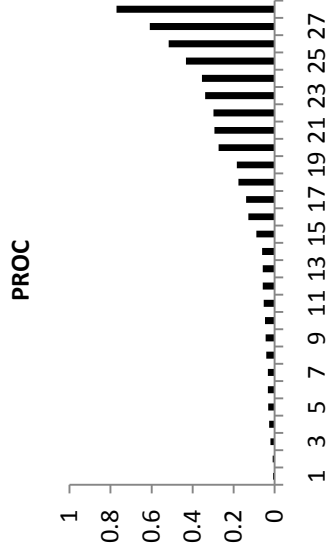
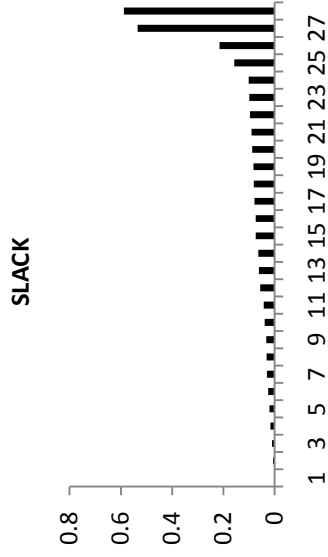
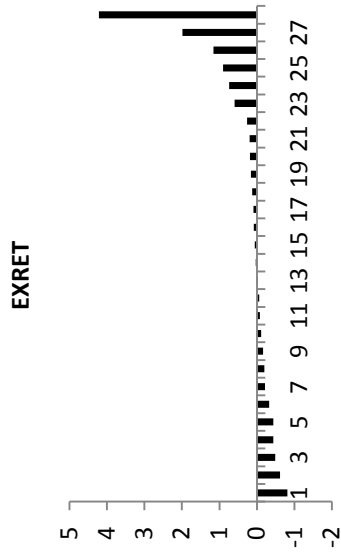
Company	Issuance	Maturity	Amount	Coupon	Coupon spread	Conversion premium	Dep. Variable feature	Call	Converted	Status
Ship Finance International	10.02.2011	10.02.2016	697	3.8%	1.1%	35%	13.0%	Y	N	Sen. Unsec.
TTS Group	18.01.2011	18.01.2016	200	8.0%	5.3%	23%	28.5%	Y	N	Sub. Unsec.
Bergen Group	28.10.2010	10.06.2011	120	5.4%	2.9%	42%	14.6%	Y	Y	Sen. Unsec.
Seadrill	27.10.2010	27.10.2017	3 794	3.4%	-2.2%	30%	24.5%	Y	N	Sen. Unsec.
Petrominerales	25.08.2010	25.08.2016	3 210	2.6%	0.0%	35%	25.8%	Y	N	Sen. Unsec.
Lappland Goldminers	03.05.2010	30.12.2013	122	6.6%	4.1%	22%	32.2%	N	N	Sen. Unsec.
Frontline	14.04.2010	14.04.2015	1 313	4.5%	2.1%	31%	22.7%	N	N	Sen. Unsec.
Marine Harvest	03.03.2010	23.02.2015	1 827	4.5%	2.2%	30%	13.2%	N	N	Sen. Unsec.
Renewable Energy Corp.	13.10.2009	13.10.2014	1 605	3.5%	1.5%	30%	23.6%	N	N	Sub. Unsec.
Subsea 7	13.10.2009	04.06.2014	2 598	6.5%	4.5%	38%	25.0%	N	N	Sen. Unsec.
Seadrill	29.09.2009	29.09.2014	2 918	4.9%	2.9%	35%	17.1%	Y	FC	Sen. Unsec.
Petrobank Energy & Resources	10.07.2009	22.04.2015	2 365	5.1%	3.2%	30%	19.5%	Y	N	Sen. Unsec.
Electromagnetic Geo Services	18.05.2009	18.05.2011	29	9.0%	6.6%	14%	23.3%	N	N	Sen. Unsec.
Sevan Marine	22.04.2009	04.11.2013	280	15.0%	12.1%	15%	10.8%	Y	FR	Sen. Sec.
Reservoir Exploration Techn.	16.04.2009	07.01.2013	113	2.9%	0.0%	8%	16.4%	N	FC	Sen. Unsec.
Grieg Seafood	02.04.2009	31.12.2010	100	8.0%	4.9%	6%	33.7%	N	Y	Sub. Unsec.
PA Resources	15.01.2009	15.01.2014	97	11.0%	7.5%	68%	18.2%			
Domstein	30.06.2008	30.06.2011	50	12.0%	5.2%	166%	7.5%			
Golden Ocean Group	20.12.2007	20.12.2012	1 167	3.6%	-2.5%	40%	23.6%	Y	FR	Sen. Unsec.
Petroleum Geo-Services	20.12.2007	03.12.2012	2 335	2.7%	-3.4%	40%	14.3%			
Petrominerales	06.12.2007	06.12.2010	584	3.4%	-2.8%	38%	24.7%	Y	Y	Sen. Unsec.
Codfarmers	30.11.2007	30.11.2013	100	15.0%	8.9%	40%	33.0%	N	FR	Sen. Unsec.
Seadrill Ltd.	08.11.2007	08.11.2012	5 837	3.6%	-2.3%	45%	30.1%	Y	FC	Sen. Unsec.
Subsea 7	29.06.2007	29.06.2017	1 021	0.0%	0.0%	35%	44.9%		FR	Sen. Unsec.
Petrobank Energy & Resources	04.05.2007	07.05.2012	1 459	3.0%	-1.7%	40%	27.3%	Y	N	Sen. Unsec.
Fred. Olsen Energy ASA	08.08.2006	30.03.2009	58	4.5%	1.2%	0%	47.2%	Y	FR	Sub. Unsec.

