

Master of Finance

Saint Mary's University

**The Effect of Firm Characteristics on the Choice Among Straight Debt,  
Convertible Debt and Equity Issuance--Evidence from Canada**

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## **Abstract**

The purpose of this paper is to examine the effect of firm-specific characteristics on firms' security issuance choice among straight debt, convertible debt and equity in Canada. Firms in this study are Canadian and listed on the Toronto Stock Exchange (TSE) that according to Bloomberg issued straight debt, convertible debt, or equity during the period from 2000 to 2012.

A Logit model is used in the study. The results show that firm size is the most significant factor both for the choice between debt-type security and equity-type security, and straight debt and debt-like convertible debt. Smaller firms are more likely to issue equity-type securities. Leverage has a negative relationship with the issuance of equity-type securities, while firms with higher stock return volatility are positively related to the issuance of equity-type securities. Firms with more tax liabilities are more likely to issue straight debt rather than debt-like convertible debt

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## **Chapter 1: Introduction**

### **1.1 Background**

With the continuous development and innovation of global financial markets, firms, especially publicly listed firms are given more choices to take advantage of external financing. In the light of this, convertible debt, which is a hybrid security, has become an important source of financing for firms. It originated in the United States in the 19th century, and has developed rapidly since the 1980s.

According to Essig (1991), more than 10% of all COMPUSTAT companies had ratios of convertible debt to total debt exceeding 33% during the period 1963-1984. Although the Canadian market is much smaller than the US market, convertible debt in the Canadian market has also become a major source of financing. After drying up during the credit crunch of 2008, the number of convertible bonds issued by Canadian companies has been on the upswing. In 2010, Canadian issuers put forth 52 new issues worth \$4.5 billion.

Convertible debt can be converted into a predetermined amount of common equity from the same company at certain times during its life. The conversion price is the nominal price per share at which conversion takes place. When the conversion price is less than the equity price, convertible debt is in-the-money; when the conversion price is equal to the equity price, convertible debt is at-the-money; when the conversion price is

greater than the equity price, convertible debt is out-of-the-money. In-the-money and at-the money convertible debts are considered as equity-like convertible debt; while out-of-the-money convertible debts are considered as debt-like convertible debt.

## **1.2 Purpose of Study**

The paper will examine the effect of firm-specific characteristics on firms' security issuance choice among straight debt, convertible debt and equity. We focus on Canadian listed firms and further analyze firms' motivation to issue a particular security.

Most firms face the problem of a security issuance decision due to the need for capital. Hence, it is significant to study the determinant of firms' security issuance choice. Many researchers have studied firms' choice between straight debt and equity issuance. (Marsh, 1982; Abd and Azila, 2003; Hull, 2011) In recent years, more researchers have taken efforts to examine the motivation of firms to issue convertible debt instead of traditional debt or equity. (Green, 1984; Brennan and Schwartz, 1988; Stein, 1992; Mayers, 1998; Lewis *et al.* 1999) However, most of the studies focused on the US market, while much less has been done to study the Canadian market.

Although the Canadian market shares certain features with the US market, the differences between them should not be neglected. To begin with, Canadian firms are much smaller than their American counterparts, which may lead to a quite different motivation for the use of convertible debts. What's more, the ownership structure in US

public companies is widely diffused, while it is highly concentrated in Canadian listed companies. According to Morcket *al.* (2000), about half of the 500 biggest Canadian companies are privately held, and only 20% of the remaining firms have large ownership. Therefore, it is of great importance to provide further evidence on the Canadian market.

### **1.3 Organization of the study**

This paper includes five chapters. This current chapter provides an introduction, including the purpose and background of the study. Chapter 2 will present a literature review and an interpretation of data and methodology is given in Chapter 3. In Chapter 4, the results of the study will be presented and analyzed. Chapter 5 is the final part of the study which will give the conclusions.



