Corporate Financial Decisions: Alternative Sources and Uses

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Abstract

Corporate financial decision making is primarily a study of alternative financing sources and uses. This thesis investigates three aspects of such decisions. First, we examine the implications of information asymmetry on the choice of security to issue and the effect of issue announcement on share price. We find that the choice between internal funds and external capital is positively related to the level of information asymmetry between managers and investors – firms with higher information asymmetry prefer the use of internal funds. The probability of issuing equity, relative to debt, is dependent on the level of information asymmetry for smaller firms. We find no significant relation between the level of information asymmetry and the choice between equity and debt for larger firms. Our results show that the share price of the firm increases after the announcement of equity issue and drops after a year of the issue of equity. We find such changes in share price are dependent on the stock volatility of the firm.

Next, we examine the determinants of debt choice between public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt. Primarily, the variables interests include credit quality, information asymmetry, market conditions, and macroeconomic conditions. We find that market conditions and macroeconomic conditions affect the choice of syndicated loans negatively relative to bilateral loans. The choice of 144A private debt against traditional non-bank private debt is negatively related to credit quality, market conditions and macroeconomic conditions, and is positively related to the level of information asymmetry. We also find that credit quality, information asymmetry, and macroeconomic conditions (market conditions) determine the choice of bank loans over non-bank private debt positively (negatively). The choice of public debt over private debt is positively associated with credit quality and market conditions, and negatively related to information asymmetry and macroeconomic conditions.

Finally, we examine whether firms retain external capital to increase their cash holdings for precautionary purposes or to repay the debt. We find that firms hoard more than a quarter of externally raised capital in cash – a source of the observed substantial increase in corporate cash balance in recent years. Precautionary motive is found to drive the increase in cash holdings, that is, finance from external sources. The cost of equity issues has a negative impact on precautionary cash holdings. Moreover, the results suggest that when the equity issue cost is low firms raise large amounts of equity capital and repay their debt. Highly levered firms are more likely to raise equity capital to repay the debt. We also find that firms are less likely to use cash balances to repay the debt. Finally, the evidence suggests that firms have a target level of cash holdings and a target level of debt in their capital structure.

Overall, the findings suggest that the financial decisions of a firm are dependent on information asymmetry, credit quality, precautionary motives, market conditions, macroeconomic conditions and that firms have been using a large proportion of externally raised capital to raise their cash holdings.

Declaration

This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree.

Signed:

Date:

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List of Abbreviations

Abbreviation	Full term
AC	Analyst Coverage
ACT	Current Assets-Total
CHECH	Cash and Cash Equivalents/Increase(Decrease)
AIC	Akaike Information Criterion
AMEX	American Stock Exchange
ANOVA	Analysis of Variance
AOLOCH	Assets and Liabilities/Other/Net Change
APALCH	Accounts Payable and Accrued Liabilities/Increase(Decrease)
AQC	Acquisitions
AR	Abnormal Return
AT	Assets-Total
BE	Book Equity
BHAR	Buy and Hold Abnormal Return
CAR	Cumulative Abnormal Return
CAPM	Capital Asset Pricing Model
CAPX	Capital Expenditure
CBEGDT	First Date of Compustat Data
CFVOL	Cash Flow Volatility
CSHO	Common Shares Outstanding
DLC	Debt in Current Liabilities-Total
DLCCH	Current Debt/Changes
DLTIS	Long Term Debt-Issuance
DLTR	Long Term Debt-Reduction
DLTT	Long Term Debt-Total
DP	Depreciation and Amortization
DPC	Depreciation and Amortization (Cash Flow)
DV	Cash Dividends (Cash Flow)
EBIT	Earnings Before Interest and Tax
EBITDA	Earnings Before Interest and Tax, Depreciation and Amortization
ESUBC	Equity in Net Loss/Earnings
EXRE	Exchange Rate Effect
FF3FM	Fama-French Three-Factor Model
FIAO	Financing Activities/Other
FOPO	Funds from Operations/Other
G-7	Canada, France, Germany, Italy, Japan, U.K and U.S.
GDP	Gross Domestic Product

Abbreviation	Full term
HML	High Minus Low
IA	Information Asymmetry
IB	Income Before Extraordinary Items
IBC	Income Before Extraordinary Items (Cash Flow)
I/B/E/S	Institutional Brokers' Estimate System
IPO	Initial Public Offering
INVCH	Inventory/Decrease(Increase)
IVACO	Investing Activities/Others
IVCH	Increase in Investments
LCT	Total Current Liabilities
M&A	Merger & Acquisition
ME	Market Equity
MM	Modigliani and Miller
MB	Market-to-book Ratio
MV	Market Value
NASDAQ	National Association of Securities Dealers Automated Quotation
NBER	National Bureau of Economic Research
NOLCF	Net Operating Loss Carry Forward
NPV	Net Present Value
NYSE	New York Stock Exchange
OIBDP	Operating Income Before Depreciation
OLS	Ordinary Least Square
PI	Pre-tax Income
PPENT	Total Property, Plant and Equipment
PRCC	Annual Closing Price
PRSTKC	Purchase of Common and Preferred Stock
PSM	Propensity Score Matching
R&D	Research and Development
RE	Retained Earnings
RECCH	Accounts Receivable/Decrease(Increase)
SPPIV	Sale of Property, Plant and Equipment and Investments/Gain(Loss)
QIC	Qualified Institutional Buyers
SALE	Sales
SEC	Securities and Exchange Commission
SEO	Seasoned Equity Offering
SEQ	Stockholders' Equity-Total
SIV	Sale of Investments

Abbreviation	**Full term**
SMB	Small Minus Big
S&P	Standard & Poor's
SPLTICRM	S&P Domestic Long Term Issuer Credit Rating
SPPE	Sale of Property
SPSDRM	S&P Subordinated Debt Rating
SIC	Standard Industrial Classification
SICH	Standard Industrial Classification-Historical
SSTK	Sale of Common and Preferred Stock
TLCF	Tax Loss Carry Forward
TXACH	Income Taxes/Accrued/Increase(Decrease)
TXT	Income Taxes-Total
U.K.	United Kingdom
US/U.S.	United States
VS.	Versus
TXDC	Deferred Taxed (Cash Flow)
TXT	Income Taxes-Total
XIDOC	Extraordinary Items and Discontinued Operations (Cash Flow)
XINT	Interest and Related Expense-Total

CHAPTER ONE

INTRODUCTION

1 Introduction

1.1 Overview and Motivation for the Study

The study of corporate financial decisions is primarily the study of financing frictions. In a frictionless market, managers of the firm can neither create nor destroy value through altering the choice of external financing (Modigliani and Miller, 1958). Fazzari et al. (1988), among others, demonstrates that the investment behaviour of a firm is heavily affected by financing frictions. This thesis examines the relationship between financing frictions and corporate financing decisions. More specifically, we examine whether the choice of security to issue is dependent on the level of information asymmetry and whether firm performance after the announcement of security issue is affected by the level of information asymmetry; what determines the choice of debt between public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt?; and whether an increase in cash holdings of firms concerning precautionary motives is dependent on external financing or, alternatively, whether debt is repaid with new equity issues.

The conventional starting point for the analysis of external financial decisions is that corporate financial decisions are to firm value maximization. Jensen (2001) argues that value maximization, among most economists, is recognized as a criterion for managers to evaluate performance and to decide among alternative firm actions. He suggests that value maximization proposition has its roots in 200 years of research in economics and finance. Sources of capital directly connect to the capital structure and value of the firm and shareholder interests. The relationship between capital structure and financing decisions has long been debated to maximize the value of the firm. Modigliani and Miller (1958) demonstrate that an optimal capital structure does not exist as the value of the firm is independent of capital structure decisions in a perfect capital market. Others, including Myers (1984) and Baker and Wurgler (2002) contend that capital structure decisions are relevant in particular circumstances. Baker and Wurgler (2002) recognize that in principal an optimal capital structure can be determined given such imperfections as taxes, costs of financial distress, and agency costs, when the assumptions of market efficiency and symmetric information are relaxed. However, an optimal level determined by the trade-off of the costs and benefits of borrowing may not be viewed in practice as the costs and benefits change over time and the costs of adjustment of adjusting the trade-off could bump a firm away from the optimum (Myers, 1984). Unlike Modigliani and Miller's (MM) irrelevance proposition, market frictions are introduced into this stream of studies. Such market frictions are documented to determine the firm's financing decisions in terms of corresponding capital structure theories, such as the trade-off theory (Kraus and Litzenberger, 1973), the pecking order theory (Myers and Majluf, 1984), and the market timing theory (Baker and Wurgler, 2002). Extensive previous studies have examined corporate financial decisions with explanations of the trade-off theory, the pecking order theory, or the market timing theory (e.g., Jung et al., 1996; Baker and Wurgler, 2002; Chang et al., 2006). However, the determination of the optimal capital structure in practice to create value maximisation remains.

A unique reflection of external financing that distinguishes it from other corporate finance research is the development of financial markets. Financial markets see design, development, and implementation of new financial instruments supported by resource providers for the demand and requirement of borrowers over time. Marks et al. (2009) argue that the aspirations and expectations of capital providers and borrowers in financial instruments change over time. This is likely a result of the changing valuation of the overall risk and cost of capital. Regulation makers and government policy may have also guided innovations in financial markets such that it brings breakthrough in financial obligations and rewards and renews risk and return systems for the market and all firms. Innovations in financial markets which consider the supply and use of capital, the matching interests of stakeholders and the development of financial markets suggest that capital structure decisions are determined by firm-specific factors and market environment.

After the most recent global financial crisis (2007/2008), fast-growing demand in designing an efficient corporate financing strategy to enhance the firm's ability to manage financing uncertainties and to maintain long-term corporate sustainability, which opens up an issue of corporate survivability, has been at the frontier of corporate strategic development debates. External financing decision-making for managers with strategic considerations is a key to creating value and improving market competency. As discussed in the work of Marks et al. (2009), one explanation for the importance of financing decisions in strategy implementation is that external financing enables financial flexibility, which mitigates the problem posed by internal funds volatility, can assist in turning around poor financial performance caused by market factors and creates other resources. Another explanation is that external financing decisions under strategic concerns enhance the market value of the firm. External financing communicates to the market the value and risk of the assets and its strategic development for increasing market value of the firm in the future.

The relevance and importance of each of the empirical chapters of this thesis on corporate financial decisions are discussed in the following paragraphs.

The first empirical chapter (Chapter 2) examines implications of information asymmetry between managers and external investors on the choice of security to issue, and the effect of issue announcement, on share price. The first part of Chapter 2 examines whether the managers of a firm that experience information asymmetry problems prefer internal to external funds when money is needed for positive NPV projects and whether the firm’s financing choice is dependent on information asymmetry if external capital is needed. Prior studies on the determinants of corporate financial decisions with support of capital structure explanations show mixed results. The majority of the studies favour the explanatory power of a single explanation such as the pecking order theory, the trade-off theory, or the market timing against alternatives. Fama and French (2005) find that stand-alone capital structure theories relative to counterparts (especially the pecking order theory vs. the trade-off theory) have some severe problems in explaining financing decisions, and suggest that research on certain aspect(s) of these theories may lead to more practical meanings, which implies that capital structure theories are better equally treated. Fama and French (2005) suggest that information asymmetry is an important (or perhaps the only) determinant of firms’ capital structure. However, the implication of the pecking order theory regarding the role of information asymmetry on corporate financing decisions is not well examined.

The second part of this chapter examines the effect of issue announcement on the share price of the firm in the context of issuing security given information asymmetry. Baker and Martin (2011) point out that *"information asymmetry exists in almost every facet of corporate finance and complicates managers' ability to maximize firm values" (p.175).*[1] Referring to the work of Myers and Majluf (1984), in the context of information asymmetry between managers and investors, managers of the firm have more knowledge concerning the value and risk of its assets than external investors. When the firm is undervalued, issuing stock dilutes stock value and reduce the interest of existing shareholders. When the firm is overvalued, the announcement of equity issue sends a negative signal to the market, and the market, in turn penalizes the issuance whose expected payoffs are directly related to the assessment of this value. However, in the absence of information asymmetry the choice of security to issue will not convey any information that is not already available to the market and the effect of the choice on the value of the firm should be neutral. Therefore, the question "is the financing decision correct for the firm?" remained not well answered.[2]

Having examined the choice of security to issue in the first empirical chapter, the second empirical chapter (Chapter 3) examines what determinant matters more in driving the choice between public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt. We focus on four principal factors, namely, credit quality, information asymmetry, market conditions, and macroeconomic conditions. As discussed in the pecking order hypothesis (Myers and Majluf, 1984), debt is preferred to equity by firms with information asymmetry between managers and investors with the concern of adverse selection cost. Debt holders provide firms with a more cost-efficient way to raise external capital and protect information on the value and risk of the assets from widely expanding relative to equity issuers. Debt holders evaluate the repaying capacity and potential prospects of the firm and monitor the borrowing portfolio of the borrower and,

[1] Oxford dictionaries define asymmetry as "*lack of equality or equivalence between parts or aspects of something; lack of symmetry*".
[2] Enhancing values (i.e., an increase on the share price) after announcement of security issue indicates a correct decision.

probably, adjust renegotiation or liquidation decisions with the lender. However, what determines the choice of sources of debt remains not well understood.

Small firms with limited access to public debt and equity instruments find bank loans and other private debt borrowings a beneficial alternative. Borrowing from banks favours the credit quality of the firm, thus enhancing the ability to access other financing sources. Denis and Mihov (2003) find that credit quality is an important determinant of debt financing: firms with high credit quality benefit from public bonds, firms with medium credit quality borrow from banks, and firms with low credit quality borrow from other private debt lenders. This intuitively suggests that the different debt choices of the firm can be differentiated by credit quality. Arena (2011) examines the effect of credit quality with further distinguished debt sources for the sample period until global financial crisis and demonstrates consistent findings as in Denis and Mihov (2003). This further indicates that credit quality, as an important determinant of firms' debt choice, still offers space for research. One implication is that the effect of credit quality on debt financing choice for the sample period including global financial crisis awaits examination. Moreover, no previous studies have evaluated both syndicated loans and bilateral loans in an empirical study of debt choices for US firms. Therefore, this thesis focuses on the determinant of firms' debt choice, with particular inclusion of debt sources such as syndicated loans, bilateral loans, public debt, 144A private debt, and traditional non-bank private debt.[3]

Having examined alternative sources of corporate financial decisions, the third empirical chapter examines whether external financing results in an increase in cash holdings for precautionary motives or, alternatively, externally raised capital is used to repay debt. The precautionary motive for cash holdings was first introduced in Keynes (1936) as the object of holding cash and cash equivalents to cover unforeseen contingencies caused by future cash flow uncertainty, to hedge against potential financial constraints, and to finance investments. Keynes (1936) contends that firms hold cash to hedge the risk of adverse cash flow shocks that might force them to forego valuable investment opportunities due to costly external financing. The precautionary motive suggests that a precautionary cash reserve alleviates the impact

[3] Definitions of these debt sources are introduced in the second empirical chapter.

of adverse cash flow shocks and difficulty in accessing external capital markets. Survey studies report that the unique role that cash holdings play on liquid management is substantially recognized by CFOs (e.g., Graham and Harvey, 2001; and Almeida et al., 2014). Given the fundamental relationship between liquidity management and the financial frictions that firms are facing or are likely to face in the future, recent studies emphasize the precautionary motive for cash holdings, which is the most common approach to maintain liquidity (e.g., Opler et al., 1999; Han and Qiu, 2007; Bates et al., 2009). Bates et al. (2009), among others, argue that firms with potential investment opportunities, volatile cash flow, and dividend pay-out policy accumulate cash so that they do not have to forego valuable investment opportunities, suffer insufficient internal cash flow, or bear financial pressure from cash dividend preparation for investors.[4] Share issuance is found as a great contribution to the precautionary cash holdings of the firm (McLean, 2011). Although there are studies of the impact of the issue of equity or debt on precautionary cash holding the term external financing, which concerns both debt and equity capital, is not well understood in the literature in the context of holding cash for precautionary motives. Hence, one focus of the third empirical chapter of this thesis is on the role of external financing on precautionary cash holdings.