**Appendix B. The Dependable Variable's Empirical Probability Distribution**

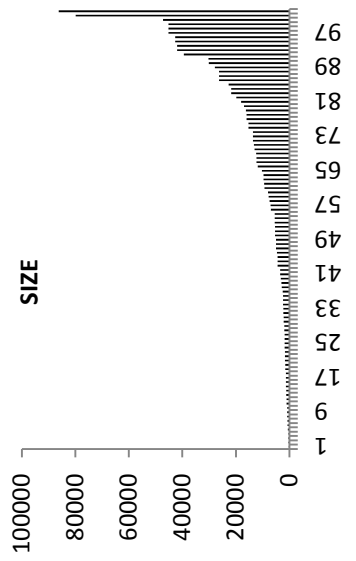
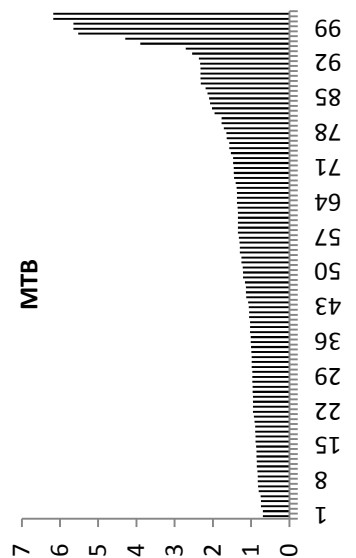
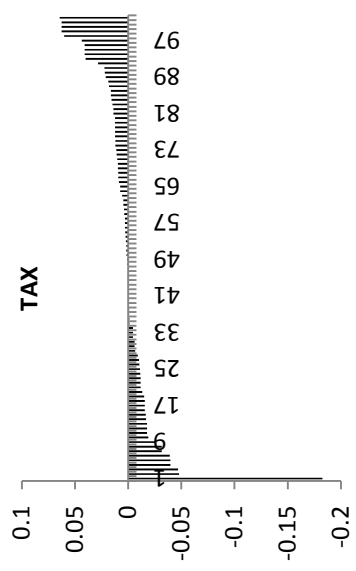
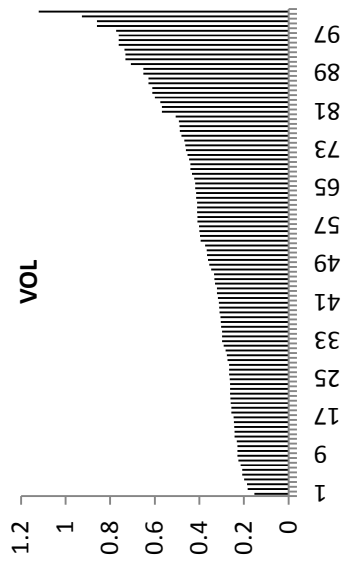
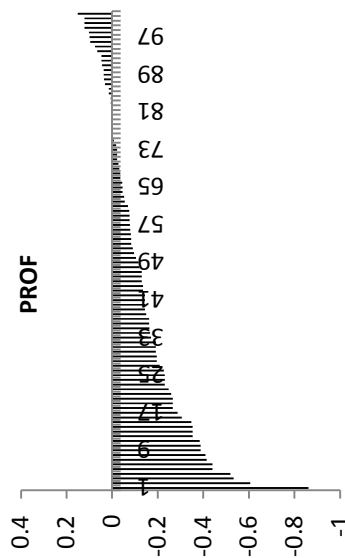
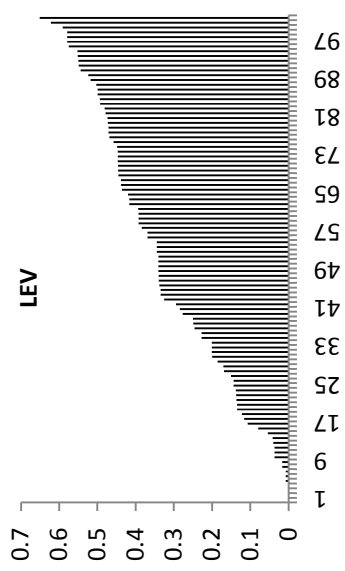
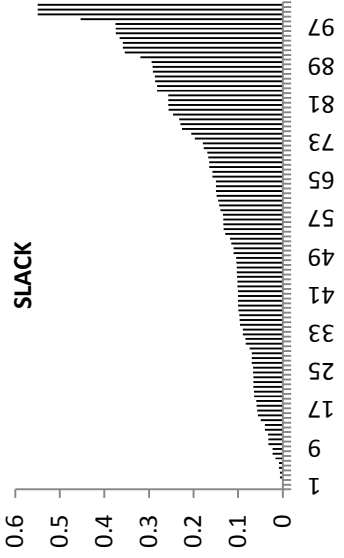
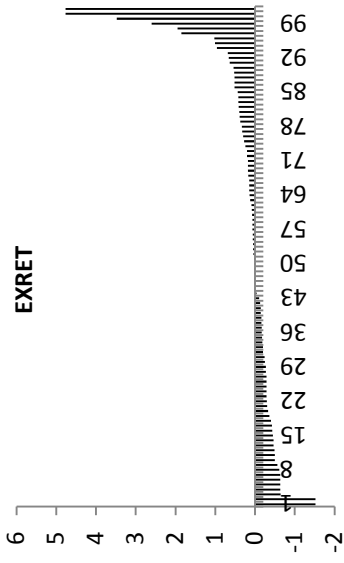
Empirical distribution of the probability of conversion at issuance for convertible debt issues over the period 2005 to 11.02.2011.