## **Chapter 2: Literature Review**

### **2.1 Motivations for convertible debt issuance**

#### 2.1.1 The asset substitution hypothesis

The asset substitution problem is the conflict between shareholders and debt holders arising from the risk level of investments to be undertaken by the firm. The shareholders of a levered firm usually have an incentive to invest in risky projects because of the higher return, and they may benefit from the project even if the project failed through transferring wealth from debt holders to themselves. The asset substitution hypothesis argues that convertible debt can mitigate shareholders' incentives to take risky projects at the expense of bondholders.

According to Green (1984), the conversion option embedded in the convertible debts give its holders the right to participate in the upside potential of the firm's stock. Therefore, the value of the stockholders' residual claim is reduced and shareholders' are less likely to engage in risky action against debt holders.

Brennan and Schwartz (1988) argued that the value of convertible debt is insensitive to the issuing firm's risk level. Although a rise in firm's risk will have an adverse impact on the straight debt component of convertibles, it can be partly offset by the positive impact on the warrant component of convertibles.

### 2.1.2 The back door equity financing hypothesis

The back door equity financing hypothesis first pointed out by Stein (1992) perceives convertible debt as a way to achieve deferred equity financing when adverse selection costs related to equity issue are high.

This hypothesis is based on the theory of asymmetric information stated by Myers and Majluf (1984). It makes the assumption that the issuing firm's management has an information advantage over investors. Investors rationally expect that the management act in the best interests of existing shareholders, i.e., issue equities when the stock is overpriced and use retained earnings or debt financing when the stock is underpriced. Therefore, the investors will consider that the issue of equity signals the overpricing of the stock, which will cause the fall of stock price and consequently creating an adverse selection cost for the issuing firm.

In Stein's (1992) study, convertible debts are perceived as a way for firms to "get equity into their capital structures through the back door" when there are high adverse selection costs related to equity financing. Stein classified firms into three different types: good firms, medium firms, and bad firms. Good firms choose debt financing, medium firms choose convertible debt financing, and bad firms choose equity financing. In addition, the three types of firms will not imitate mutually, otherwise it will create greater financing costs. Convertible debt, as a deferred equity financing can mitigate the

asymmetric information problem between issuer and investors, reducing adverse selection costs.

### 2.1.3 The sequential financing hypothesis

The sequential financing hypothesis arises from the uncertainty about the value of future investment options. According to Mayers (1998), convertible debt is more suitable for financing a sequence of investment options with uncertain value than either short- or long-term bonds. Convertible debts lower the issuing costs that would be associated with multiple short-term debt offerings, since conversion leaves funds inside the firm. In addition, convertible debts reduce stockholders' tendency to overinvest in projects with a negative NPV through returning the funds to debtholders by redemption when the investment option has no value. Unlike the previous three models, Mayers (1998) makes some adjustments to the previous models. His study relies on the critical assumption that convertible debts are callable, whereby companies are able to force the conversion of the convertible debt into equity when the investment option has a positive value.

## 2.2 Empirical evidence on security issuance choice

Baxter and Cragg (1970) use the data of 129 US industrial companies that issued securities from 1950 to 1965 to study the determinants of debt, convertible bond, preferred stock and equity issuance among corporations. They use probit and logit

models to identify the variables that affect firms' securities issuance choice. The conclusion of their study is that the higher the leverage, higher the P/E ratios and lower the total asset, the higher is the probability that a firm will issue equity or equity like securities. This result shows the significant impact of bankruptcy cost on corporate financing decision making.

Billingsley et al. (1988) investigate the relationship between securities issuance choice and deviation from target capital structure variables, target ratio proxies, market timing variables and payout ratio. The data consists of 189 straight debt issues, 139 convertible debt issues, and 205 equity issues in the United Kingdom. Their study shows that the balance sheet of convertible debt issuers are similar to those of the straight debt issuers while the risk-return complexion of convertible debt issuers are more like that of equity issuers. However, firm size is the only significant variable in the logit model of their analysis, indicating that smaller firms are more likely to issue either convertible debt or equity.