Apart from using externally raised capital on precautionary cash holdings, issuing securities to repay debt can be an alternative use, which has not been investigated by other empirical studies. This is consistent with one implication of the pecking order theory that when funding for investment opportunities is satisfied, externally raised capital can be used to repay debt. Bates et al. (2009) argue that with the increase of equity issues, the complete debt of the firm can be retired. Wyatt (2014) finds that the majority of capital raised from IPOs is used to repay debt. As a result of repaying debt, leverage of the firm is lowered so that firms have more opportunities to raise capital when they need funds. This, in turn, reduces the need of reserving cash for precautionary motives. Moreover, according to Marks et al. (2009), it is advantageous to issue equity as the firm has no fixed obligation to repay the amount of equity issued to investors, although doing so dilutes ownership interest of old

[4] Volatile cash flow, R&D spending, and dividend payment are demonstrated as key proxies of precautionary motives (Han and Qiu, 2007; Bates et al., 2009; McLean, 2011).

shareholders in the future growth of the firm. Note that capital raised from new debt issues is not often used to repay debt. Debt is marked with a note or written obligation to repay with interest at some future point in time on a detailed schedule or by the maturity date. Unlike equity holders, debt holders have no right to participate in the affairs of the firm including future growth and appreciation of the firm's assets or profits. A specified schedule on debt repayment disciplines management's commitment to clean the obligation on debt principal and interest. Jensen (1986) adds that a debt repayment schedule which results from debt financing can efficiently limit overspending of the management. Given that the schedule to repay debt is senior to the plan to pay dividends and distribution to equity holders, the firm may use proceeds from equity issuance to repay debt. Hence, another focus of the third empirical chapter is issuing equity to repay debt.

1.2 Research Objectives

The aim of the first empirical chapter (chapter 2) is to examine whether the choice of security to issue is dependent on the level of information asymmetry and how the firm performance is affected by the announcement of security issue.[5] In the literature, there are studies on the importance of information asymmetry on the choice of security to issue (e.g., Chang et al., 2006; Bessler et al., 2011; Pan et al., 2015), and on post-issue performance of the firm after announcement of security issue given information asymmetry (e.g., Dierkens, 1991). However, there is a shortage of studies on connecting the two important parts of a corporate financing decision, which closely relate to implications of information asymmetry and the effect of issue announcement. Therefore, Chapter 2 extends, or widens, the abovementioned research direction and determines whether a firm has made the correct choice to enhance the value of the firm.

The first empirical chapter also explores the extent that information asymmetry provides managers with the opportunity and incentive to make the correct choice of security to issue. We will provide evidence to answer "do managers prefer internal to external funds when capital is needed for investments?" We conduct a two-stage

[5] Firm performance is measured by change in share price of the firm. Given that listed firms are owned by shareholders and market capitalization indicates firm value, hence firm performance is reflected on change in share price.

analysis to determine whether firms prefer internal to external funds and whether firms prefer debt to equity if external capital is needed for profitable investment projects. Hence, we hope to add understanding to the literature of two-stage examination on financing decisions. Moreover, both short- and long-term performance after announcement of security issue are analysed to explore whether investors adjust their perception regarding the risk and value of the firm over time. We aim to gain understanding of the correct financing decisions in enhancing firm value. Additionally, we control for all firm-specific variables but allow for information asymmetry, market factors, and economic factors so that we can ensure a comprehensive analysis.

Having examined the choice between internal funds and external capital and the choice of security to issue, we are interested in examining determinants of the choice among alternative debt sources in the second empirical chapter. Debt instruments of this chapter cover the majority of sources in the debt market, including public bonds, syndicated loans, bilateral loans, traditional non-bank debt, and 144A private debt. Unlike prior studies (e.g., Denis and Mihov, 2003; Arena, 2011; Khang et al., 2015), this is aimed to provide a comprehensive set of debt sources for our study. Given that there is a shortage of studies of syndicated loans and bilateral loans simultaneously in the literature, we design this study to examine the distinction between syndicated loans and bilateral loans. We also focus on the position of syndicated loans and bilateral loans along with other debt categories including public debt, non-bank private debt, and 144A private debt. This extends the comprehension of debt sources as the set of debt sources in the literature is not well considered (e.g., Arena, 2011; Khang et al., 2015). We hope to add understanding of relevance of every single debt category on a firm's debt financing decisions.

With regard to the determinants of the choice of debt sources, we are not limited to the most popular (i.e., credit quality) that has been demonstrated in the literature extensively (e.g., Denis and Mihov, 2003; Altunbaş et al., 2010). We seek evidence on other important factors (information asymmetry, market conditions, and macroeconomic conditions) that may provide equally practical implications to the real world. This is expected to extend the width of determinants of the choice of debt sources. Another objective of this chapter is to examine whether debt choice of the firm changes with time-varying macroeconomic conditions in terms of the four principal factors. We hope to add understanding of alternative determinants of a firm's preference of debt sources.

Having examined the financing decisions of alternative financing sources in the first two empirical chapters, in the third empirical chapter (chapter 4), we examine another interesting topic relevant to corporate financing decisions (uses of funds). Specifically, we test the effect of precautionary motives on cash holdings from external capital including both debt and equity (the first aspect) and the use of externally raised capital for repaying debt (the second aspect). Although simply issuing equity or debt to increase precautionary cash holdings are study in the literature (e.g., McLean, 2011; Sanchez and Yurdagul, 2013) the impact of external financing as a whole (debt and equity) on an increase in precautionary cash holdings is not well understood. One objective of this aspect of the chapter is to observe whether firms continue to increase cash holdings with evidence from external financing as a whole regardless of equity or debt in the context of precautionary motives. Comparing with two alternatives (operational cash flow and others), we explore the extent that external capital, including both debt and equity, contributes to the precautionary cash holdings of the firm. We use three major proxies to measure precautionary motives, including volatility of cash flow, R&D spending, and dividend payment (Bates et al., 2009; McLean, 2011). An index of precautionary motives is created to capture the precautionary components of the three proxies in order to identify the fit of the three proxies.

Moreover, we also explore the extent that equity is used to repay debt, as the second aspect of Chapter 4. Although there are several studies that have examined the use of proceeds raised from IPOs on debt repayment (e.g., Wyatt, 2014), debt repayment treated as an alternative use of externally raised capital to precautionary cash holdings is not investigated. We emphasize the relevance of the issue of equity regardless of its form (e.g., either IPOs or SEOs) on debt repayment. We control for precautionary motives and cash holdings in the estimation to examine the influence of precautionary cash holdings on debt repayment. In addition, we also design examinations for the role of debt repayment on cash holdings. This is in order to explore the simultaneity between cash holdings and debt repayment. This empirical chapter could advise managers of policies that are conductive to the liquidity management of the firm.

1.3 Main Findings

The main findings of chapter 2 relate to the relevance of information asymmetry between managers and investors on the choice of security to issue, and the effect of security issue announcements, on firms' share prices. The findings are summarized in the following four aspects.

First, with respect to the preference between internal funds and external funds when funding is needed, we find that the level of information asymmetry between insiders and external investors positively influences the preference of internal to external funds. This finding is consistent with the prediction of the pecking order theory in terms of the first-order financing hierarchy (internal funds vs. external capital).

Second, with respect to the choice of security to issue (debt vs. equity), we find that firms with high levels of information asymmetry are likely to issue equity for the full sample in the data, which is not consistent with the core assumption of the pecking order theory (i.e., debt followed by equity given information asymmetry). However, we find that firms with high levels of information asymmetry are likely to issue debt for sub-samples of smallest firms, which is consistent with the pecking order theory. Hence, this suggests that information asymmetry could be an important determinant of the choice of security to issue. Information asymmetry explains a higher proportion of the choice of security to issue for smaller firms compared to larger firms. We find no significant effect of information asymmetry on the choice between debt and equity for the largest firms.

Third, in the univariate analysis, we find that the share price of the firm increases after equity announcements. In the multivariate analysis, we find that information asymmetry could not explain the increase in share price after the issue announcement, which is not consistent with the implication of the pecking order theory. However, we find that firm performance after firms announce the choice of security to issue is positively related to the stock volatility of the firm.

Lastly, regarding long-term performance of security issuers, we find that share price of equity issuers drops in one year and in five years after the completion of equity issue, which contradicts with the firm performance around the announcement period. We find that the decreases in share price are similar for one year after the completion of equity issue and for five years after the completion of equity issue. Moreover, our results show that for small equity issuers and large equity issuers, the amplitude of price drop in one year and in five years after completion of equity issue is similar. We show that firm performance of the firm is inversely dependent on stock volatility of the firm in one year after completion of equity issue. However, information asymmetry does not play a significant role in explaining the firm performance.

Having found the preference of funding for positive NPV projects between internal funds and external capital, as well as between debt and equity, we explore further to examine the financing choice among debt sources in Chapter 3, which compromise the preferred instruments group relative to equity instruments based on our findings from Chapter 2. First, we find that market conditions play a negative role on the choice of syndicated loans over bilateral loans for the full sample and for the sub-sample of high GDP growth years. The choice of syndicated loans against bilateral loans is negatively related to macroeconomic conditions for the full sample and is positively related to macroeconomic conditions for the sub-sample of high GDP growth years. The credit quality of the firm and information asymmetry between managers and investors do not seem to affect the choice between syndicated loans and bilateral loans significantly.

Second, as to the choice between 144A private debt and traditional non-bank private debt, we find that the credit quality of the firm has a significantly negative effect on the choice of 144A private debt over traditional non-bank private debt for the full and all sub-samples. Information asymmetry is consistently in a positive relation to the choice of 144A private debt against traditional non-bank private debt for the full sample and for all sub-samples. Market conditions and the probability of 144A private debt over traditional non-bank private debt are negatively related for the full and sub-sample of low GDP growth years. The probability of 144A private debt over traditional non-bank private debt is a decreasing function of macroeconomic conditions for the full sample.

Third, with respect to the choice between bank loans and non-bank private debt, we find that both credit quality and information asymmetry influence the choice of bank loans to non-bank private debt positively for full samples and for the three sub-samples. The probability of bank loans relative to non-bank private debt is inversely affected by market conditions for the full and sub-sample of high GDP growth years. Macroeconomic conditions have a favourable effect on the preference of bank loans to non-bank private debt for the sub-sample of medium GDP growth years.

Fourth, in the case of the choice between public debt and private debt, we find that the credit quality of the firm has a positive influence on the probability of public debt issue to private debt issue for the full and sub-samples. Information asymmetry affects the choice of public debt to private debt negatively for the full and sub-samples. Market conditions favour the issue of public debt over private debt for the full and sub-samples of medium and high GDP growth years. We also find that macroeconomic conditions decrease the likelihood of issuing public debt relative to private debt for the full and sub-samples of low GDP growth years.

In Chapter 4, we examine whether external financing leads to an increase in cash holdings for precautionary motives or, alternatively, whether the use of proceeds raised from external financing is on debt repayment. Our findings are summarized in terms of the two research focuses. First, our findings on the relationship between external financing and precautionary cash holdings are presented as follows. We find that firms hoard more than a quarter of externally raised capital as cash on average in the past four decades. Firms persistently increase cash holdings for precautionary motives. Compared to alternative sources of cash (i.e., cash flow and other sources), external financing is likely to be preferred for precautionary cash holdings. Our results show that three proxies of the precautionary motive (R&D spending, volatility of cash flow, and dividend payment), as well as precautionary motives index, drive external financing for cash holdings. Specifically, firms with large R&D expenditures, firms with high volatility of cash flows, and those not paying dividends tend to retain cash from capital raised from external financing. Cost of equity issue has a negative influence on precautionary cash holdings.

Secondly, we find that firms use equity issues to repay debt. Our results show that equity issuers tend to issue large amounts of equity at low issuance cost to repay debt. Conversely, debt issue increases the debt level of the firm, thus leading to more debt to be repaid. Highly levered firms are more likely to use equity capital to repay debt. This suggests that firms may use security issues to adjust leverage towards a target level when possible. Regarding the relationship between cash holdings and debt repayments, we find that cash holdings and debt repayments are simultaneously related to each other. Specifically, firms repaying debt are less likely to retain new cash from cash sources and firms that increase cash holdings are less likely to use external financing to repay debt. Additionally, firms also tend to have a target level of cash holdings.

1.4 Contributions and Implications

The main contributions of Chapter 2 are as follows: on the one hand, unlike others that consider either the core assumption of the pecking order theory or the influential implication that the market penalizes risky security issues in the presence of information asymmetry, this empirical chapter contributes to knowledge by examining both aspects. This is because the performance of the share price could justify the reliability of the two-stage corporate financial decisions. Myers and Majluf (1984) posit that the growth prospects of the firm are visible to the market and market participants could be able to estimate the value of investments after investments are revealed through announcements of security issuances. If the corporate financial decision has been rightly made, the share price of the firm will increase. Conversely, if the decision destroys benefits of existing shareholders, the market penalizes the firm with a decrease on share price. More importantly, the two aspects are the two key implications of the pecking order theory that should be treated equally and worth investigating in one study. On the other hand, our research adds understanding of placing increasing weight on specific aspects of a capital structure theory rather than comparing the explanatory power of alternative theories as pointed out by Fama and French (2005). Moreover, this chapter adds to the literature with a novel way of examining whether the firm makes the correct choice of security to issue that enhances the firm's value given information asymmetry. We define the correct choice of security to issue as that the market is neutral to the announcement of risky security issues (equity). Conversely, an incorrect choice of security is defined as when risky securities (equity) are issued the market penalizes the firm through a reduction in share price. In addition, this research also adds evidence to the literature strand by controlling for all firm characteristics, market factors, and economic elements, which provides a detailed and comprehensive analysis.

Chapter 3 contributes to the literature in two ways. Firstly, this chapter contributes to the literature by considering both syndicate loans and bilateral loans in a single empirical study. To our knowledge, this research is the first to include both syndicated loans and bilateral loans into categories of debt sources for the financing choice in a study of US firms. We provide direct comparison for the choice between syndicated loans and bilateral loans. Bilateral loans and syndicated loans are considered as separate asset classes in this study. With the development of syndicated loan markets, each asset class of debt financing gradually stands out. It is important to consider both syndicated loans and bilateral loans as equal forces on the choice of debt mix because at the time of decision making firms do (and need to) consider all available sources. Unlike prior studies (e.g. Denis and Mihov, 2003; Arena, 2011), this chapter also adds evidence to knowledge in terms of comprehension of debt categories through examining all other comparisons between debt sources (syndicated loans, bilateral loans, public debt, 144A private debt, and traditional non-bank private debt). We provide novel evidence from comparative analysis for the choice between syndicated loans/bilateral loans and a more general category (non-bank private debt) and for the choice between 144A private debt/traditional non-bank private debt and a more general category (bank loans). The sample period of this study is extended to cover the most recent financial crisis. This chapter extends the understanding of the distinction between bilateral loans and syndicated loans in comparing choice of debt. We add knowledge to the literature by conducting comprehensive comparisons among a wider range of debt sources.

Secondly, this chapter adds knowledge to existing studies in terms of depth of determinants of debt choice. We study not only the most important determinant (i.e., credit quality) of debt choice in the literature (e.g., Denis and Mihov, 2003; Rauh and Sufi, 2010; Arena, 2011) but also three other influential and popular factors (information asymmetry, market factors, and macroeconomic conditions). We provide novel evidence that the choice of debt sources changes with time-varying macroeconomic conditions. Influences of other major factors also change with time-varying macroeconomic conditions. By demonstrating the importance of the four principal factors in determining the choice of debt sources, this chapter extends our understanding of the reasons to issue debt and strategies employed to design future debt mix.

In the third empirical chapter, our contributions to the knowledge are threefold. First, we add novel evidence to the cash holdings literature by demonstrating that firms persistently increase precautionary cash holdings through external financing. Unlike others, we consider external financing as a whole regardless of equity or debt rather than looking into a single channel of external capital (i.e., only equity or debt). Technically, we construct an index to measure precautionary motives that only uses the precautionary components of the three major precautionary motives proxies. This provides a new tool for studying the relevance of external financing on cash holdings for precautionary motives.

This chapter then sheds light on the use of equity capital to repay debt, which adds to our understanding of the relationship between use of proceeds and financing decisions. We are the first to provide empirical evidence that firms use equity issue to repay debt as an alternative to precautionary motive. Whereas previous studies consider either such single instruments of equity as IPOs or SEOs, this research considers all types of equity instruments that result in cash proceeds for the purpose of repaying debt. Finally, we add knowledge to the literature with new evidence that cash holdings and debt repayment are simultaneously (inversely) related. This differentiates from others by addressing the simultaneous relations of the two uses of cash sources. This chapter adds understanding of simultaneous relationships between cash holdings and debt repayment.