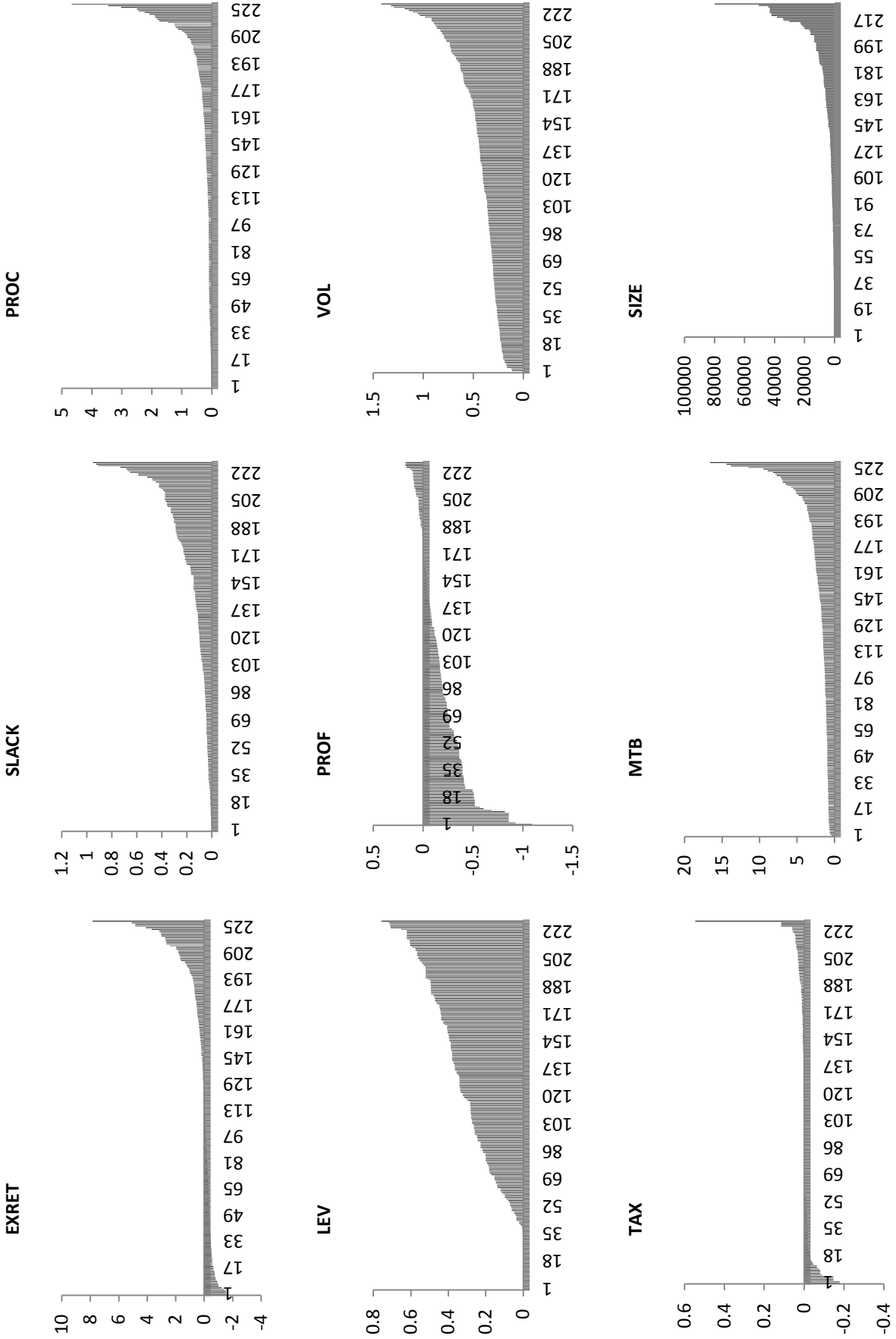
**Appendix C. Distributional Plots of the Convertible Bond Sample's Variables**