Essig (1991) argues that the ratios of long-term debt to equity, market value to book value of equity, Research and Development (R&D) to sales, as well as the volatility of the firm's cash flows, are all positively related to firms' use of convertible debt; while the ratio of tangible assets (property, plant and equipment, and inventories) to total assets is negatively related to firms' use of convertible debt. The relationship with market value to book value of equity, R&D to sales, and tangible to total assets all have real investment

option interpretations that are coherent to the sequential financing hypothesis.

The positive relationship with long-term debt ratio is also consistent with the sequential financing hypothesis because potential savings should be greater (from being able to reduce leverage through conversion when extra financing is required for the project) when leverage is greater. Moreover, the positive relationship with the volatility of the firm's cash flows is consistent because convertible debts are considered to be more popular among firms that have focused activities.

Lee and Gentry (1995) analyze the impact that firm's financial situation has on the security issuance choice involving straight debt, convertible debt and common stock by using the data of 540 industrial companies that issued securities over the year 1977 to 1986 in the United States. Their study is based on the Pecking Order Hypothesis of Myer and Majluf (1984) that market signals firms issuing debt securities as financially stronger than those issuing equity securities. Hence, they reckon that straight debt is issued by financially healthier firms, while more junior securities such as convertible debt and equity are issued by financially weaker firms. They also support their view with the hypothesis that financially healthy firms can issue debt because they are able to meet the obligations related to a higher debt level. The results show that companies that offered straight debt have a higher percentage of operating cash flows and a higher percentage of cash outflows going to dividend vis-à-vis companies that offered equity. In addition, the results indicate that US firms follow the financing hierarchy under the

## Pecking Order Hypothesis.

Lewis et al. (1999) study the influence of pre-offer issue, issuer and microeconomic information on securities choices among straight debt, convertible debt and equity over the period from 1977 and 1984 of US companies. Lewis et al. (1999) argues that the asset substitution hypothesis and back door equity financing hypothesis on convertible debt financing are not mutually exclusive. They study convertible debt issuer motivations with a security choice model containing straight debt, convertible debt, and equity. Convertible debts in their study are classified as debt-like convertibles (i.e., convertibles with a low conversion probability) and equity-like convertibles (i.e., convertibles with a high conversion probability). Firms with debt capacity, high investment opportunity and high firm risk tend to substitute debt-like convertibles for straight debt; and firms with high financial distress cost and high asymmetric information cost tend to substitute equity-like convertible debt for equity. Their study shows that tax shield, firm size, issue size, and share price volatility have positive relationships with debt-like convertible debt; while leverage, growth opportunity, pre-announced stock return and share price volatility have positive relationships with equity-like convertible debt.

Dutordoir & Van de Gucht (2009) study European convertible debt issuer motivations by estimating a security choice model similar to Lewis et al. (1999). The results show that European convertibles are used as debt-like convertibles, not as equity-

like convertibles. This motivation is reflected in the debt-like design of most European convertible issues. From their study, firm size is the most significant security choice determinant. Smaller firms are more likely to choose equity-type securities. Firms with a higher stock return volatility are most likely to issue equity and less likely to issue convertible debt and least likely to issue debt.

## **Chapter 3: Data and Methodology**

### **3.1 Sample Selection**

Firms in this study are Canadian, listed on the Toronto Stock Exchange (TSE) and that according to Bloomberg issued straight debt, convertible debt, or equity during the period from 2000 to 2012. Financial and utilities firms are excluded due to their specific financial structure. The initial sample consists of 1202 straight debt offerings, 208 convertible debt offerings, and 333 common equity offerings. The security offerings are kept only if the issuing firms' financial and security-related data are available at least for the fiscal year preceding the security offering. The final sample includes 214 straight debt offerings, 138 convertible debt offerings, and 143 common equity offerings.