Research Implications

This thesis provides managers and investors with practical implications. With respect to the causes of external financing, we suggest managers assess both the short-term financing expectations and long-term strategic financing expectations of the firm before making a choice of security to issue. Managers should pay special attention but not limited to information asymmetry between managers and investors for the choice between debt and equity, and credit quality for the choice among debt sources. Further, managers should also consider the effects of all other firm characteristics, market factors, and economic conditions for the financing choice that is likely to enhance the value of the firm. Concerning cash holdings, managers are suggested to retain a target level of precautionary cash holdings for favourable investment opportunities, cash flow uncertainties, and future dividend payments. We would address to managers that equity issuance is an appropriate source to repay debt when share issuance cost is cheaper than debt issuance cost. Managers are likely to be aware that using equity capital to repay debt requires firms to reserve less cash from external capital; and, retaining cash from external financing requires firms to use less on debt repayment.

Creditors could benefit from lending if they are aware that payment receivables from borrowers are not only dependent on the assets value of borrowers, but also on other factors such as information asymmetry and credit quality. Our research could benefit creditors if they are aware of what drives firms' choice between various debt sources. Creditors are suggested to assess borrowers in terms of credit quality, information asymmetry, market factors, and macroeconomic conditions. We suggest that creditors lend to firms with higher credit quality and lower levels of information asymmetry debt with medium and long maturity and large volume in order to enjoy long-term favourable returns, and they lend to firms with low credit quality and higher levels of information asymmetry debt with short maturity and small volume. Creditors can mitigate probability of debt in default by lending syndicated loans or having a well-designed maturity structure of the debt. In addition, creditors could benefit from this thesis by placing emphasis on the existing creditor-borrower relationship which contributes largely to future returns, and assessing the firm's ability to issue equity.

Other investors are suggested to pay attention to the firm's information which is signalled at the announcement of security to issue. This is particularly valuable to investors for short-term abnormal returns. Those who look for long-term abnormal returns should consider other factors such as agency conflict, cost of equity issuance, or (inter)temporary variance of information asymmetry other than information asymmetry. It would benefit investors if they are aware that long-term firm performance is based on various time-varying shocks from all around. These investors should consider the effect of other types of corporate events such as M&A on capital structure that may boost their returns. Additionally, relevant analyst reports of earnings forecast may be a beneficial reference for investment decisions.

It is suggested that other investors who prefer long-term favourable stock return invest in firms with either precautionary cash holdings retained from external financing or the proceeds of equity issue is used to repay debt. This thesis could also benefit investors if they are aware that precautionary cash holdings from external financing and debt repayment by equity issuance are related to corporate future development. [6] Another lesson investors could learn from this thesis is to focus on precautionary cash holdings as to the strategic importance for direct investment on future profitable projects, management of financial constraints caused by future cash flow uncertainties, and dividend pay-out schemes.

1.5 Organization of the Thesis

The thesis is structured by way of empirical chapters. The outline of each empirical chapter develops from the introduction and literature review, research questions, hypothesis development, sample description, to empirical results and conclusions. A brief synopsis of the remaining four chapters of the thesis is as follows.

[6] Our estimation models in the third empirical chapter controls for these factors that affect the cash balance. From an economic view, if the coefficient(s) of factor(s) representing motives is significant then investors know that cash balance of the firm is different from what can be explained by other factors. A positive coefficient of precautionary motives measure would suggest that the firm has such a balance.

Chapter Two explores the relationship between information asymmetry and external financing. The puzzle relating to the choice of different debt sources is investigated in Chapter Three. In Chapter Four, we consider the use of external financing (for precautionary cash holdings and debt repayment). Chapter Five summarizes the findings and implications of the thesis, provides some closing remarks, and indicates potential directions for future research.

CHAPTER TWO

INFORMATION ASYMMETRY AND EXTERNAL FINANCING

2 Information Asymmetry and External Financing

2.1 Introduction

Information asymmetry between firm managers and outside investors plays a pivotal role in the capital structure choice of a corporation. The pecking order proposition (Myers and Majluf, 1984) of capital structure theories distinctively articulates the relevance of information asymmetry on the choice of security to issue. Myers and Majluf (1984) posit that managers of the firm hold more information about the value and risk of the firm than external investors, and raise external capital for the best interest of existing shareholders. This theory suggests that when money is needed to fund new positive NPV projects managers follow a pecking order on the choice of financing instruments, i.e., internally generated funds (e.g., operation cash flow and cash from asset sales) are preferred to external capital in the form of debt and equity issues. Should they need external financing they issue safest security first, and issue equity only as a last resort when cheaper and less information-sensitive alternatives (e.g., bank debt followed by public debt) are exhausted. This is because when risky securities (equity) are issued the market penalizes the firm through a reduction in share price. This is based on the premise that if the new project is value enhancing and/or the firm is not overvalued the manager would not transfer the wealth of existing shareholders to new owners by issuing new equity. However, in the absence of information asymmetry the choice of security to issue will not convey any information that is not already available to the market and the effect of the choice on the value of the firm should be neutral. Therefore, this chapter examines the implications of information asymmetry between insiders and outsiders on the choice of security to issue and the effect of issue announcement on share price.

In the pure pecking order theory, Myers and Majluf (1984) assume that the firm has no well-defined target leverage ratio as there are two types of equity: the internal is at the top of the financing hierarchy, while the external is at the bottom. The observed leverage ratio of the firm according to the pecking order theory reflects its cumulative requirements for external capital over a period of time.

Existing literature emphasizes two primary strands of research related to the pecking order hypothesis: (1) studies on the empirical power of the pecking order theory against the trade-off theory, in explaining firms' financing behaviour;[7] and, (2) investigations on the core assumption of pecking order theory that information asymmetry is an important determinant of financing decision(s) or on the performance of the firm after the announcement of security issues.[8]

The existing evidence on the explanatory power between pecking order theory and trade-off theory is mixed. Shyam-Sunder and Myers (1999), among others, find limited evidence to support the prediction of trade-off theory that firms have target leverage ratios as revision to the target leverage is slow. Instead, pecking order theory is demonstrated to be better than trade-off theory in explaining financing decisions. Consistently, in the event of controlling for heterogeneity in debt capacity, debt issue is prior to equity issue (Lemmon and Zender, 2010). Conversely, Chirinko and Singha (2000) contend that Shyam-Sunder and Myers' (1999) evidence is associated with econometric problems that weaken its explanatory power. Frank and Goyal (2003a) document that the financial deficit of the firm is positively covered by equity issues relative to debt issues. The contradictory results lead to challenges to the ability of the pecking order theory to explain firms' financing behaviour.

The recent decade has seen a rising trend in the study that examine the core assumption of pecking order theory, that information asymmetry is an important determinant of capital structure decisions (e.g., Chang et al., 2006; Bessler et al., 2011; Pan et al., 2015); or examines post-performance after the announcement of a security issue, which is an important implication of pecking order theory (e.g., Dierkens, 1991; Korajczyk et al., 1991; Lemmon and Zender, 2010). This is especially the case after the influential work of Fama and French (2005) who conclude that both pecking order theory and trade-off theory run into severe problems in explaining corporate financial decisions. Regarding the problem of pecking order theory, the alternative ways to the use of Seasoned Equity Offerings

[7] For example, Shyam-Sunder and Myers (1999), Chirinko and Singha (2000), Fama and French (2002), Frank and Goyal (2003b), and Fama and French (2005) examine the explanatory power of one over the other between the two popular theories.

[8] Chang et al. (2006), Agarwal and O'Hara (2007), Dittmar and Thakor (2007), Bharath et al. (2009), Autore and Kovacs (2010), and Bessler et al. (2011) investigate the core assumption of the pecking order theory that information asymmetry is an important determinant of corporate financial decisions. Meanwhile, Dierkens (1991), Korajczyk et al. (1991), Datta et al. (2003), and Lemmon and Zender (2010) examine post-performance after announcement of a security issue.

(SEOs) to raise equity such as issues to employees, rights issues, and direct purchase plans avoid costs related to the asymmetric information problem that is assumed by the pecking order theory. This suggests that equity issues may not be sensitive to information asymmetry and not be the last resort after the use of internal funds and debt capital. For the problem of trade-off theory, prior studies document that the assumptions of the trade-off theory may not be consistent with the empirical evidence. For example, leverage has been found to be inversely related to profitability contrary to the central hypothesis of trade-off theory that tax and agency benefits of debt outweigh the bankruptcy costs of debt (Rajan and Zingales, 1995; Fama and French, 2002). Meanwhile, if firms have target leverage, the targets are soft (Graham and Harvey, 2001) and the revision to the targets are slow (Shyam-Sunder and Myers, 1999; Fama and French, 2002). They then suggest that pecking order theory and trade-off theory are better to be treated as equal forces in statistically explaining corporate financing decisions.

Although Fama and French's paper comparably studies pecking order theory and trade-off theory, it is inferred that similar exceptional problems in explaining corporate financing decisions may occur in comparable studies between any capital structure theories. Fama and French (2005) also suggest transferring research focus from explanatory power between capital structure explanations. It would be relatively fruitful and meaningful to study a single capital structure theory in favour of some specific aspects of financing decisions, for example, the core assumption of pecking order theory that information asymmetry is an important (or perhaps even the sole) determinant of external financing or related implications that the choice of security to issue may enhance or destroy the value of the firm.

The second strand of literature relating to pecking order theory consists of two separate aspects of studies: (1) investigating the effect of information asymmetry on the firm's security choice; (2) examining the validity of pecking order theory that the announcement of an information-sensitive security issue is not value-enhancing to the firm. Previous studies focus on simply either the effect of information asymmetry on external financing decisions or the firm's performance to the announcement of a security issue.

Prior findings on the relationship between information asymmetry and security choice are mixed. On the one hand, firms tend to issue equity relative to debt when information asymmetry is lower (Hovakimian et al., 2001; Chang et al., 2006; Lemmon and Zender, 2010) since under low levels of information asymmetry choice on information-sensitive instruments leads to no or small adverse selection effects to the firm. On the other hand, firms prefer equity to debt when information asymmetry is high (Jung et al., 1996; Frank and Goyal, 2003a; Autore and Kovacs, 2010) since cost of debt issuance is more expensive than cost of equity issuance due to the limited supply of debt by external creditors or other costs such as agency conflicts between the principal and agent outperforms information asymmetry over external financing decision-making.

The performance of firm value after the announcement of a security issue choice has been extensively studied in the literature. However, the existing empirical evidence on market reactions to corporate financing decisions is mixed: one aspect is that the market inversely responds to the firm's announcement of equity issue when there exists a high level of information asymmetry (e.g., Dierkens, 1991; Lemmon and Zender, 2010) since equity issue announcements signal unfavourable information about the firm to the market and cause the corporation's future performance (market reaction) to be questioned; another aspect is that firms experience non-negative reactions at the announcement of equity issues (Fama and French, 1998; Drobetz et al., 2010) where stock price run-up, indicates the existence of future profitable projects prior to the equity issue announcement or where firms have issued debt prior to equity issue announcements, such situations signal to the market confidence about the firm's future performance. Since these conflicting results do not ignore the importance of information asymmetry, the second part of this chapter examines change in the value of the firm after announcement of a security issue when information asymmetry is high. After controlling for market factors, macroeconomic factors, and all firm characteristics but allowing for measuring the effect of information asymmetry, we expect a negative response from the market to the announcement of equity issue among firms with high levels of information asymmetry.

Although both lines of research have been distinctively studied, few studies have examined information asymmetry as an important determinant of external financing choice and market reactions to the choice of security issue in one study. The question "which security to issue constitutes the correct choice" is not well understood. The correct choice may be indicated by an increase on the stock price after the announcement of a particular security. The asymmetric information problem generates the possibility that market participants will not price the firm's security issues appropriately, thus providing an influence for corporate financing decisions. Firms with high levels of information asymmetry tend to take asymmetric information problem into account and use internal funds as apposed to external capital for investments. Among the choice of security to issue (debt vs. equity), the firm would issue less information-sensitive security first (i.e., debt) and issue equity as a last resort. When the firms' managers discover a profitable investment opportunity with an excess return that could offset the costs of security issuance, they are likely to issue securities. Given that pecking order theory is centred on information asymmetry, it is natural to break down narrower sets of firms issuing equity and issuing debt. As posited by pecking order theory, the external financing decision of the firm is determined by information asymmetry. This theory should do the best job of explaining financing behaviour among firms experiencing high levels of information asymmetry. Small high-growth firms, typically with large financing needs, are often thought of as firms with high levels of information asymmetry. Those firms are consequently likely to issue debt to cover a financing deficit. On the other hand, large firms that are less likely to be restricted by information asymmetry tend to be neutral to debt and equity. Managers of such firms are less reluctant to issue equity relative to small high-growth firms. Therefore, the first part of this chapter addresses the following research question: how does information asymmetry affect the choice of security to issue?

The first part of this chapter aims to examine whether or not information asymmetry is an important determinant of corporate financing decisions and, if it is, how information asymmetry determines the choice of the security to issue. This section includes two issues: 1) is the choice between internal funds and external capital to finance positive NPV projects dependent on the level of information asymmetry? 2)

In the event that these firms decide to raise external capital is the choice of security to issue (debt vs. equity) dependent on the firm's level of information asymmetry? We will conduct a two-stage logistic modelling procedure (Maddala, 1983) to document the financing hierarchy.

At the first stage, we examine whether, when there is a need for funds for investment, managers prefer internal funds or external capital. Following Hovakimian et al. (2001) and Chang et al. (2006), we specifically focus on how information asymmetry affects a firm's choice between internal funds and external capital after controlling for a set of variables including all firm-specific characteristics except information asymmetry, market factors, and macroeconomic conditions. Analyst coverage is a reliable proxy to catch information asymmetry between managers and investors and is used in our capital structure decision study. Draper and Paudyal (2008) argue that firms followed by a large number of analysts do not experience expensive communications costs to attract public attention, while firms with few analysts following are motivated to attract public attention and cannot avoid communications costs because the marginal value of information communicated is relatively high. Brennan and Subrahmanyam (1995) argue that the adverse selection cost is reduced by the increasing number of analysts following a firm and Draper and Paudyal (2008) show that firms with higher analysts' coverage have lower levels of information asymmetry and experience small value change when a corporate decision is announced. There are also relevant studies documenting the special roles of analysts. More informative stocks show high linkage with analyst coverage and momentum strategies are less likely to be used (Hong et al., 2000), more hidden value is unlocked for firms with high analyst coverage issuing security (Chemmanur and Paeglis, 2001), rapid incorporation of accruals and cash flow information is indicated among firms with high analyst coverage (Barth and Hutton, 2004), SEOs with high analyst coverage are less likely to be under-priced (Bowen et al., 2008). Therefore, it is based on the idea that an increasing number of analysts following a firm will mitigate information asymmetry and lower adverse selection cost, so that firms that have observed lower information asymmetry will throw themselves into security markets. We expect a negative relationship between the level of information asymmetry and the probability of security issue.

At the second stage, we examine the effect of information asymmetry on the choice between the two types of security (i.e., debt and equity). Similar to the estimation on the choice between issuing security and not-issuing security given information asymmetry, we use a logistics technique to examine the relationship between the level of information asymmetry and probability of external financing decision between equity and debt. This action - that when firms need to raise capital externally they prefer less risky debt to equity and when there are large numbers of analysts following they are more likely to issue equity - is guided by Chang et al. (2006) and Ang and Cheng (2011). Firms with higher levels of information asymmetry between managers and investors experience a higher adverse selection cost of equity and, consequently, choose cheaper security to act in the interests of existing shareholders. Therefore, we expect a negative relationship between the level of information asymmetry and the probability of equity issue.

By looking at the two individual financing groups (internal funds vs. external capital) at the first stage, we are able to test the hypothesis that firms with information asymmetry prefer internal to external funds due to the cheaper cost of internal financing. The second stage of the modelling process offers an insight into the external financing behaviour of the firm. We expect to observe evidence of a financing hierarchy between debt and equity given the asymmetric information problem, and preference of debt to equity as a result of adverse selection costs related to information sensitive security such as equity. The two-stage procedure could also technically avoid biased and inconsistent estimates caused by the problem of simultaneity or reciprocal causation (Greene, 2011).