**Appendix D. Distributional Plots of the Bond Sample's Variables**



**Appendix E. Distributional Plots of the Equity Sample's Variables**



## Appendix F. Convertible Bonds Survey

Out of the convertible bonds sample of 21 issuers I received 9 respondents, corresponding to 43% of the data sample. The companies received and responded to the survey via email.

### 1. What factors have affected your company when issuing convertible bonds?

	Very important	Important	Neutral	Less important	Not important
a) Cheap debt, lower coupon rate than straight debt	2 22%	4 44%	2 22%	1 11%	0 0%
b) Management consider stock to be undervalued	1 11%	2 22%	5 56%	0 0%	1 11%
c) Management consider stock to be overvalued	0 0%	2 22%	4 44%	1 11%	2 22%
d) "Delayed equity", expecting conversion of the debt	0 0%	4 44%	1 11%	1 11%	3 33%
e) Ability to "call" or force conversion of debt if/when needed to	1 11%	5 56%	1 11%	2 22%	0 0%
f) To avoid short-term equity dilution	2 22%	3 33%	2 22%	1 11%	1 11%
g) To avoid dilution of shareholders (entrepreneurs) who would not be able to participate in an equity issues	0 0%	1 11%	3 33%	1 11%	4 44%
h) Protecting bondholders against unfavorable actions by management or shareholders	0 0%	0 0%	1 11%	2 22%	6 67%
i) Good signal to market about future growth opportunities	0 0%	3 33%	4 44%	1 11%	1 11%
j) Attraction of investors who were unsure about the company's risk	0 0%	0 0%	5 56%	2 22%	2 22%
k) Compared to bonds, we reach a more international investor base	2 22%	1 11%	3 33%	0 0%	3 33%

l) Fewer covenants than straight bonds and bank debt	0	6	2	0	1				
	0%	67%	22%	0%	11%				
m) Flexibility in financing uncertain future investments as and when needed	2	1	2	3	1				
	22%	11%	22%	33%	11%				
n) Recommendation by investment bankers	0	1	3	2	3				
	0%	11%	33%	22%	33%				
o) Tax advantage of interest deductibility	0	0	1	5	3				
	0%	0%	11%	56%	33%				

2. Please rank the following factors by order of importance on a scale from 1 to 8 on the extent it influenced your decision to issue convertible bonds (1 = most influential)