### **3.2 Explanatory variables**

In order to examine the effect of firm-specific characteristics on firms' security issuance choice among straight debt, convertible debt and equity, seven variables are used in the model, including leverage, tax shield, issue size, firm size, profitability, daily stock return volatility and growth opportunities. The definition and sense of the variables are discussed as follows:

1. Leverage (LEVER). It is calculated as the ratio of total debt to total assets. Firms with higher leverage are more exposed to asset substitution and risk-related adverse



selection costs. Financial leverage is reported to be positively related to the use of convertibles, providing support to the view that higher expected costs of financial distress is related to the use of convertibles (Mikkelson 1981, Essig 1992, Lewis et al. 1997a). Moreover, higher leverage enhances the attractiveness of convertible debt as a sequential-financing device, since potential savings from reducing debt by calling the convertible should be larger when current leverage is higher (Mayers, 1998)

2. Tax shield (Tax). It is measured as the ratio of taxes paid to total assets. The tax shield is not directly associated with a specific convertible debt model but rather with capital structure theory in general. Firms with more tax liabilities can benefit more from a debt-type issuance of securities, since interest payments can be deducted from corporate tax payments. The obvious proviso is that they have to have the earnings to take advantage of the tax shield.

3. Issue Size. The relative issue size is calculated as the offering proceeds divided by the market value of equity measured on the announcement date. Based on Krasker's (1986) study, issues with large offering proceeds increase the potential for wealth losses by existing shareholders, and thus are related to higher adverse selection costs.

4. Firm Size. It is measured as the natural logarithm of total assets. Frank and Goyal (2003) argue that smaller firms are exposed to higher level of asymmetric information which may increase the cost of debt. Hence, it is generally assumed that smaller firms

are more likely to choose equity-type securities (Dutordoir & Van de Gucht's, 2009) .

5. Profitability (PROF). Mizen and Tsoukas (2010) uses the ratio of earnings before interest and taxes (EBIT) relative to total assets as a measure of the firm's ability to generate profits. Profitability is highly related to the amount of firms' internal equity. Therefore, based on the Pecking Order Hypothesis, when external financing is sought, profitable firms would be more likely to issue straight debt in order to avoid the potential dilution of ownership (Chen and Zhao, 2004). It is thus assumed that lower profitability firms are more likely to issue convertible debts instead of straight debt.

6. Daily stock return volatility (Volatility). It is measured in line with Lewis *et al.* (1999, 2003) over trading days -240 through -40 prior to the announcement date. Firms with a higher stock return volatility are assumed to face higher asset substitution and risk-related adverse selection costs. According to Dutordoir & Van de Gucht (2009), firms with a higher stock return volatility are more likely to issue equity than issue convertible debt, and are more likely to substitute convertible debt for straight debt.

7. Growth Opportunities (Growth). The market-to-book ratio is calculated as a proxy for the firm's growth opportunities. Firms with more growth opportunities (i.e., a high market-to-book ratio) tend to have higher levels of asymmetric information, and thus incur higher costs associated to straight debt and equity issuance (Brennan and Schwartz, 1988; Lewis *et al.*, 1999). In addition, the availability of growth opportunities

increases the likelihood that convertible debt will be used as a sequential-financing tool (Mayers, 1998).

### **3.3 Methodology**

#### **3.3.1 The classification between debt-like and equity-like convertible debt**

This paper will use a two-step security choice model which is in line with the framework proposed by Lewis *et al.* (1999). In the first step, the model aims at analyzing the determinant of firms' choice to issue a debt-type security (straight debt or debt-like convertible debt) or an equity-type security (equity-like convertible debt or equity). In the second step, the model will further study firms' choice between straight debt and debt-like convertible debt within the debt-type security group; or study firms' choice between equity-like convertible debt and equity within the equity-type security group.

To distinguish between the debt-type security and equity-type security, the risk neutral probability that the security will be converted into equity at maturity is calculated. A continuous variable on the interval (0, 1) is created using an approach similar to the one developed by Lewis *et al.* (1999). The conversion probability equals one for common equity and zero for straight debt. Convertible debt with a probability of conversion less than 0.5 is considered as debt-type security; while convertible debt with a conversion probability greater than or equal to 0.5 is considered as equity-type security.