The second part of this empirical chapter examines post-performance (announcement period and long-term) of security issues. When the market is perfectly efficient, managers and investors share the same information concerning the value and risk of assets; should the firm issue different types of security the market is neutral to the announcement as there are no adverse selection costs for equity issuance relative to debt issuance, hence the announcement of security to issue does not destroy the value of the firm. In the event of high levels of information asymmetry between managers and investors, the market penalizes the financing decisions of information sensitive security such as equity. Therefore, the second part of this chapter, which concerns the third issue of our analysis, examines that with the concern of the level of information asymmetry whether the financing decision is correct for the firm. An increase in the stock price after a security issue (announcement period and long-term) indicates the correct decision. We expect to observe a negative market response to the announcement of equity issue and a non-positive change on the share price of the firm after the announcement of debt issue provided the level of information asymmetry is high.

As highlighted in Myers and Majluf (1984), one main implication of the pecking order theory is that issuing equity will reduce the value of the firm when information asymmetry is high. A debt issue on the other hand will lead to a non-negative effect on the value of the firm when information asymmetry is high. When firms do not face information asymmetry problems, the equity issue is not very different from debt issue and has a neutral influence on the value of the firm. To avoid adverse selection costs on equity issue when information asymmetry is high, firms could reserve cash for valuable investment projects when there is less asymmetric information. Therefore, this chapter further addresses the second research question: "how is the market reaction to the issue of security dependent on the level of information asymmetry?"

With respect to estimation of firm performance, we use an event study technique to assess firm performance regarding the issue announcement period in the short term. This method assumes that in an efficient market, a change in the stock market value of the firm is caused by an event that gives an unbiased estimate of the value relevance of the event for the firm. The event also delivers valuable information that the market can observe. Unlike a long horizon estimation of firm value that aims to capture the effects of an event on future financial performance but is difficult to isolate the effect of a particular event, an event study focusing on stock returns isolates the effect of an event on firm value. We conduct univariate analysis to estimate abnormal return in the event window and multivariate analysis to test for the magnitude and significance of share price change around the event window.

Long horizon estimation of the effect of financing decisions on firm performance lies on a calendar time portfolio regression model (Lyon et al., 1999) and Buy and Hold

Abnormal Return (BHAR) framework (Barber and Lyon, 1997). We follow Barbopoulos et al. (2012) to adopt a two-step evaluation in order to capture a more appropriate measure of the abnormal return an investor achieves in the long term.

The first model for long-term performance is a calendar-time portfolio regression model. Compared to a traditional model (e.g., CAPM), a calendar-time portfolio regression model includes more risk factors to cover the risk of financial distress or recessionary risk, which are also assumed to be sources of priced systematic risk. A standard event study ignores the fact that test periods for different stocks overlap in the event time causing underestimation of the standard error of any test statistics where there is an overlap and increasing the likelihood of making a Type I error. However, when test periods for different stocks overlap in calendar time, they are not independent observations. Hence, a calendar time portfolio regression model mitigates the problem of cross-sectional dependence of abnormal returns.

The second is a multivariate analysis for BHAR. According to Barber and Lyon (1997), the BHAR framework addresses solutions for some potential biases involved in cumulative abnormal returns (CARs) including measurement of an investor's actual return bias, survivorship bias that a newly listed stock is included in the calculation of market benchmark involved after event day, skewness bias, and rebalancing bias resulting from using an equally-weighted market index for serially correlated returns. Like Capstaff and Fletcher (2011) and Barbopoulos et al. (2012), we focus on both BHAR and the calendar time portfolio regression model in order to judge whether the fit of empirical results is associated with the model conducted. In event time BHAR is measured by using matched non-issuing firms at two points in the event time. We employ Fama and French's three-factor model (Fama and French, 1993) to examine the performance of portfolios of security issuing firms. The long-horizon post-event performance is evaluated over one- and five-year event windows for both models.

We present the findings on the following aspects in this chapter.

First of all, with respect to the choice between internal funds and external capital, we find that information asymmetry between insiders and external investors positively drives the probability of using internal funds for investments relative to external capital. This finding is consistent with the prediction of pecking order theory in terms of first-order financing hierarchy (internal funds vs. external capital). One explanation is that using internal funds to cover financial deficit rather than external capital could avoid transaction costs and issuing costs that are related to security issues.

Secondly, regarding the choice of security to issue, we find that the choice of equity relative to debt is positively related to the level of information asymmetry for the full sample in the data, which violates predictions of pecking order theory (i.e., debt followed by equity given information asymmetry). This suggests that information asymmetry could be an important determinant of the choice of security to issue. However, we find that the probability of equity issue to debt issue is dependent on the level of information asymmetry for sub-samples of smaller firms, which is consistent with pecking order theory. The effect of the level of information asymmetry on the probability of debt to equity is strongest for the sub-sample of smallest firms. We find no significant effect of information asymmetry on the choice between debt and equity for the largest firms.

Thirdly, in the univariate analysis, we find that the share price of the firm increases after equity announcement. This is not consistent with that reported in Walker and Yost (2008) and Ang and Cheng (2011), who find that the share price of the firm decreases after equity announcement. They argue that the announcement of equity issue exposes asymmetric information on the risk and value of the firm to the public. In other words, the announcement of equity issuances updates (negatively) the market's view of the firm value. However, our result is consistent with the work of Cooney and Kalay (1993) and Walker et al. (2015). According to Cooney and Kalay (1993), if the firm has no information asymmetry problem (i.e., the market has recognized the value of the firm) and the firm raises capital to finance a positive NPV project the market reaction is expected to be positive. In short, the main reason for a positive market response is that the announcement of equity issue does not always signal "bad news". A full explanation can be referred to in section 2.7.3. In the multivariate analysis, we find that change in the share price after firms announce the choice of security to issue is not dependent on the level of information asymmetry, which is not consistent with the implication of pecking order theory.

However, we find that firm performance after firms announce the choice of security to issue is positively related to the stock volatility of the firm.

Finally, in the long term, share price of equity issuers drops for one year and five years after the completion of equity issue, which contradicts with the firm performance at around the announcement period. Adverse changes in share price are close for one year after the completion of equity issue and for five years after the completion of equity issue. We find that, for small equity issuers and large equity issuers, the price drop one year and five years after completion of equity issue is consistent. Our results show that the share price of the firm is negatively dependent on stock volatility of the firm in one year after completion of equity issue. Stock volatility reflects risks and informational discrepancies of the firm (Bessler et al., 2011). Frank and Goyal (2003a) argue that a volatile stock signals a high risk and high level of information asymmetry. The negative relationship between volatility and change in share price (in the long-term) can be explained on the following aspects. First, given that high volatility relates to higher level of information asymmetry (Fama and Jensen, 1983), the level of information asymmetry decreases after announcement of equity issue for firms with high volatility. This is because the firm's prospects may be disseminated over time after the completion of equity issue. Hence the market penalizes the issuer with a decrease in share price. Second, stock volatility could result in detrimental sequence to stakeholders (Frank and Goyal, 2007).[9] However, the level of information asymmetry does not seem to significantly affect firm performance in the long term after completion of equity issue.

The contribution of this research relates to two issues. First, we contribute to knowledge by connecting the core assumption of the pecking order theory whereby information asymmetry is an important determinant of capital structure decisions with the influential implication that the market penalizes the firm when equity is issued at a high level of information asymmetry in one single study, which is the main contribution of this chapter. Second, this chapter adds new evidence to the financing decisions literature on the correct choice to enhance firm value for equity-issuing companies, which contributes to the knowledge in a novel way. We add

[9] Full explanations can be referred to section 2.7.4.

understanding of the sequence of information asymmetry driving the choice of security to issue and of the choice of security to issue on firm performance. This chapter also extends our understanding of transferring to focus on some specific aspects of a stand-alone capital structure theory as suggested by Fama and French (2005).

The reminder of this chapter is organized as follows. Section two reviews previous studies and frames the gap in the literature. Section three designs research questions and testable hypotheses. Data and methodology is structured in section four. Empirical results are presented in section five. We conclude this chapter in section six.

2.2 Literature Review and Research Gap

Like all other scientific theories, capital structure theories start with a set of idealized assumptions. The Nobel Prize winners Modigliani and Miller (hereafter MM) intuitively open a door to market imperfections and relevant implications for capital structure decisions in corporate finance research. MM's irrelevance proposition drives some far-reaching capital structure theories including pecking order theory. In a perfect market that does not exist capital market imperfection and/or the possibility of arbitrage opportunities, the value of the firm is equal to the market value of total cash flows generated by total assets and is not affected by security issuances (Modigliani and Miller, 1958). Without changing the value of total cash flow, security issue simply changes the allocation of cash flow between debt and equity. This irrelevance proposition reveals the capital structure relevance in the real world. According to Vanacker and Manigart (2010), imperfections faced in the real world evoke increasing importance on financing behaviour as this influences not only the value of the firm but also the future development of the firm. Considering information asymmetry between managers and external investors, external funds are more expensive than internal funds as external investors require higher premiums to cover the insecurity they face (Kadapakkam et al., 1998). When external capital is needed, other things being equal, information asymmetry drives firms to issue debt. An improper choice of financing instruments can have a non-positive effect on the value of the firm.

2.2.1 Review of Capital Structure Theories

Pecking Order Theory

Pecking order theory, as one of the founding blocks on capital structure research, was proposed in Myers and Majluf (1984). It concerns notions of information asymmetry and related adverse selection costs. Insiders (i.e., managers) who know more about the firm's market value, investment opportunities, and earnings distribution than outsiders (i.e., external investors) are sensitive to issue security, particularly equity, for two reasons. On the one hand, issuing equity will dilute the benefit of existing shareholders if the market value is underestimated. On the other hand, announcements of equity issue deliver negative signals of an overestimated firm value to the market if the firm is perceived to be overvalued, causing stock price to drop immediately after issue. If the firm is not overvalued the price reaction is an appropriate price adjustment that will be unavoidable over time. When managers need external capital to fund profitable investment opportunities they will follow a pecking order. Internal funds (retained earnings) will be taken into account in the first place, less risky or less information-sensitive debt instruments (e.g., bank debt followed by public debt) will follow, and equity will be issued as a last resort. Relative to equity, the value of debt is neither claimed flexibly nor restricted by asymmetric information problems (Baker and Martin, 2011).[10] Based on the above discussion, supposing managers do not follow the hierarchy of financing (i.e., debt followed by equity), their share price drops at the announcement of equity issue but there is little (no) share price change at the announcement of risky (riskless) debt issues because the choice of equity to issue and following investment conveys negative information to the market.[11] Therefore, in the context of underinvestment and presence of information asymmetry, firms raise external funds to support valuable investments by following a pecking order not to destroy the interest of existing shareholders to satisfy new shareholders by issuing equity.

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[10] Value of debt is not claimed flexibly (i.e., debt is a fixed claim). According to Narayanan (1988), if the firm experiences bankruptcy, overvaluation of equity has no consequence to the firm since equityholders get nothing. If the firm is solvent, overvaluation of equity does not increase with the firm's output.

[11] According to Myers and Majluf (1984), an adverse selection problem can be avoided if firms finance valuable projects by using internal capital or riskless debt (e.g., bank debt); or, it can be less severe if firms finance with risky debt relative to equity.

Trade-off Theory

Trade-off theory was initially proposed by Kraus and Litzenberger (1973) who introduce the notion that the benefits of debt from interest tax shield offsets the costs of financial distress and bankruptcy so that the firm holds a balanced optimal level of debt to maximize firm value. Tax shield arises as it can be used to deduct tax liability. This increases the firm's preference on debt over equity. However, an increasing amount of debt increases the likelihood of financial distress and bankruptcy. The costs of financial distress and bankruptcy include reconstructing costs, credit costs, reducing customer loyalty, and agency costs (Baker and Martin, 2011). Trade-off theory takes two forms: static trade-off theory and dynamic trade-off theory. In static trade-off theory, a single period balance between the benefits of interest tax shield and the costs of financial distress and bankruptcy leads to a single-period optimal leverage. This ignores multi-period capital structure decisions and adjustments to target. Given that maintaining an optimal leverage over multi-periods requires frequent adjustment between debt and equity, it incurs enormous adjustment costs such as transaction costs, thus leading to dynamic trade-off theory. Even small transaction costs cause deviation from an optimal leverage. Welch (2004), Leary and Roberts (2005), and Chang and Dasgupta (2009) demonstrate that fluctuations in the debt level for the firm tend to be explained by different adjustment costs when adding long-term variation on the leverage into the dynamic trade-off theory as the market value of the firm seems not to move with short-term equity fluctuations but with long-term equity changes. Consequently, trade-off theory suggests that an optimal capital structure can be achieved in a single period while a target capital structure is likely attributable to long-term adjustments over time.

Market Timing Theory

The idea of market timing theory (Baker and Wurgler, 2002) is that the choice of equity issue is contingent upon market performance (Lucas and McDonald, 1990; Korajczyk et al., 1991). There are two essential components on timing behaviour. Firstly, the information on the value of a firm known by managers must be more than that known by investors; and managers must be able to recognise when stock prices have diverged from their fundamental value. Secondly, the market must underreact to the announcement of equity issue, or a misevaluation perceived by managers will be corrected immediately. On the basis of the above conditions and managers' correction actions, timing behaviour can create value for a firm's long-term shareholders.

Essentially, the implication of market timing theory is that on the basis of current performance in financial markets (both debt and equity markets) managers employ a more favourable financing instrument or choose to issue neither but wait until the markets are becoming favourable. Information asymmetry can influence market timing of firms in two ways.

At first, according to Myers and Majluf (1984), firms with high levels of information asymmetry are more likely to experience undervaluation. Managers will normally postpone issuing equity until the unfavourable misevaluation disappears. Hence, firms with higher levels of information asymmetry issue equity less frequently. Moreover, with a price run-up, managers will take advantage of the temporary overvaluation and issue equity in the interests of long-term shareholders. Such misevaluation will not be corrected immediately if investors do not completely take account of managers' issuing options. Therefore, firms with a price run-up issue equity more frequently when firms experience high levels of information asymmetry.

Secondly, it arises from the need to rebalance a firm's capital structure. When firms are undervalued and issue no equity they may have to support their projects by selecting the counterpart of issuing options, i.e., debt. But there are still deviations from an optimal target debt ratio. Conversely, when firms are overvalued or the level of information asymmetry is reduced in terms of improvements in general business conditions (Choe et al., 1993), they will issue a great amount of equity to rebalance their capital structures. Therefore, a firms' issue size is connected with their past returns.

2.2.2 Pecking Order Theory vs. Non-pecking Order Theories

The past three decades[12] see continuation in studying validity of standalone pecking order theory, and comparative statistical power of pecking order theory against alternative theories, in explaining corporate financing behaviour.

Test for Standalone Pecking Order Theory

In the first stream of literature, standalone pecking order theory has been widely tested.

Shyam-Sunder and Myers (1999) report strong evidence to support pecking order theory. Their results show that a sample of 157 mature, public firms had traded continuously from 1971 to 1989.[13] The performance of pecking order theory occurs strongly, particularly on the first-order description of corporation financing behaviour. The time-series variance in actual debt ratios is driven by internal financial deficit. Firms finance anticipated money shortfall with debt, and fund unanticipated capital need with short-run debt. Hovakimian et al. (2001) argue that short-run pecking order financing behaviour is driven by mainly transaction costs. In the long-run, firms periodically readjust financing decisions towards a target ratio that reflects benefits and costs of debt financing (trade-off theory).

Frank and Goyal (2003b), among others, find opposing evidence to the standalone pecking order theory. They use a larger sample of US public firms over a longer time period. Contrary to the pecking order explanation, their findings show that firms tend to use net equity issuance relative to net debt issuance to finance internal financial deficit. Insignificant results are observed from the regressions with conventional leverage factors and for the sample from the 1990s. Pecking order considerations are found to be the driving forces of financing decisions among large firms that are less likely to experience severe adverse selection problems as they are followed by more analysts. Frank and Goyal finally conclude that pecking order theory does not support the broad patterns with their selected data.

[12]This is the period since exposure of the works of Myers (1984) and Myers and Majluf (1984).

[13] Shyam-Sunder and Myers (1999) use a requirement for continuous data on flow of funds. This data requirement is required by target-adjustment models as used in Auerbuch (1985) and Titman and Wessels (1988).

Fama and French (2005) find that equity issue is common over the time period 1973 to 2002. Equity is not even commonly issued as a last resort by many firms. Issuing equity violates pecking order theory as there are alternatives such as issues to employees, rights issues, and direct purchase plans to issue equity with low transactions costs and moderate information asymmetry. In other words, transaction costs and information asymmetry problems may not constrain the equity issue decision.