	1	2	3	4	5	6	7	8
a) Delayed equity	3	2	2	0	0	0	0	2
	33%	22%	22%	0%	0%	0%	0%	22%
b) Cheap debt	2	1	1	3	0	2	0	0
	22%	11%	11%	33%	0%	22%	0%	0%
c) Few covenants and need for financial stability	2	4	1	0	2	0	0	0
	22%	44%	11%	0%	22%	0%	0%	0%
d) Utilization of all financing sources	1	3	1	3	0	0	1	0
	11%	33%	11%	33%	0%	0%	11%	0%
e) Market timing	2	3	2	1	0	1	0	0
	22%	33%	22%	11%	0%	11%	0%	0%
f) Minimizing agency costs	0	0	4	0	2	0	3	0
	0%	0%	44%	0%	22%	0%	33%	0%
g) Suitable financing source for growth potentials	1	5	1	0	0	0	2	0
	11%	56%	11%	0%	0%	0%	22%	0%
h) Company's risk hard to assess	1	0	0	1	2	0	1	4
	11%	0%	0%	11%	22%	0%	11%	44%



## 3. How was your decision to issue convertibles affected by market conditions?

	Very important	Important	Neutral	Less important	Not important
a) High stock market volatility	4 44%	3 33%	2 22%	0 0%	0 0%
b) Low interest rates	1 11%	5 56%	1 11%	2 22%	0 0%
c) High current stock price locked in a favorable premium with the convertible	2 22%	4 44%	1 11%	0 0%	2 22%
d) Highly liquid market	0 0%	4 44%	3 33%	0 0%	2 22%
e) Successful convertible offerings by other companies	1 11%	1 11%	5 56%	0 0%	2 22%
f) Company could not issue straight bonds (due to market conditions, financial condition, e.g.)	1 11%	1 11%	1 11%	2 22%	4 44%
g) Company could not issue straight equity (due to market conditions, financial condition, e.g.)	1 11%	2 22%	2 22%	0 0%	4 44%

## 4. What factors are important when determining conversion policy?

	Very important	Important	Neutral	Less important	Not important
a) Forced conversion would impact the EPS negatively	0 0%	4 44%	5 56%	0 0%	0 0%
b) Conversion is not important to us	2 22%	0 0%	3 33%	3 33%	1 11%
c) Forced conversion would be done as and when future investment opportunities occur	0 0%	1 11%	4 44%	2 22%	2 22%

5. Please rank the most attractive alternative prior to issuing convertible bonds by preference. (1 = highest preference, 0 = not considered)

	1	2	3	4	0
a) Straight bond	5	2	1	1	0
	56%	22%	11%	11%	0%
b) Common stock	3	2	2	0	2
	33%	22%	22%	0%	22%
c) Preferred stock	0	0	0	0	9
	0%	0%	0%	0%	100%
d) Synthetic convertible bond	0	2	1	0	6
	0%	22%	11%	0%	67%

6. How did you choose financial advisor and what was the major advice given by the advisor when issuing convertible bonds?

	Very important	Important	Neutral	Less important	Not important
a) Good relationship with the investment bank advising us	1	6	2	0	0
	11%	67%	22%	0%	0%
b) The investment bank was famous for its convertible bond expertise	2	4	3	0	0
	22%	44%	33%	0%	0%
c) Chose investment bank who could finance the company as well	0	3	1	1	4
	0%	33%	11%	11%	44%
d) Chose the investment bank with lowest fees	0	4	3	1	1
	0%	44%	33%	11%	11%
e) Chose investment bank that offered the best placing power	7	2	0	0	0
	78%	22%	0%	0%	0%
f) Chose investment bank that offered the best price on the convertible	0	2	3	3	1
	0%	22%	33%	33%	11%

g) Advised us to issue convertibles due to good market conditions	2	2	2	1
	22%	22%	22%	11%
h) Helped us pricing and designing the convertible	1	7	1	0
	11%	78%	11%	0%
i) Helped us evaluate other alternate securities	1	3	4	1
	11%	33%	44%	11%
j) Explained the advantages of convertibles	1	3	2	2
	11%	33%	22%	11%
			11%	22%

7. What was the major use of the proceeds from the issuance?

	Mostly	Some	None
a) Refinancing	1	2	6
	11%	22%	67%
b) Investments	4	0	5
	44%	0%	56%
c) Growth opportunities	3	2	4
	33%	22%	44%
d) M&A	2	0	7
	22%	0%	78%
e) General financing	4	4	1
	44%	44%	11%

8. What is your expectation for future use of convertible bonds?

	More	Same	Less	Uncertain
Convertible bonds	2	3	2	2
	22%	33%	22%	22%