Assuming that the underlying stock follows a Geometric Brownian Motion diffusion process, thus the probability of conversion is calculated as  $N(d_2)$ , where  $N(\cdot)$  is the probability under a standard normal distribution function and  $d_2$  is determined as:

$$d_2 = \frac{\ln(S/X) + (r - \delta - \frac{1}{2}\sigma^2)T}{\sigma\sqrt{T}} \quad (3.1)$$

$\delta$  — continuously-compounded dividend yield for the fiscal year-end preceding the announcement date;

$S$  — price of the underlying stock measured before the announcement date

$X$  — conversion price

$\sigma$  — standard deviation of the continuously compounded equity return estimated over the period 240 to 40 trading days prior to the announcement date

$T$  — initial convertible debt maturity (expressed in years);

$r$  — continuously-compounded yield on a ten-year Canadian government bond (measured on the announcement date)

As stated in the Sample Selection part, the final sample of the research includes 138 convertible debt offerings. After the calculation of the conversion probability, 128 of the offerings have a conversion probability that is less than 0.5, and 10 offerings have a

conversion probability that is greater than 0.5. That is, only 10 of the 138 convertible debt offerings are considered as equity-like convertible debt, and the rest 128 offerings are considered as debt-like convertible debt.

### 3.3.2 Logit Model

The paper will use logit regression to study the relationship between security issuance choice and firm characteristics. The dependent variable of logit model is calculated as the natural log transformation of the odds ratio, which can be written as<sup>1</sup>:

$$L_{i=\ln\left(\frac{P_i}{1-P_i}\right)} = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \dots + \beta_k X_{kt} + \epsilon_{it} \quad (3.2)$$

As stated above, the determinant of firms' choice to issue a debt-type security or an equity-type security is examined in the first step. Therefore, the model in the first step can be written as:

#### Model 1:

$$SC_{it} = \beta_0 + \beta_1 LEVER_{1t} + \beta_2 Tax_{2t} + \beta_3 Issue\ Size_{3t} + \beta_4 Firm\ Size_{4t} + \beta_5 Growth_{5t} + \beta_6 PROF_{6t} + \beta_7 Volatility_{7t} + \epsilon_{it} \quad (3.3)$$

$SC_{it}$ — Security Choice.  $SC_{it}$  equals to 0 for debt-type securities and  $SC_{it}$  equals to 1

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<sup>1</sup> J. S. Kramer, The Logit Model for Economists, Edward Arnold Publishers, London, 1991

for equity-type securities

LEVER — Leverage, which is calculated as the ratio of total debt to total assets.

Tax — Tax shield, which is measured as the ratio of taxes paid to total assets

Issue Size — The relative issue size, which is calculated as the offering proceeds divided by the market value of equity measured on the announcement date.

Firm Size — measured as the natural logarithm of total assets

Growth — Growth Opportunities. The market-to-book ratio is calculated as a proxy for the firm's growth opportunities.

PROF — Profitability, which is calculated as the ratio of earnings before interest and taxes relative to total assets.

Volatility — daily stock return volatility, which is measured over trading days  $-240$  through  $-40$  prior to the announcement date.

In the second step, the security issuance decision should be analyzed within the debt-type or equity-type securities separately.

For debt-type securities, the model can be written as:

**Model 2:**

$$SC_{it} = \beta_0 + \beta_1 LEVER_{1t} + \beta_2 Tax_{2t} + \beta_3 Issue\ Size_{3t} + \beta_4 Firm\ Size_{4t} \\ + \beta_5 Growth_{5t} + \beta_6 PROF_{6t} + \beta_7 Volatility_{7t} + \epsilon_{it} \quad (3.4)$$

$SC_{it}$ — Security Choice.  $SC_{it}$  equals to 0 for straight debt and  $SC_{it}$  equals to 1 for debt-like convertible debt

Other factors are the same as defined in Model 1.