Helwege and Liang (1996) provide evidence for not supporting pecking order theory from young firms. These young firms have less contact or communication with the public. Accordingly, outsiders are not likely to have much information about asset value and investment opportunities, leading to high levels of information asymmetry. Information asymmetry (firm age as a proxy) could have no significant effect on the choice between internal funds and external capital, or on the choice between equity and public debt issues,[14] but have a positive impact on the choice of equity relative to bank debt.

Others, including the works of Leary and Roberts (2005, 2010), Autore and Kovacs (2010), Lemmon and Zender (2010), and Morellec and Schurhoff (2011) also express a lack of evidence in supporting information asymmetry between insiders and outsiders as a driver of firms' financing choice in a pecking order although different information asymmetry proxies are tested. Autore and Kovacs (2010) explain that other dominating factors such as agency conflict, instead of information asymmetry, affect the financing decisions of the firm. Compared to Autore and Kovacs (2010), Leary and Roberts (2005) document that with considerations of other theories (e.g., trade-off), the performance of the pecking order theory appears to be better. Leary and Roberts (2010), and Lemmon and Zender (2010) show that firms constrained by debt capacity choose to issue equity; firms with debt ratings are not constrained by debt capacity in the data and choose to issue debt often; while those that have no debt ratings are small and have high-growth, and they issue equity to cover financial deficit. This is consistent with the findings of Fama and French (2002) and Frank and Goyal (2003a). Morellec and Schürhoff (2011) add that firms may convey their

[14] Their findings show an insignificant relation between the probability of external financing and internal financing deficit.

private information such as the type of performance quality (good or bad) to the market by timing firm actions in order to eliminate adverse selection problems.[15] Firms with accelerating investment would inform outsiders about the good prospects of their performance and company value by means of timing corporate actions and mixing issue choices.

Therefore, we conclude that those studies with findings to support pecking order theory assume and interpret it in a way where, other things being equal, firms will mainly use internal funds relative to external capital. For the choice of security to issue, other aspects being equal, under pecking order theory, equity will never be issued if debt can be feasibly borrowed. Empirical evidence increasingly reveals that strict interpretation is actually refutable, and the more studies that are conducted the less evidence there seems to be to support pecking order theory (Frank and Goyal, 2007). This leads to the argument of Frank and Goyal (2003b) that *"even if a theory is not strictly correct, when compared to other theories it might still do a better job of organizing the available evidence. The pecking order is a competitor to other mainstream empirical models of corporate leverage"*(p. 219), which reflects extensive extant literature on testing for the comparative ability of pecking order theory over alternative explanations, which accounts for the other part of the literature studying pecking order theory.

Pecking Order Theory vs. Non-pecking Order Theories

Evidence from testing the validity of pecking order theory's predictions in explaining firms' financing behaviour against those of alternative theories (e.g., trade-off and market timing) is mixed[16]. These tests compose one of the two popular strands of literature regarding pecking order theory studies. The work of Shyam-Sunder and Myers (1999) set the basis for research on the explanatory power of pecking order theory relative to counterparts in evaluating mature and public firms' financing hierarchy. They focus on time series variance in debt ratios and test the pecking order model and trade-off model independently and find variances in debt ratio for

[15] Fama and French (2005) shed light on the information asymmetry issue in a way that presumes firms can take action to avoid adverse selection problems.

[16] Huang and Ritter (2009), among others, imply that the trade-off model and market timing model importantly explain capital structure.

both, but changes in debt ratios are mainly due to the need for external financing rather than adjustments to an optimal capital structure.[17] Moreover, when testing models with simulated data, pecking order theory could not even be accepted if external financing were followed by attempting to achieve an optimal ratio. Shyam-Sunder and Myers (1999) find the same result by taking cross-sectional tests of trade-off theory that include ratios of research and development, plant earnings, and tax-loss carry forwards to assets. Therefore, they conclude that the pecking order model is superior to the target adjustment model in explaining firms' financing behaviour. Other research along with this alliance includes Hovakimian et al. (2001) and Fama and French (2002) concerning profitable firms' reliance on internal funds and debt issuance to finance investment and cash flow uncertainty, Frank and Goyal (2003b), concerning firms with uninterrupted trading records, follow pecking order over external financing rather than an optimal leverage ratio, and de Jong et al. (2011) concerning firms' preference on debt issuance when debt capacity is reached.

In contrast, Chirinko and Singha (2000) debate that Shyam-Sunder and Myers (1999) contain some misleading inferences when examining the explanatory power of capital structure theories. Chirinkon and Singha (2000) refute this by stating that Shyam-Sunder and Myers' (1999) estimation of the pecking order model is not an identity because it does not include either net equity issues or debt capacity. They follow Shyam-Sunder and Myers's (1999) pecking order model and consider the explanatory power problem with the trade-off model, but their empirical results can assess neither the pecking order model nor the trade-off model. Chirinko and Singha (2000) further tests joint hypothesis of financing behaviour (i.e., debt is followed by equity) and proportions of issues (i.e., proportion of equity issues among total issues is lower). Chirinko and Singha find that debt is not preferred to equity, and proportion of equity issues among total issues is higher. Thus, Chirinko and Singha (2000) reveal that Shyam-Sunder and Myers' (1999) model that supports pecking order hypothesis does not offer a good approximation on firms' financing behaviour and call for alternative tests that can identify the determinants of capital structure and

[17] Test of pecking order theory is to estimate the need for external financing being treated as a financing deficit, calculated as subtracting operating cash flows after interest and taxes from the sum of dividends paid, capital structures, current portion of long term debt at the start of the period, while test of trade-off theory is to regress the difference in the previous period's debt level from the firm's target level on the amount of debt issued or retired (Shyam-Sunder and Myers, 1999).

can discriminate among competing models. Other research along the alliance includes Graham and Harvey (2001) and Bessler et al. (2011) concerning the fit of the trade-off model relative to pecking order theory on capital structure decisions in the long term, Hackbarth et al. (2007) concerning the explanatory power of trade-off theory on the debt structure puzzle, and de Jong et al. (2011) concerning the descriptor of trade-off theory on repurchase decisions.

Furthermore, other work (e.g., Graham and Harvey, 2001; Bessler et al., 2011; Autore et al., 2014) demonstrates that the most dominant factor in driving financial managers' capital structure decisions is to maintain financial flexibility (e.g., to preserve unused debt capacity or some target credit rating), other than the relative explanatory power of capital structure theories.

Finally, Fama and French (2005) conclude that both pecking order theory and trade-off theory stand against each other and suggest avoiding testing explanatory power between pecking order theory and alternative interpretations. Huang and Ritter (2009) also add that a single capital structure theory could not explain all time-series and cross-sectional patterns that have been documented. The relative importance of each theory varies among prior studies. The pecking order theory that focuses on information asymmetry gained popularity in 1990s. Baker and Wurgler (2002) introduced the market timing theory that provides challenges to static trade-off theory and pure pecking order theory. Similarly, the market timing theory is criticized by recent studies that securities issued in a year have long-lived effects on capital structure. Instead, it is better to test these theories as an explanation of some aspects of financing decisions such that the core assumption of pecking order theory is that information asymmetry is an important determinant of capital structure decisions or, the relevant implications of capital structure theories, for example, one implication of the pecking order theory.[18]

2.2.3 Information Asymmetry and External Financing

The second broad set of literature related to pecking order theory examines the core assumption of pecking order theory, i.e., whether the decision to issue debt or equity is dependent on the level of information asymmetry. Early studies on the effects of

[18] Given information asymmetry, the market penalizes risk security issue (i.e., equity) with a decrease in share price of the firm.

information asymmetry on external financing date back to the 1980s, when Myers and Majluf (1984) proposed pecking order theory that firms would give priority to internal financing relative to external financing if they are suffering a financial deficit and should they need external funds they will issue the safest security first and choose equity as a last resort when cheaper and less information-sensitive options are exhausted.[19] Although the following review may show some overlap with the previous sections, we think it is meaningful to present the discussion.

The literature uses different proxies to measure information asymmetry between managers and external investors. These are studies that find evident measures of information asymmetry that have a positive effect on debt issue relative to equity issue. Diamond and Verrecchia (1991) document the importance of firm size in measuring information asymmetry; compared to small firms, large firms tend to be more mature, have established and time-tested policies and practices, have accumulated a reputation, and also attract more attention from the market and regulators. Large firms tend to be more diversified, have been around longer, and experience less severe adverse selection costs when they issue equity (Frank and Goyal, 2007). The empirical results of Chang et al. (2006) find that the group of smallest firms presents the most significant support for pecking order theory.

Chang et al. (2006), and Draper and Paudyal (2008) focus on the effect of analyst coverage as information asymmetry proxy. They argue that firms with less analyst following experience greater information asymmetry problems. Conversely, firms with more analysts following experience less information asymmetry problems. This is because analysts disseminate firm information to the market, mitigating information asymmetry between managers and investors. The pecking order theory is strongly supported because those firms with less analysts following are more likely to issue debt relative to equity, and when they issue equity, they normally raise larger amounts. Moreover, firms with less analyst coverage react positively to favourable market conditions such as stock price run-up prior to issuance. Halov and Heider (2011) add that a high level of information asymmetry could inversely affect the pricing of risky debt and equity.

[19] Investigations on decisions to hold cash also support the pecking order. Specifically, firms with enough cash are less likely to raise external capital (Ozkan and Ozkan, 2004).

Moreover, Jung et al. (1996) insist on the measurement of information asymmetry in terms of firm age. Young firms have less contact and communication with the public and experience high information asymmetry concerning risk and value of assets. To protect valuable information for the growth of the firm and to bear lower cost of issuance, debt is preferred to equity.

However, there exist studies in the literature that violate the positive effect of information asymmetry on debt issue. This story starts from the argument of Halov and Heider (2011) that *"debt is a concave claim that is going to be mispriced by uninformed investors, i.e., it has an adverse selection cost, if risk matters, and the mispricing is more severe if outside investors know less about risk…"* (p. 769). Equity, accordingly, may become a preferred instrument. This indicates that equity issuers do not necessarily have lower levels of information asymmetry than other firms.

Jung et al. (1996) report that firms that issue equity at high levels of information asymmetry are perceived to have opportunities to grow profitably since excess returns of investments exceed costs of adverse selection. Agency problems could also explain firms' issue of equity at high levels of information asymmetry. Although firms do not have favourable investment opportunities, managers could issue equity to benefit themselves by investing in non-favourable projects.

Gomes and Phillips (2012), among others, focus on the distinction between private and public markets to test the hypothesis that information asymmetry is a major determinant of capital structure decisions differently within private and public markets, while the evidence is weak when data from private and public markets are combined altogether. However, their findings cannot support the prediction that firms issue less information-sensitive securities in the public markets when the level of information asymmetry is high; instead, under high levels of information asymmetry, firms tend to issue private equity, debt, convertibles relative to public equity, debt, and convertibles, which are partly consistent with the findings of Hertzel and Smith (1993) and Wu (2004) that firms prefer private equity to public equity and of Denis and Mihov (2003) that firms prefer private debt to private equity. Gomes and Phillips (2012) also suggest reasons why existing studies show mixed results. Specifically, they argue that previous capital structure decisions research[20] does not distinguish the market (private and public) or type of securities (e.g., public debt, private debt, public equity, public equity, and convertibles).

Perspectives of market timing are also included in the study of equity issue with information asymmetry. Dittmar and Thakor (2007) predict that a firm issues equity when stock price is high because investors are highly likely to agree with firm managers' financing decisions. They find that their theory performs much better in explaining firms' financing decisions than alternatives such as pecking order theory and trade-off theory. The work of Dittmar and Thakor (2007) can explain the effect of market timing on equity issue, but consistent with the finding of Schultz (2003) that market timing cannot be rejected as a possible motivation to equity issue. Dittmar and Thakor (2007) conclude that firms issuing equity have higher stock prices and experience incremental investments as investors perceive the quality of the firm through analysts' reports and have high consensus with those firms' decisions. This suggests that the degree of agreement has a stronger explanatory power relative to market timing, information asymmetry, and stock price performance.

Gatchev et al. (2009), among others, show that equity is predominantly used to cover profit shortfall. Small firms, high growth firms, and low profitability firms tend to issue equity. In general, firms rely more on equity to finance their intangible projects and internal investments. Agency and contracting costs outweigh adverse selection costs to dominate firms' choice of security to issue.

Finally, some work (e.g., Leary and Roberts, 2010; Halov and Heider, 2011) argue that, in general, no single theory could accurately explain more than half the choices of security to issue. Equity issuance accounts for a predominant part of external financing decisions among the following firms: smaller firms, younger firms, and firms that have higher leverage, greater cash flow volatility, more growth opportunities, and fewer tangible assets. Equity-issuing firms may raise funds to

[20] Helwege and Liang (1996) only consider private debt issue as the choice of private security to issue, which is not comprehensive or reasonable. Neither Hovakimian et al. (2001) nor Leary and Roberts (2010) include private equity in their samples because their issuances of securities are reliable on firms' statements of cash flow.

resolve capital demand problems that could not be met by debt issuance, or to reserve debt capacity to fund anticipated future investment opportunities. Findings show that incentive conflicts other than information asymmetry drive the pecking order financing hierarchy because the pecking order hypothesis can only explain less than half of the second-stage decisions (debt-equity) and explain even less if firms experience more severe agency problems, and the agency problem has more explanatory power on external financing decisions than the information asymmetry problem.

Alternatively, the effect of (inter)temporal variance in information asymmetry on security issue choice is examined (e.g., Ang and Cheng, 2011; Bessler et al., 2011). They conclude that a temporally lower level of information asymmetry than the recent past leads to relatively lower cost in issuing information sensitive securities, thus encouraging managers to issue equity.[21] Additionally, coincident with the work of Korajczyk et al. (1991) and Viswanath (1993), firms tend to issue equity extensively if issuing equity does not destroy existing shareholders' interests.

2.2.4 Post-event Performance

Announcement Period Performance

According to pecking order theory (Myers and Majluf, 1984), when risky securities (i.e., equity) are issued the market penalizes the firm through a reduction in share price. This is based on the premise that if the new project is value enhancing and/or the firm is not overvalued the manager would not transfer the wealth of existing shareholders to new owners by issuing new equity. However, in the absence of information asymmetry the choice of security to issue will not convey any information that is not already available to the market and the effect of the choice on the value of the firm should be neutral.

The empirical results of Dierkens (1991) show a significantly negative association between share price performance and information asymmetry between insiders and outsiders at the announcement of equity issue, consistent with the findings of Krasker

[21] Firms may use voluntary communication to mitigate information asymmetry problems. Voluntary communication contains management forecasts, analysts' presentations and conference calls, press releases, internet sites, and other corporate reports (Healy and Palepu, 2001), some other voluntary disclosure may also include annual and interim financial statement reports (Ang and Cheng, 2011).

(1986) and Brennan and Kraus (1987).[22] Dierkens (1991) also argues that although information asymmetry fluctuates over time it is an important determinant of equity issue and stock price performance. Evidence is found in different scenarios, including among equity-based executive compensation companies (Datta et al., 2003), concerns with debt capacity constraints (generally seen among small, high-growth firms) (Lemmon and Zender, 2010), and with risk-factor loadings (Armstrong et al., 2013).

The market penalizes equity issue with a decrease in share price given information asymmetry (Myers and Majluf, 1984). The stock price continues to fall over the period from announcement of equity issue to the issue date. However, Korajczyk et al. (1991) find that after information release (e.g., earnings, dividend announcements), the degree of information asymmetry decreases. As a result, high-communication firms appear to suffer no adverse market reaction when they announce a new equity issue since a positive signal has been delivered to the market with the information release, and that low-communication firms see the stock price drop at the announcement of equity issue (Korajczyk et al., 1991; Morellec and Schürhoff, 2011).

Viswanath (1993) argues that the market reacts to equity issue inversely when there is a share price run-up prior to the announcement because equity issue following price run-up is realized by the market as bad news. However, Myers (1977) argues that the market reacts to equity issue positively with price run-up prior to the announcement because a potential part of a firm’s value expresses options to invest in further projects on possible favourable terms. Moreover, price run-up prior to equity issue announcement can then be reasonably recognized by outsiders as a good indication of existence of future profitable projects. This is consistent with empirical results in Asquith and Mullins (1986).

Given that firms have enough cash holdings to cover investment opportunities and decide not to raise external capital, a higher level of information asymmetry could

[22] Brennan and Kraus (1987) also find that firms using part of equity capital to retire debt can experience a diminishing stock price drop. Krasker (1986) documents that stock price inversely respond to the increasing size of equity issue under information asymmetry and information asymmetry drives firms’ financing decisions.

result in more moral hazards (Drobetz et al., 2010). As a result, the market value of cash decreases because the agency costs incorporated in free cash flow theory outweigh the benefits of cash holdings in mitigating adverse selection costs incorporated in external financing. However, firms that have the most favourable investment opportunities experience non-negative market reaction at the announcement of equity issue. Firms that have no favourable investment opportunities experience significant stock price drop after announcing equity issue although they experience higher asset growth than counterparts that are issuing debt.

There is also debate concerning information asymmetry and stock price performance, whether or not firms decide to raise external capital. Bradford (1987) argues that given that managers work for their own interests and issue in relatively more beneficial situations, the market value of the firm will be higher than when managers can neither trade in their shares before nor after the announcement of equity issue, no matter whether the firm decides to issue. As a consequence, if managers do not trade in their shares, either before or after the announcement of issuances, the market value of the firm will be higher. When they sell or repurchase shares of the firm, firms with insider trading in shares experience more or less severe stock price drop than firms without insider trading. This is because insider trading channels bad or good signals concerning the value of the firm to the public although the share price of the firm may fluctuate or maintain a stable level.

Long-term Performance

According to Ritter (1991), firms experience depreciation on firm value in the long run, which is associated with long-term underperformance. Their discussions are summarized as follows. At first, the market is overoptimistic about valuation of the firm because of information asymmetry and uncertainty regarding the value of issue. Given that the value and risk of the firm becomes more transparent after equity issues, the informational asymmetry will diminish over time. Secondly, the market may rebalance their demand on investments after fanaticism and excess confidence on IPOs or SEOs. Thirdly, equity issues of the firm may be overvalued at announcement of issue, especially over equity issue cluster periods.[23] This could lead to price drop after investors recognize the value and risk of the firm. Fourthly, from the cognitive view of behavioural finance, the market expects firms issuing equity to present an abnormal performance after issue of equity.

The empirical evidence of long-term performance following equity issues can be traced back to Loughran and Ritter (1995) who observe a decrease on the stock price in the long term and explain that this movement is a result of lack of legitimacy at announcement of issue. As Fama-French three-factor model is widely used to calculate abnormal returns, a pattern that is distinct from other cross-sectional patterns such as size and book-to-market ratio could cause legitimate problem. Loughran and Ritter (2000) interpret that long-term underperformance is dependent on overvaluation by the market over the announcement period. Jegadeesh (2000) and Polk and Sapienza (2009), among others, demonstrate that market inefficiency explains the long-term underperformance of the firm and that investors in the market are overoptimistic about the firm issuing equity.[24] Last but not least, Fama (1998) and Eckbo et al. (2000) argue that, technically, share price decreases in the long run could be resulted from measurement errors.

2.2.5 Research Gap in the Literature

Earlier studies investigate the validity of pecking order theory in explaining firms' financing behaviour relative to alternative explanatory theories. More recent studies extend the test of pecking order theory to examination of the core assumption of pecking order theory. Namely, information asymmetry is an important determinant of corporate external financing. Concerning adverse selection cost caused by information-sensitive security choice (i.e., equity), firms follow a pecking order to issue security. Intuitively, should the firm issue an information-sensitive security instrument, the public will observe the problem of information asymmetry regarding firm value and risk, thus penalizing the firm with a drop in stock price.

[23] Managers of the firm may take advantage of low issuance cost and overvaluation over periods of clusters.

[24] The inefficient market hypothesis posits that a firm raises external capital when a higher price over fundamental value has been observed. Issuing at such a price could add value to existing shareholders.

There is a gap between the literature stream that either studies the importance of information asymmetry on financing behaviour (e.g., Chang et al., 2006; Bessler et al., 2011; Pan et al., 2015) and the literature stream that the post-issue performance of the firm after announcement of a security issue (e.g., Dierkens, 1991). The literature is short of studies connecting the two important aspects of a corporate financing decision in the context of information asymmetry between managers and investors. Therefore, a single piece of work to extend the abovementioned research direction in light of information asymmetry and external financing and to determine whether the firm has made an appropriate choice to enhance the value of the firm, which is not well understood, is necessary. This chapter examines the following three issues: 1) whether the choice between internal funds and external capital to finance positive NPV projects is dependent on the level of information asymmetry; 2) in the event that these firms decide to raise external capital whether the choice of security to issue (debt vs. equity) is dependent on the level of information asymmetry; 3) whether market reaction to the issue of equity (announcement period and long-term) is dependent on the level of information asymmetry. This study aims to extend the understanding on whether external financing decisions are dominated by information asymmetry among specific firms with the control of all firm-specific characteristics but allow measuring the effect of information asymmetry as well as market- factors and macroeconomic conditions, and on whether a favourable firm performance after security issue announcement has been observed.

2.3 Hypotheses Development

Given that the first step of two is to test the core assumption of pecking order theory and the other is to test the influential implication of pecking order theory, this chapter examines:

- When there is a need for funds for investment and whether managers prefer internal or external funds.
- If external capital is needed, whether the firm's choice of security to issue is driven by information asymmetry between managers and outside investors.

- Whether the financing decision is correct for the firm. Whether an increase on the stock price after the announcement of security indicates the correct decision.

The research questions are presented below:

A. How does information asymmetry affect the choice of security to issue?

Sub-questions:

(1) Do firms raise external capital to finance investment projects?

(2) Is the decision to raise external capital dependent on the level of information asymmetry?

(3) Do firms prefer internal to external funds?

(4) If external capital is needed, how does information asymmetry affect the choice of security to issue?

B. How is the market reaction to the issue of security dependent on the level of information asymmetry?

Sub-questions:

(5) Is market reaction to the choice of security to issue dependent on the level of information asymmetry?

The pecking order theory (Myers and Majluf, 1984) contends that firms with information asymmetry prefer internal funds to external financing instruments. Most firms hold some internal funds such as cash and cash equivalents even when they issue security. Myers and Majluf (1984) explain that firms may take windows of opportunities that have been overvalued by external investors to issue security. This may also be considered by managers who tend to avoid situations in which profitable investment opportunities have to be financed by external funds such as equity capital that occurs with expensive issuing costs as well as losses in shareholders' interest (i.e., drop in share price) (Bessler et al., 2011). This implies that firms tend to use internal funds relative to external capital for investments. Prior studies (e.g., Chang et al., 2006; Ritter and Huang, 2009) suggest that investment is an important concern that relates to financial deficit and the costs of forgoing profitable investments are tremendous. Moreover, this may be resulted from transaction costs associated with the security issue (Frank and Goyal, 2007). Naranjo et al. (2012) also argue that security issue may influence the financial disclosure of the firm, thus causing uncertainties on the signalling of assets value and risk to the public. Hence, everything else being equal, firms that experience asymmetric information problems will mostly rely on internal funds against external capital to finance positive NPV projects. Therefore, we hypothesise that:

Hypothesis 2.1: Firms that need funds for investments prefer internal to external funds given information asymmetry

Bharath et al. (2009) demonstrate that the level or change of information asymmetry (adverse selection cost) is positively associated with debt issuances for US firms during the past 30 years. Firms with high levels of information asymmetry use more debt issue to mitigate financing deficit than equity issue when compared to firms with less asymmetric information. They find that information asymmetry can explain the relationship between financing deficits and debt issuances. Their findings are consistent with the predictions of pecking order theory. As there is information asymmetry between managers and investors, Myers and Majluf (1984) predict that managers will favour debt issue over equity issue and only use equity financing as a last resort after cheaper and less information-sensitive alternatives (internal cash, bank debt, or public debt) are used to cover financing deficits. According to strict interpretation of pecking order theory, if debt issue is feasible, equity should never be issued after IPOs (Frank and Goyal, 2007). However, this leads to the measurement of debt feasibility that is correlated to debt capacity. To avoid the interference of other things, motivated by Myers and Majluf (1984) we focus simply on information asymmetry but control for all firm-specific characteristics, market factors, and macro-economic conditions in this chapter and assume other things to be equal.

Therefore, the second hypothesis is as follows:

Hypothesis 2.2: Firms with higher (lower) information asymmetry prefer to issue debt (equity) rather than equity (debt) when they need to raise external capital.

Dierkens (1991) and Korajczyk et al. (1991) document that the level of information asymmetry decreases with the announcement of equity issue.[25] After the equity issue announcement, market-adjusted abnormal returns and the residual variance of daily prices are lower. Consistent with the findings of Narayanan (1988), Viswanath (1993) finds that firms experience larger drops in stock price under higher levels of information asymmetry. Bessler et al. (2011) discuss that there is a negative association between price run-up and the level of information asymmetry because "*it may gradually resolve information asymmetry between managers and investors in Lucas and McDonald's (1990) model that has triggered the price run-up"* (p. 125). We expect that share price performance can be used to assess if a firm has made an appropriate issue choice. Therefore, the third hypothesis is developed as follows:

Hypothesis 2.3: Among equity issuers, firms with higher (lower) levels of information asymmetry experience larger (smaller) drops in share price.

2.4 Descriptive Statistics

2.4.1 Sample Selection

This study examines the cases of US firms listed in three major stock exchanges (NYSE, NASDAQ, and AMEX) using the data over the period from 1990 to 2011. The firm-specific data are available from Compustat; market data are collected from CRSP; data on security issues are available from Thomson One; analysts forecast data are available from I/B/E/S. Following Chang et al. (2006) and Huang and Ritter (2009), we exclude financial, insurance, and real estate firms (SIC 6000-6999), regulated utilities (SIC 4900-4999) as these firms apply different financial regulation and accounting standards, and firms with missing book values of assets.[26] A small number of firms with a format code of 5 have been excluded from the sample.[27] We exclude those observations with missing value on net equity issue, net debt issue, sales, and annual close price and with book value of assets less than $1 million to

[25] Managers have incentives to issue equity when the firm is overvalued, after equity issue announcement outsiders become clearer about the firm's value quality and the level of information asymmetry between managers and investors decreases.

[26] According to Hovakimian et al. (2001), exclusion of financial firms results from different capital structures from other industrial, nature resources, and services firms.

[27] Reporting format code 5 is for Canadian firms.

reduce the effect of outliers. Overall the sample is selected based on available equity announcement dates from Thomson One, and firms with missing equity issue announcement dates have been excluded.

Firms with both equity issue and debt issue for a given year have been excluded. Similar to Chang et al. (2006), firms are defined as issuing firms when the net amount issued divided by the book value of assets at the beginning of the fiscal year exceeds 1%. Relative to previous studies that set a 5% threshold, this study designs the threshold as 1% to cover the larger sample size. Small equity issue size refers to net equity issued in fiscal year divided by total assets at the beginning of fiscal year exceeding 1% up to 10%. Large equity issues exceed 10%. Years in which neither net equity nor net debt at fiscal year-end divided by total assets at beginning of fiscal year exceeding 1% have been omitted, resulting in a sample of 94,657 firm-year observations. Our sample has been evenly split into five size groups in terms of the market capitalization at the beginning of the fiscal year. Smallest firms are included in *sub-sample 1* and largest firms are included in *sub-sample 5*.[28] We assume firms that have no analyst data available in I/B/E/S have no analysts following.

2.4.2 Summary Statistics

Table 2.1 presents descriptive statistics of independent variables for the full and five sub-samples. Firms in the sample have been classified into five sub-samples by the firms' size (market capitalization), and firms with missing capitalization have been excluded in the sample. The median value of market capitalization ranges from 14 million among smallest firms to 2,870 million among largest firms. The mean value of number of analysts following a firm for full sample is 2.07. Consistent with Chang et al. (2006) and Draper and Paudyal (2008), analyst following increases with firm size and analyst coverage among largest firms is much more than that among smallest firms on average (6.68 vs. 0.05). Decreasing mean value of cash ratio means that larger firms have a smaller cash ratio. Cash ratio is calculated as the ratio of cash and cash equivalent and short-term investment to total assets. It suggests that small firms may have generated higher cash ratios from their operations than larger firms and that small firms may have raised more external capital per unit of asset

[28] As Chang et al. (2006) noted in their work, the book value of assets may change over time for a firm, leading to a firm's position classified in different sub-samples.

than large firms.[29] This can be explained by pecking order theory in terms of cheaper internal funds. On average, larger sized firms have lower book leverage than those of a smaller size, which suggests smallest firms may raise more debt from the market. Noticeably, the increasing mean value of debt rating dummy indicates that larger firms have higher credit ratings.

We report summary statistics of security issues for both equity and debt for full and sub-samples in Table 2.2. Issue size is the net amount issued divided by the book value of assets at the beginning of the fiscal year. Net equity issues equals the sale of common and preferred stock minus the purchase of common and preferred stock; and, net debt issues equal long-term debt issuance minus long-term debt reduction plus changes in current debt.[30]

The summary statistics illustrate the research question *"(1) Do firms raise external capital to finance investment projects?"* There are 6,965 equity issues among smallest firms (sub-sample 1) and 2,036 equity issues among largest firms (sub-sample 5). The smallest firm group has the smallest number of debt issues and the largest firm group has the largest number of debt issues (1,912 vs. 6,841 in number). Smallest firms issue more equity than debt (6,965 vs. 1,912 in number) and largest firms issue more debt than equity (6,841 vs. 2,036 in number). The median value of debt issue size and that of equity issue size decrease with firm size, and equity issue size ranging from smallest to largest firms (52.64% vs. 3.47% of market value) drops much more than debt issue size ranging from smallest firms to largest firms (12.39% vs. 5.51% of market value); smallest firms have relatively larger equity issue size than debt issue size; and largest firms express higher relative debt issue size in median value. On average, equity issuers have a larger issue size than debt issuers (12.48% vs. 7.4% of market value). This suggests that when firms choose to issue equity relative to debt, they issue a larger size.

[29] More cash generated from operations may result from higher profitability.

[30] Following Chang et al. (2006), this study defines debt issue and equity issue based on balance sheet data.