For equity-type securities, the model can be written as:

**Model 3:**

$$SC_{it} = \beta_0 + \beta_1 LEVER_{1t} + \beta_2 Tax_{2t} + \beta_3 Issue\ Size_{3t} + \beta_4 Firm\ Size_{4t} \\ + \beta_5 Growth_{5t} + \beta_6 PROF_{6t} + \beta_7 Volatility_{7t} + \epsilon_{it} \quad (3.5)$$

$SC_{it}$ — Security Choice.  $SC_{it}$  equals to 0 for common equity and  $SC_{it}$  equals to 1 for equity-like convertible debt

Other factors are the same as defined in Model 1.

## Chapter 4: Empirical Results and Analysis

### 4.1 Summary of the variables

**Table 4.1**

Summary of independent variables in the sample

	Mean	Median	St Dev	Max	Min
Leverage	0.2803	0.2910	0.1811	1.1753	0.0000
Tax	0.0024	0.0021	0.0142	0.1348	-0.1339
Issue Size	0.1449	0.0927	0.2260	3.5622	0.0008
Firm Size	7.0469	7.0691	2.0381	10.8838	0.8059
PROF	0.0127	0.0163	0.0418	0.4195	-0.2625
Volatility	0.4017	0.3191	0.2559	1.6560	0.0989
Growth	2.5838	1.9478	3.6159	35.7184	-22.3456

Table 4.1 presents a summary of independent variables in the sample, including the mean, median, standard deviation, maximum and minimum value of the seven independent variables in the model. From the table, we can have a general outline of the firm-specific characteristics of the selected Canadian firms. Specifically, the firms in the sample have an average debt to asset ratio (leverage) of 28.03%. The average ratio of taxes paid to total assets (tax shield) is 0.24%. The average relative issue size is 0.1449. The natural logarithm of total assets (firm size) has a mean of 7.0769. The average ratio of EBIT to total assets (profitability) is 1.27%. The average daily stocks return volatility is 0.4017. These firms have average growth opportunities of 2.5838.



**Table 4.2**

The mean and median value of variables with different security type

	Straight Debt		Convertible Debt		Common Equity	
	Mean	Median	Mean	Median	Mean	Median
Leverage	0.3552	0.359	0.274	0.2842	0.1744	0.1369
Tax	0.0054	0.0045	-0.0002	0	0.0006	0
Issue Size	0.0963	0.0413	0.1972	0.1423	0.167	0.1267
Firm Size	8.7346	8.7123	6.1761	6.1024	5.3617	5.2663
PROF	0.0218	0.0205	0.0127	0.0125	-0.0011	0.0017
Volatility	0.2886	0.2515	0.386	0.3163	0.5862	0.5611
Growth	2.2955	2.076	2.481	1.593	3.0842	1.9874

From Table 4.2, we can make a comparison of the firm-specific characteristics among firms issuing straight debt, convertible debt, and common equity. Firms issuing straight debt have the highest mean and median value of leverage ratio, firm size, and profitability, while firms issuing common equity have the lowest of those values. The opposite situation prevails for the value of daily stock return volatility.

Firms issuing straight have the highest tax shield in average. The average issue size for firms issuing convertible debt is the largest, while the lowest issue size is for firms issuing straight debt. The average growth opportunities for firms issuing common equity is the highest, while the highest median value is for straight. The median value of growth opportunities for firms issuing convertible debt and common equity is much lower than their mean value. This is somewhat because the growth opportunity for firms issuing convertible debt and common equity are volatile. In contrast, the growth opportunity for

firms issuing straight is relatively stable.

#### 4.2 Determinants of the choice between debt-type security and equity-type security

**Table 4.3**

Logit regression of the choice between debt-type security and equity-type security

```

Logistic regression                               Number of obs   =       495
                                                  LR chi2(7)      =       215.62
                                                  Prob > chi2     =       0.0000
Log likelihood = -177.6807                       Pseudo R2      =       0.3776
  