Table 2.1 Summary Statistics of Independent Variables

		Full Sample	(1)	(2)	(3)	(4)	(5)
Analyst coverage	Mean	2.07	0.05	0.25	0.92	2.46	6.68
	Median	0.00	0.00	0.00	0.00	0.00	3.00
	S.D	5.04	0.27	0.83	2.17	4.16	8.60
Market capitalization	Mean	2,401.16	47.99	117.62	268.34	698.21	10,896.77
	Median	141.05	14.91	43.28	127.65	403.58	2870.79
	S.D	15,667.08	241.88	557.07	725.77	1,156.72	33,723.97
Profitability	Mean	-0.05	-0.61	-0.09	0.06	0.15	0.16
	Median	0.11	-0.17	0.05	0.13	0.15	0.15
	S.D	2.04	4.57	0.89	0.67	0.28	0.12
Tangibility	Mean	0.31	0.24	0.25	0.30	0.34	0.40
	Median	0.24	0.15	0.17	0.22	0.27	0.36
	S.D	0.25	0.25	0.23	0.24	0.25	0.25
Age	Mean	12.68	8.04	9.48	10.38	13.18	22.32
	Median	8.00	6.00	8.24	7.00	9.00	17.00
	S.D	12.12	7.20	7.00	9.19	11.23	16.55
Cash	Mean	0.20	0.26	0.26	0.23	0.15	0.09
	Median	0.09	0.15	0.16	0.12	0.06	0.05
	S.D	0.24	0.28	0.27	0.26	0.19	0.12
Capital expenditure	Mean	0.08	0.08	0.07	0.08	0.08	0.07
	Median	0.05	0.03	0.04	0.05	0.05	0.06
	S.D	0.10	0.14	0.10	0.09	0.09	0.07
Book leverage	Mean	0.34	0.68	0.20	0.20	0.28	0.31
	Median	0.19	0.14	0.11	0.13	0.24	0.29
	S.D	3.79	8.44	0.28	0.25	0.27	0.21
Stock volatility	Mean	2.93	4.43	3.90	3.76	2.19	1.19
	Median	0.15	0.23	0.19	0.16	0.13	0.09
	S.D	8.85	10.76	10.13	9.88	7.62	5.66
Term structure of interest rates	Mean	1.88	1.90	1.84	1.84	1.88	1.92
	Median	1.73	1.74	1.73	1.73	1.73	1.88
	S.D	1.17	1.18	1.17	1.17	1.16	1.16
Deviation from target	Mean	0.02	0.01	0.03	0.01	0.02	0.02
	Median	-0.02	-0.05	-0.03	-0.04	-0.02	0.00
	S.D	0.20	0.23	0.21	0.20	0.20	0.17
Debt rating	Mean	0.18	0.00	0.00	0.02	0.20	0.67
	Median	0.00	0.00	0.00	0.00	0.00	1.00
	S.D	0.38	0.00	0.02	0.13	0.40	0.47
Share price performance	Mean	0.65	-0.01	0.42	0.77	0.69	1.18
	Median	0.09	-0.03	0.02	0.29	0.55	1.05
	S.D	27.33	2.76	4.94	8.94	13.97	54.56

This table shows summary statistics of independent variables. Data are collected from Compustat, CRSP, I/B/E/S, and Federal Reserve for the period of 1990 to 2011. The full sample is equally split into five sub-samples according to market capitalization at the beginning of the fiscal year. *Analyst coverage* is defined as the number of analysts following a firm who make annual earnings forecasts in any month over a 12-month period prior to issue decisions. *Market capitalization* equals the number of shares outstanding multiplied by the closing stock price at the end of the fiscal year. *Profitability* is the ratio of operating income before depreciation, to total assets at the beginning of the fiscal year. *Tangibility* is the ratio of net PPE to book value of total assets at the beginning of the fiscal year. *Age* is the number of years since a firm's data became available on Compustat. Cash equals the ratio of cash or cash equivalent and short-term investment to total assets. *Capital expenditure* is the ratio of capital expenditure to total assets. *Book leverage* is the ratio of total debt (debt in current liabilities + long-term debt) to total assets. *Stock volatility* is the standard deviation of the daily stock return for the past 12 months prior to the announcement of issue. *Term structure of interest* rates equals the difference between the month-end yields on ten-year government bond and the one-year treasury-bills, with a six-month lag, matched to the month of a firm’s fiscal year-end. *Deviation from target leverage* is the deviation of a firm's market leverage minus median value of total debt to market value of assets by SIC code and by year. *Debt rating* equals 1 if the firm has a debt rating assigned by Standard & Poor, 0 otherwise. *Share price performance* which is the annual change in share price is matched to the month of the firm's fiscal year end. S.D. is abbreviated for standard deviation. Dollar figures are in millions.

Table 2.2 Summary Statistics of Debt/Equity Issues

	Full sample	Sub-sample 1	Sub-sample 2	Sub-sample 3	Sub-sample 4	Sub-sample 5
Total number of debt issues	20,071	1,912	2,741	3,542	5,035	6,841
Total number of equity issues	24,314	6,965	6,136	5,293	3,884	2,036
Median size of debt issues	7.40%	12.39%	8.35%	8.31%	7.90%	5.51%
Median size of equity issues	12.48%	52.64%	14.40%	5.85%	4.06%	3.47%
Number of firm-years	94,657	18,930	18,933	18,931	18,932	18,931

This table shows summary statistics of security issues for both debt and equity. Data are collected from Compustat, CRSP, I/B/E/S, and Federal Reserve for the period of 1990 to 2011. The overall sample is equally split into five sub-samples according to market capitalization at the beginning of the fiscal year. Firms are defined as issuing firms when the net amount issued divided by the book value of assets at the beginning of the fiscal year exceeds 1%. Issue size is the net amount issued divided by the book value of assets at the beginning of the fiscal year. Equity issues equal the sale of common and preferred stock minus the purchase of common and preferred stock. Debt issues equal long-term debt issuance minus long-term debt reduction plus changes in current debt. Firms that issue both debt and equity in a given year are excluded from the sample. Years in which neither net debt nor net equity at fiscal year-end divided by total assets at the beginning of the fiscal year exceeding 1% have been omitted.

Table 2.3 Panel A: Spearman's Rank Correlation Matrix

	Book leverage	*Analyst coverage*	*Profitability*	*Tangibility*	*Age*	*Cash*	*Capital expenditure*	*Deviation from target*	*Share price performance*	*Term structure of interest rates*	*Stock volatility*	*Debt rating*
Book leverage	1											
Analyst coverage	0.0069	1										
Profitability	0.0699*	0.2155*	1									
Tangibility	0.3638*	0.0611*	0.3058*	1								
Age	0.1407*	0.1921*	0.1461*	0.1324*	1							
Cash	-0.5643*	-0.0139	-0.2312*	-0.4079*	-0.2279*	1						
Capital expenditure	0.1227*	0.0550*	0.2844*	0.6689*	0.0063	-0.1855*	1					
Deviation from target	0.5413*	-0.1256*	-0.1890*	0.0212*	0.0768*	-0.2784*	-0.0847*	1				
Share price performance	-0.0577*	0.0520*	0.2086*	0.0261*	0.0603*	0.0420*	-0.0363*	-0.2124*	1			
Term structure of interest rates	-0.0369*	0.0157	-0.0496*	-0.0385*	0.0221*	0.0638*	-0.0902*	0.0031	0.0527*	1		
Stock volatility	-0.1476*	-0.2438*	-0.3555*	-0.2509*	-0.3641*	0.2717*	-0.1592*	0.0705*	-0.0909*	0.0441*	1	
Debt rating	0.3558*	0.3108*	0.1774*	0.2304*	0.3182*	-0.2453*	0.1142*	0.1221*	0.0292*	0.0199*	-0.3024*	1

This table shows Spearman's Rank correlations between variables. Data are collected from Compustat, CRSP, I/B/E/S, and Federal Reserve for the period of 1990 to 2011. *Analyst coverage* is defined as number of analysts following a firm who make annual earnings forecasts in any month over a 12-month period prior to issue decisions. *Profitability* is the ratio of operating income before depreciation, to total assets at the beginning of the fiscal year. *Tangibility* is the ratio of net PPE to book value of total assets at the beginning of fiscal year. *Age* is the number of years since a firm's data became available on Compustat. *Cash* equals the ratio of cash or cash equivalent and short-term investment to total assets. *Capital expenditure* is the ratio of capital expenditure to total assets. Book leverage is the ratio of total debt (debt in current liabilities + long-term debt) to market value of total assets. *Stock volatility* is the standard deviation of the daily stock return for the past 12 months prior to the announcement of issue. *Term structure of interest rates* equals the difference between the month-end yields on ten-year government bond and the one-year treasury-bills, with a six-month lag, matched to the month of a firm's fiscal year-end. *Deviation from target leverage* is the deviation of a firm's market leverage minus median value of total debt to market value of assets by SIC code and by year. *Debt rating* equals 1 if the firm has a debt rating assigned by Standard & Poor, 0 otherwise. *Share price performance* which is the annual change in the share price is matched to the month of the firm's fiscal year end. Coefficients marked with * are significant at 1% level.

Table 2.3 Panel B: VIF Values		
Variable	VIF	1/VIF
Tangibility	1.78	0.56
Capital expenditure	1.55	0.65
Cash	1.49	0.67
Debt rating	1.4	0.71
Age	1.29	0.78
Analyst coverage	1.26	0.79
Deviation from target	1.15	0.87
Profitability	1.14	0.88
Share price performance	1.02	0.98
Stock volatility	1.01	0.99
Term structure of interest rates	1.01	0.99
Mean VIF	1.28	

This table shows VIF values from Spearman's Rank correlations. Data are collected from Compustat, CRSP, I/B/E/S, and Federal Reserve for the period of 1990 to 2011. VIF values are presented to show multi-collinearity among our variables. *Analyst coverage* is defined as number of analysts following a firm who make annual earnings forecasts in any month over a 12-month period prior to issue decisions. *Profitability* is the ratio of operating income before depreciation, to total assets at the beginning of the fiscal year. *Tangibility* is the ratio of net PPE to book value of total assets at the beginning of fiscal year. *Age* is the number of years since a firm's data became available on Compustat. *Cash* equals the ratio of cash or cash equivalent and short-term investment to total assets. *Capital expenditure* is the ratio of capital expenditure to total assets. Book leverage is the ratio of total debt (debt in current liabilities + long-term debt) to book value of total assets. *Stock volatility* is the standard deviation of the daily stock return for the past 12 months prior to the announcement of issue. *Term structure of interest rates* equals the difference between the month-end yields on ten-year government bond and the one-year treasury-bills, with a six-month lag, matched to the month of a firm's fiscal year-end. *Deviation from target leverage* is the deviation of a firm's market leverage minus median value of total debt to market value of assets by SIC code and by year. *Debt rating* equals 1 if the firm has a debt rating assigned by Standard & Poor, 0 otherwise. *Share price performance* which is the annual change in the share price is matched to the month of the firm's fiscal year end.

Spearman's rank correlation coefficients on relevant variables are shown in Panel A of Table 2.3. As summarized in Hauke and Kossowski (2011), Spearman's rank correlation assesses how well an arbitrary monotonic function can describe a relationship between two variables without making any assumptions about the frequency distribution of the variables. Unlike Pearson's correlation, Spearman's rank correlation does not stick to the assumption that the relationship between two variables should be linear or make requirement that variables need to be measured on interval scales. Instead, Spearman's rank correlation can be used for variables that are measured at the ordinal level. The correlation coefficients among these variables range significantly from 0.02 to 0.67, indicating that individual variables have correlation with each other and that every variable characterizes unique information or power.

Corporate leverage correlates with analyst coverage negatively, as well as with cash ratio. This suggests that firms with lower levels of information asymmetry (i.e., more analyst coverage) tend to have lower leverage, and that firms raising external capital are possibly showing higher leverage. Leverage is highly correlated with deviation from target, indicating that firms tend to compare their leverage with the market and adjust their leverage to the industry level. Additionally, the capital expenditure of the firm and tangibility are significantly and positively correlated, which signals that firms covered by high tangibility are unlikely to have a low capital expenditure ratio. Furthermore, share price performance shows a significantly negative correlation with leverage.[31] This can be explained by the market timing theory (Baker and Wurgler, 2002) and dynamic adverse selection models (Lucas and McDonald, 1990). A higher proportion of equity issues among total security issues (i.e., 54.78%) and larger equity issue size (i.e., 12.48%) also justify these explanations.

VIF values are reported in Panel B of Table 2.3. Following O'Brien (2007), R_i^2 is used to show the proportion of variance in the *ith* independent variable that is associated with other independent variables in the model. Tolerance for the ith independent variable, which is used to check for the degree of multi-collinearity, is calculated as 1- R_i^2. The Variance Inflation Factor (VIF) is the reciprocal of tolerance. As a rule of thumb, a VIF of more than 10 (i.e., tolerance is less than 0.1) could indicate serious multi-collinearity (Menard, 1995; Neter et al., 1989). However, O'Brien (2007) suggests that a VIF value of more than 10 do not suggest such common treatments of multi-collinearity problems such as elimination of some independent variable(s), use of ridge regression, nor combination of independent variable(s) into a single index. This is because threshold values of VIF should be assessed in terms of contextually other factors that influence the variance of regression coefficients, as argued in O'Brien (2007). Although the discussions on the threshold values of VIF in the literature are mixed, the threshold value of 10 is

[31] Share price performance takes into account allowance for dividends.

widely used to indicate excessive multi-collinearity. Conversely, if the reciprocal of VIF (i.e., tolerance) is close to 1, there is little multi-collinearity. The mean VIF value of 1.28 in Panel B of Table 2.3 indicates that there is little multi-collinearity among our variables.

2.5 Measures of Information Asymmetry and Control Variables

2.5.1 Measures of Information Asymmetry

"…the degree of informativeness varies systematically with firm and economy characteristics…"

Healy and Palepu (2001, p. 431)

"Information asymmetry is not directly observable and, thus, is difficult to measure empirically…"

Jiang and Kim (2004, p. 190)

Prior studies measure information asymmetry in two different ways. One strand of studies use "index" or "score" to measure information asymmetry that are derived from multiple proxies of information asymmetry (e.g., Bharath et al., 2009; Cai et al., 2009; Ang and Cheng, 2011). Most other studies use one or two individual measures of information asymmetry such as firm size (e.g., Thomas, 2002; Draper and Paudyal, 2008), analysts coverage (e.g., Chang et al., 2006; Draper and Paudyal, 2008), growth opportunities (e.g., Smith and Watts, 1992), R&D expenses (e.g., Aboody and Lev, 2000; Bessler et al., 2011), etc. The focus of information asymmetry in this study lies in the two parties between managers and investors since such information asymmetry directly reflects value and risk of assets relative to information asymmetry among external investors.[32] Following Chang et al. (2006) and Draper and Paudyal (2008), we use two traditional and reliable proxies to measure this type

[32] Agarwal and O'Hara (2007) classify information asymmetry between managers and investors as intrinsic information asymmetry.

of information asymmetry: firm size and analyst coverage.[33] Due to limited access to data regarding the earnings forecasts of managers, we are unable to test the robustness of analyst coverage with the divergence between earnings forecasts of manager and analysts. However, there is extensive literature in favour of the key role of financial analysts play in mitigating information asymmetry. As summarized in Chang et al. (2006), analyst coverage could be a reliable measure of information asymmetry for the following reasons. First, financial analysts aggregate complex information and synthesize it in a form that is more easily to understand by less sophisticated investors. Second, these analysts provide information that is not widely known in the public. Third, Hong et al. (2000), among others, firms with high analyst coverage are more informative and incorporate information on accruals and cash flows more rapidly. Forth, financial analysts are attracted to more transparent firms. Lastly, with respect to the earnings forecasts of managers, managers may manage expectations, leading to understatement of the earnings to reveal a positive surprise on announcement. Therefore, other information asymmetry proxies such as divergence between the earnings forecasts of manager and analysts is unlikely to be less noisy than analyst coverage. An information asymmetry index will be constructed as an alternative way to test robustness.[34]

Analyst coverage: Intuitively, the more analysts following a firm, the more information of the firm is revealed to the public and the less information asymmetry problems the firm experiences.[35] Information asymmetry affects the choice of security issue and firm value. Draper and Paudyal (2008) argue that firms followed by a large number of analysts do not experience expensive communication costs to attract public attention, while firms with few analysts following are motivated to attract public attention and could not avoid communication costs because the

[33] Analysts directly link managers and investors, and they motivate themselves to evaluate information about firm value and communicate to their clients; information about the value of a large firm is more likely accessible for external investors.
[34] Larcker et al. (2007) argue that the measurement error introduced from using a single measure for a complex construct will almost certainly cause the regression coefficients to be inconsistent.
[35] Healy and Palepu (2001) conclude that financial analysts contribute information to capital market by analyzing firms' financial reporting decisions, forecasting future earnings, and recommending buy/sell activities.

marginal value of information communicated is relatively high.[36] Brennan and Subrahmanyam (1995) argue that the adverse selection cost is reduced by the increasing number of analysts following a firm and Draper and Paudyal (2008) show that firms with higher analyst coverage have lower information asymmetry and experience small value change when a corporate financing decision is announced. There are also relevant studies documenting the special roles of analysts. More informative stocks show high linkage with analyst coverage and momentum strategies are less likely to be used (Hong et al., 2000), more hidden values are unlocked for firms with high analyst coverage issuing security (Chemmanur and Paeglis, 2001), rapid incorporation of accruals and cash flow information is indicated among firms with high analyst coverage (Barth and Hutton, 2004), SEOs with high analyst coverage are less likely to be under-priced (Bowen et al., 2008). We set analyst coverage as the maximum number of analysts who make annual earnings forecasts in any month over a 12-month period, which is consistent with that used in Chang et al. (2006) and Draper and Paudyal (2008).

Firm size: larger firms are likely to have lower information asymmetry as they tend to be more mature, have established and time-tested disclosure policies and practices, and receive more attention from the market and regulators (Diamond and Verrecchia, 1991; Ozkan and Ozkan, 2004), they have greater capability to issue information-sensitive securities such as equity (Rajan and Zingales, 1995). Draper and Paudyal (2008) argue that institutional investors who generally own the shares of larger firms have sufficient resources and monitor companies' activities cost-effectively. Larger firms are able to hire public relations managers to maintain visibility in the market; thus, information communicated to the market is more readily available and reliable than small firms. Consistent with the argument of Draper and Paudyal (2008), Drobetz et al. (2010) also claim that firm size is an important proxy of information asymmetry and small firms suffer from higher information asymmetry, and that size effect is independent of the composition of information between public and private sources. Fama (1985) discusses that information provided by firms increases with its

[36] Draper and Paudyal (2008) argue that analysts are motivated to collect information and disseminate it to clients. Firms with high analyst coverage are associated with more activities of information collection, analysis, and dissemination. Hence, they have lower information asymmetry.

size and increases the information received by investors. Additionally, Easley and O'Hara (2004) argue that information risk is less for larger size firms that have a greater total amount of information. We use market capitalization to measure firm size and also test alternatives such as total assets and sales.