```

sc	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
lever	-2.131147	.8606746	-2.48	0.013	-3.818039 - .4442562
tax	2.240499	8.834981	0.25	0.800	-15.07575 19.55674
issuesize	-1.153717	.7717288	-1.49	0.135	-2.666278 .3588435
firmsize	-.8034749	.1070741	-7.50	0.000	-1.013336 -.5936135
prof	1.643332	3.299188	0.50	0.618	-4.822958 8.109622
volatility	1.643046	.6445177	2.55	0.011	.3798149 2.906278
growth	-.0381906	.0395552	-0.97	0.334	-.1157173 .0393361
_cons	4.820298	.8735824	5.52	0.000	3.108108 6.532488

Table 4.3 shows the results of a logit regression of security issuance choice between debt-type security (straight debt and debt-like convertible debt) and equity-type security (common equity and equity-like equity). In the regression, the dependent variable equals one for equity-type securities, and zero for debt-type securities.

From the results we can see that, tax shield, issue size, profitability, and growth opportunity are not statistically significant to firms' security issuance choice. Firm size is the most significant factor with a negative relationship with the issuance of equity-type securities, indicating that smaller firms are more likely to issue equity-like

securities. This is consistent with the previous empirical studies (Jung *et al.*, 1996; Lewis *et al.*, 1999; Dutordoir & Van de Gucht's, 2009). Leverage is negatively related to the issuance of equity-type securities, indicating that firms with higher leverage are more likely to issue debt-type securities. This is consistent with Galai & Masulis's (1976) argument that shareholders of firms that are already highly levered will have a greater incentive to increase firm risk, since higher leverage has more potential for financial distress costs. Stock return volatility is positively related to the issuance of equity-type securities, which is still consistent with the former empirical studies (Lewis *et al.*, 1999; Dutordoir & Van de Gucht's, 2009).

#### 4.3 Determinants of the choice between straight debt and debt-like convertible debt

**Table 4.4**

Logit regression of the choice between straight debt and debt-like convertible debt

```

Logistic regression                Number of obs   =       342
                                   LR chi2(7)        =       174.52
                                   Prob > chi2        =       0.0000
Log likelihood = -99.833366        Pseudo R2       =       0.4664

```

sc	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lever	-2.050588	1.300858	-1.58	0.115	-4.600222	.4990457
tax	-75.61042	24.68051	-3.06	0.002	-123.9833	-27.23751
issuesize	.0889142	.6581361	0.14	0.893	-1.201009	1.378837
firmsize	-1.617906	.20555	-7.87	0.000	-2.020777	-1.215035
prof	20.67825	10.14585	2.04	0.042	.7927585	40.56375
volatility	.0958861	.9756332	0.10	0.922	-1.81632	2.008092
growth	-.0765568	.069446	-1.10	0.270	-.2126684	.0595549
_cons	11.9672	1.752075	6.83	0.000	8.533199	15.40121

Table 4.4 shows the results of a logit regression of security issuance choice between straight debt and debt-like convertible debt. In the regression, the dependent variable equals one for debt-like convertible debt, and zero for straight debt.

From the results we can see that, leverage, issue size, stock return volatility, and growth opportunity are not statistically significant to firms' security issuance choice. Firm size is still the most significant factor with a negative relationship with the issuance of debt-like convertible debt, indicating that smaller firms are more likely to issue debt-like convertible debt, while larger firms are more likely to issue straight debts. This is in line with the previous empirical studies (Lewis *et al.*, 1999; Frank and Goyal, 2003; Dutordoir & Van de Gucht's, 2009). Tax shield is negatively related to the issuance of debt-like convertible debt, implying that firms with more tax liabilities have more incentive to issue straight debt. The result is consistent with the general capital structure theory, which has already been discussed in Chapter 3. Profitability has a positive relationship with the issuance of convertible debt. The result is not consistent with the assumption based on the pecking order theory that profitable firms would be more likely to issue straight debts in order to avoid potential dilution of ownership (Chen and Zhao, 2004).

#### 4.4 Determinants of the choice between common equity and equity-like convertible debt

**Table 4.5**

Logit regression of the choice between common equity and equity-like convertible debt

```

Logistic regression                Number of obs   =       153
                                   LR chi2(7)         =        9.23
                                   Prob > chi2        =       0.2368
Log likelihood = -13.748117        Pseudo R2       =       0.2513

```

sc	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lever	-3.675804	4.962905	-0.74	0.459	-13.40292	6.051311
tax	115.143	76.25464	1.51	0.131	-34.31339	264.5993
issuesize	.3030155	3.810405	0.08	0.937	-7.165242	7.771273
firmsize	.8223029	.6229084	1.32	0.187	-.3985752	2.043181
prof	-12.29117	23.00037	-0.53	0.593	-57.37108	32.78873
volatility	-3.834851	3.823756	-1.00	0.316	-11.32928	3.659572
growth	-.2147391	.287284	-0.75	0.455	-.7778055	.3483272
_cons	-6.407299	4.346421	-1.47	0.140	-14.92613	2.111529

Note: 1 failure and 0 successes completely determined.

Table 4.5 shows the result of logit regression of security issuance choice between common equity and equity-like convertible debt. In the regression, the dependent variable equals one for equity-like convertible debt, and zero for equity.

As can be seen from Table 4.5, none of the independent variables has a significant impact on the security choice between common equity and equity-like convertible debt. This is mainly because that only 10 of the 138 convertible debt offerings are classified as equity-like, which is not sufficient for the regression to properly reflect the relationship

between firms issuance choice between common equity and equity-like convertible debt.

## **Chapter 5: Conclusions**

### **5.1 Conclusions**

This paper studies the effect of firm-specific characteristics on firms' security issuance choice among straight debt, convertible debt and equity. The study focuses on Canadian firms listed on the Toronto Stock Exchange (TSE) that according to Bloomberg issued straight debt, convertible debt, or equity during the period from 2000 to 2012. Financial and utilities firms were excluded due to their specific financial structure.

In the first step of the study, the conversion probability of the convertible debt is calculated, in order to classify the convertible debt into two groups: debt-like convertible debt and equity-like convertible debt. In the second step of the study, three logit models are used to analyze the determinants of firms' security issuance choice between debt-type security and equity-type security, straight debt and debt-like convertible debt, and common equity and equity-like convertible debt specifically. Seven firm-specific variables are chosen as the independent variables in the logit model, i.e. leverage, tax shield, issue size, firm size, profitability, daily stock return volatility and growth opportunities.

The results of the study show that firm size is the most significant factor both for the choice between debt-type security and equity-type security, and straight debt and debt-

like convertible debt. Smaller firms are more likely to issue equity-type securities relative to debt-type securities. Within the debt-type securities, smaller firms have more incentive to issue debt-like convertible debt compared with straight debt. Leverage has a negative relationship with the issuance of equity-type securities, while firms with higher stock return volatility is positively related to the issuance of equity-type securities. In addition, the tax shield is significant within the debt-type securities, but not significant in the regression of the whole sample. Firms with more tax liabilities are more likely to issue straight debt rather than debt-like convertible debt. All these results are in line with previous studies as discussed in Chapter 4. However, profitability is positively related to the issuance of debt-like convertible debt relative to straight debt, which is opposite to the pecking order theory. Issue size and growth opportunities do not present significant influences within both groups.

Since only 10 of the 138 convertible debt offerings are classified as equity-like convertible debt, it is not sufficient for the regression to properly examine the determinants of firms' issuance choice between common equity and equity-like convertible debt. As a result, none of the independent variables has a significant impact on the security choice between common equity and equity-like convertible debt.

## **5.2 Limitations and Recommendations**

The paper has certain limitations to be improved in future studies. Due to the



availability of data and the time limit, only Canadian firms listed on the Toronto Stock Exchange are selected as the sample. The sample is not large enough, especially for the analysis of equity-like convertible debt. Moreover, firm-specific characteristics may not be the only factors that influence firms' security issuance choice among straight debt, convertible debt, and common equity.

In further studies, a larger sample is suggested to examine the securities issuance choice in the Canadian market. For example, firms listed in the Canadian Venture Exchange instead of the Toronto Stock Exchange could also be included in the sample. Some macro-economic variables could be added to the model to make some improvements in the study.

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