Analyst coverage vs. firm size: firm size may measure full level of information asymmetry, which is supported by Draper and Paudyal (2008) on three aspects: a) a great amount of shares of large firms are held by institutional investors, thus representing high importance; b) a large percentage of trading activities are taken by large firms so that they attract much more analysts' following; c) managers from large firms have, relatively, a more crucial role in connecting the public than those from small firms; incremental contribution provided by analyst coverage is limited. Motivated by Draper and Paudyal, we use the following equation to evaluate analyst coverage (thereafter *AC*) that could be explained by firm size and calculate the residual effect of analyst coverage to measure the incremental role of analyst coverage:

$$\mathbf{Ln}(\mathbf{1} + \boldsymbol{AC_i}) = \boldsymbol{\alpha} + \boldsymbol{\beta Ln}(\mathbf{1} + \boldsymbol{MV_i}) + \boldsymbol{\varepsilon_i} \tag{2.1}$$

Where AC_i is the maximum number of analysts following firm i who makes annual earnings forecasts in any month over a 12-month period, and MV_i is the market value of firm i. The error term (ε_i) is the incremental analyst coverage that is not explained by firm size.

2.5.2 Control Variables

1) Profitability

Arguments of existing studies on the relationship between profitability and the choice of security issues are mixed. Rajan and Zingales (1995) and Antoniou et al. (2008a), particularly, argue a negative relationship between profitability and debt supply because firms prefer to finance with internal funds rather than debt, and equity financing is the last resort. In other words, if companies have enough retained earnings to cover investments and fixed dividends, keeping information asymmetry constant, firms with higher profitability will demand less debt and become less levered over time. Jensen (1986) argues that managers of profitable firms try to avoid the disciplinary role of debt if the market for corporate control is ineffective. Agarwal and O'Hara (2007) also argue that firms that are more profitable tend to accumulate more equity and have lower leverage in the presence of adjustment costs.

Antoniou et al. (2008a) and Leary and Roberts (2010) argue a positive relationship between debt issue and profitability by referring to the argument of Harris and Raviv (1990) that debt issue can reduce agency cost of free cash flow if managers work in the interests of current shareholders and make the correct investment decisions to mitigate bankruptcy risk. Moreover, those firms could also benefit from higher leverage in terms of the larger interest tax shields available, thus leading to lower probability of financial distress and reduction of agency costs (Jensen, 1986). On the supply side, suppliers should be more willing to lend to firms with current cash flows (Rajan and Zingales, 1995).

2) Firm size

The effect of size on equilibrium leverage and security issuance works both ways. On the one hand, debt issue increases with firm size. Rajan and Zingales (1995) explain that larger firms with more tangible assets tend to be more diversified and fail less often, making them less likely to face bankruptcy and have greater debt capacity. The works of Titman and Wessels (1988) and Leary and Roberts (2010) support this by demonstrating that larger firms are mature and have lower volatility of earnings and cash flows, those factors have a positive relationship to leverage, thus increasing debt issue if information asymmetry is constant. Antoniou et al. (2008a) also point out that large firms can easily raise capital from debt markets and have lower borrowing costs. On the other hand, Leary and Roberts (2010) imply that small firms are less likely to issue securities in a pecking order to avoid adverse selection cost compared to larger firms given their presence and reputation in the external markets.

Frank and Goyal (2003a) find large firms have more assets and are more likely to have adverse selection based on existing assets. Firm size may also be used to measure the information outside investors have, which could positively affect demand for equity rather than debt (Rajan and Zingales, 1995).

3) Tangibility

A larger number of tangible assets tend to secure debt and debt holders experience low risk premiums because if companies go into bankruptcy, tangible assets can be evaluated with a market value while intangible assets will no longer have any value.[37] Moreover, Stulz and Johnson (1985) argue that tangible assets will also secure investment opportunities, reducing agency costs, transaction costs, and expected distress costs and ensuring firms issue more debt. Rajan and Zingales (1995) and Leary and Roberts (2010) argue that if a large fraction of a firm's assets are tangible, then assets should be served as collateral, diminishing the risk of the lender suffering the agency costs of debt and leading to more debt issuances and higher leverage. More value in liquidation should also be retained. Therefore, the greater the proportion of tangible assets on the balance sheet, the more willing should lenders be to supply loans and, given constant information asymmetry, firms with higher tangibility on assets are likely to raise loan capital.

4) Growth (Investment opportunities)

It can be explained that cost of financial distress and agency costs increase with growth opportunities and, hence, managers are less likely to issue debt. Bessler et al. (2011) argue that growth opportunities are relevant to misevaluation and potential timing considerations. Higher growth opportunities may indicate overvaluation that firms tend to issue equity relative to debt. Early studies (e.g., Myers, 1977) demonstrate that highly levered companies are more likely to pass up profitable investment opportunities. Hence, those firms that are expecting high future growth will use a greater weight of equity finance when their share price is high relative to earnings or book value (Leary and Roberts, 2010). Furthermore, Agarwal and O'Hara (2007) argue that growth opportunities have a negative effect on a firm's debt issue. Firms with high growth or good investment opportunity sets are not likely to favour the disciplinary role of debt to restrict the problems associated with excess free cash flow, and thus would appear to have lower leverage. Alternatively, Rajan and Zingales (1995) suggest that firms may time the market and issue equity when stock price is high, leading to low leverage. However, when retained earnings

[37] Frank and Goyal (2003a) find higher levels of firms' tangibility indicate greater debt capacity.

are not enough to cover profitable investment opportunities and managers are reluctant to issue equity, with the concern of information asymmetry firms would raise debt rather than equity according to pecking order theory.

5) Probability of bankruptcy

Frank and Goyal (2003a) argue that higher probability of financial distress reflects an increase in the probability of bankruptcy or downsizing or other disruptions in normal business impose costs, thus leading to less debt issue given that information asymmetry remains constant, which is consistent with that predicted in trade-off theory. Leary and Roberts (2010), among others, find significant evidence to support this. However, based on market timing theory, as argued in Frank and Goyal (2003a), if the market is favourable relative to other time periods, bankruptcy probability may not affect firms' capital structures.

6) Industry conditions

Industry conditions have a potential effect on capital structure (Hovakimian et al., 2001; Faccio and Masulis, 2005). Firms tend to adjust their debt ratios towards the industry level in order to achieve competition. This considers a constant level of information asymmetry. Leary and Roberts (2010) discuss that highly levered firms rely heavily on equity financing, adjusting towards target ratio. Industry movements will also affect competition, heterogeneity of assets, business risk, technology, or regulation, or even correlated but omitted factors from the company (Frank and Goyal, 2007). Higher deviation leads to more debt issue in order to adjust towards industry level. Trade-off theory explains that firms act to achieve an optimal level or trade-off between benefit and cost of distress or agency cost.

7) Taxes

Following market equilibrium where there exists an interior optimal leverage among firms, non-debt tax shield results in lower debt demand, as predicted by trade-off theory (Frank and Goyal, 2003a). Given the level of information asymmetry, Leary and Roberts (2010) reveal a positive effect of non-debt tax shield on debt issue and leverage because higher non-debt tax shield indicates a stronger financial deficit, which is consistent with pecking order theory.

8) Risk

Firms with volatile cash flow face higher expected costs of financial distress, thus leading to less debt issuances. Volatile cash flow could also reduce the possibility of the use of tax shields. This is because when the firm has high level of cash flow, the need of raising external capital including debt and equity decreases. Hence, volatility decreases the issue of debt in terms of the trade-off theory. Fluck (1998) suggests that equity issuance could absorb risk of the firm, and firms with higher risk would prefer to issue equity. Moreover, firms with higher risk are more likely to issue equity since they are less able to repay debt (Bessler et al., 2011). However, according to dynamic pecking order theory, volatility reflects both risk and information discrepancies. Hence, higher volatility that captures more serious asymmetric information results in more debt issue. Bolton and Freixas (2000) also argue that in equilibrium riskiest firms experience difficulties in raising equity capital and are likely to issue debt (bank loans).

9) Supply-side factors

When firms are restricted to access debt market, all else equal, they opt to issue equity. Hence, restricted debt access (i.e., not a rated debt) would lead to more equity issuances. Moreover, according to the pecking order theory, debt rating process involves information dissemination to the market by the rating agency. As a result, firms with higher debt ratings experience less severe adverse selection problems. Hence, firms with higher debt ratings prefer to issue equity. However, if a firm has been assigned a debt rating, all else equal, it can access debt markets and will have more debt issuances.[38]

10) Debt market conditions

Debt market conditions reflect economic performance and expected growth opportunities. Given that the debt market is expensive to access, managers prefer equity to debt, acting for the current shareholders' interests. This also confirms the perspective that if the interest of long-term borrowing is relatively high, firms will be reluctant to issue debt. Moreover, if a higher term structure of interest rate signals higher growth and the level of information asymmetry remains constant firms will

[38] Firms that have a debt rating attract more investors in the debt market.

issue more equity. Antoniou et al. (2008a) find a significant inverse relationship between leverage and term structure of interest rate. This is consistent with the trade-off hypothesis that firms offer discount to equity investors if the benefit of equity issue outweighs the cost of discount or capital raised from equity issue is greater or equivalent to the real value of the market share.

11) Stock market conditions

More and larger equity issues following price run-up is in line with market timing behaviour (Baker and Wurgler, 2002) and dynamic adverse selection models (Drobetz et al., 2010). Firms may postpone issuing equity to finance a profitable project if the firm is undervalued. Whilst they wait to issue equity, the market may perceive the favourable news about the profitable project or the probability that the value of the profitable project increases. The level of information asymmetry also diminishes. Hence, share price of the firm increases over the time period. Moreover, firms will issue equity if the market value is overvalued and they even offer discount to attract new investors who demand a discount, their realized value may be higher than the real value and do not destroy the interest of existing shareholders if the benefit of equity issue is greater than the cost of discount offered. Stock returns prior to equity issue are normally higher than unconditional stock returns because they are normally those firms that postpone taking projects. Empirical evidence also shows that share price run-up is followed by equity issue (Antoniou et al., 2008a; Autore and Kovacs, 2010; Bessler et al., 2011).[39]

Further discussion concerning relationships between these variables and security issues, as well as variable definitions is shown in Appendix A.

2.6 Methodology

2.6.1 Security Issue Choice

Maddala (1983) employs a two-stage least squares method to avoid biased and inconsistent estimates caused by the problem of simultaneity (or reciprocal causation). Maddala describes that whenever sample separation is determined by the

[39] Stock price increase is generally associated with improved growth opportunities; firms would lower their optimal leverage ratio. However, Chang et al. (2006) demonstrate that for better-covered firms, higher price run-up is not strongly associated with larger issue size.

variable that exits observations the probit two-stage method may be applicable. Furthermore, as comparisons between detailed logit models regarding different assumptions concerning the random noise or error, Gomes and Phillips (2012) apply multinomial logit and nested logit models.[40] In the literature, regarding estimations of firms' choice of an event, scholars are more "nested logit model"-oriented relative to multinomial logit regression (e.g., Chang et al., 2006; Agarwal and O'Hara, 2007; Huang and Ritter, 2009). Following the two-stage nested probit procedure used by Hovakimian et al. (2001) in examining corporate finance decisions, Chang et al. (2006), among others, particularly estimate the choice between equity issue and debt issue although some may use this methodology to estimate the choice of other corporate events. For example, Barbopoulos et al. (2012) use it to examine the choice between earn out and non-earn out currencies for M&A deals.

Specifically, we intend to use the two-stage procedure to answer research questions "*(2) Is the decision to raise capital dependent on the level of information asymmetry*", research question *"(3) Do firms prefer internal to external funds?"* and research question *"(4) If external capital is needed, how does information asymmetry affect the choice of security to issue?"*. Following Hovakimian et al. (2001) and Chang et al. (2006), we specifically focus on how information asymmetry affects a firm's choice between debt and equity after controlling for a set of variables.[41] As discussed in the previous section, analyst coverage is a reliable proxy to catch information asymmetry between managers and investors and is used in this chapter. It is based on the idea that increasing numbers of analysts following a firm will mitigate information asymmetry and lower adverse selection cost, so that firms observing lower information asymmetry will throw themselves into the security market rather than rely on retained earnings to cover financial deficit and investment opportunities. This information asymmetry argument is consistent with Chang et al. (2006) and Draper and Paudyal (2008). The first stage is designed to test *Hypothesis 2.1* regarding the choice between internal funds and external capital. The corresponding equation is expressed below:

[40] The importance of the nested logit model relative to multinomial (or conditional) logit model has become increasingly important for estimating discrete outcomes, as specified by Hovakimian et al. (2001).

[41] External financing choice will be examined in the next sub-section.

$$\Pr[\text{External Choice} = 1] = \mathrm{F}(\alpha + \beta X_i + \gamma AC_i) \tag{2.2}$$

where the dependent variable is the dummy variable, which takes a value of 1 if a firm chooses to raise external capital and 0 if internal choice is taken. The function F stands for the logistic cumulative distribution. X_i is the vector of control variables.[42] AC_i is analyst following that is set as the number of analysts following firm i that make annual earnings forecasts prior to announcement of equity issue. Our estimation models examine the effect of information asymmetry on the choice of security to issue and also control for other factors. If the dependent variable is significantly affected by explanatory variables, then we know firms need additional funds. We expect a positive sign on *AC* in the regression. Antoniou et al. (2008a) argue that it takes, on average, six months for a firm to assess firm value and investment opportunities and to prepare documents for listing. In addition, in order to relax the endogeneity problem, we take six months further to one-period lagged number of analysts following a firm and also predict the incremental analyst coverage effect on the choice. It is important to control for endogeneity, since it is likely that both unobservable and observable responses influencing information asymmetry also influence other firm-specific and market factors and the possibility that information asymmetry and financing decisions relating to each other exists. Endogeneity between information asymmetry proxy and financing decisions may exist in two ways (Chang et al., 2006). One aspect is that a firm may attract more analysts in a given time period that may also affect equity issue.[43] Another is that some firms tend to issue more debt or equity due to characteristics that the market cannot control.[44] Ang and Cheng (2011) view that "*Firms endogenize the extent of information asymmetry by choosing the optimal level and channels of direct communication with the capital markets…*" (p. 411), which is inconsistent with the assumption of Myers and Majluf (1984) who illustrate an exogenous informative

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[42] We control for all firm specific and economy factors that affect issue decisions and the leverage ratio, apart from information asymmetry which is the explanatory variable; definition of these variables are also defined in appendix A.

[43] Chang et al. (2006) give such examples that firms may enjoy greater coverage because analysts anticipate that the firm would issue equity; or given analyst coverage is affected by issue decisions in the recent past, it would likely affect current equity issue if firms gradually adjust to a target capital structure.

[44] Noticeably, given that analysts follow firms issuing more equity, firms that might issue more equity may also favour higher analyst coverage.

asymmetry relationship between managers and investors and firms do not act to reduce information asymmetry. Ang and Cheng (2011) note firms benefitting continuously from reduction of information asymmetry take action to mitigate the level of information asymmetry via disclosure or communication.

In the second stage, we assume companies are in financial deficit and they need to raise external capital. The function of the probit method relevant to the second stage is:

$$External_{i,t} = \begin{cases} 1\ if\ in\ financial\ deficit \\ 0\ otherwise \end{cases} \tag{2.3}$$

The dependent variable takes a value of 1 if a company needs to raise external capital to cover financial deficit in a given year and 0 otherwise. Given that companies need funds to support profitable investments from external instruments, we then have a value of 1 representing the choice of raising external capital, which means companies are in financial deficit, otherwise 0.

Similar to the estimation on the choice between issuing security and not-issuing security given information asymmetry, we use a consistent logistic technique to examine the relationship between information asymmetry and external financing choice between equity and debt. The design is set to test *Hypothesis 2.2: Firms with higher (lower) information asymmetry prefer to issue debt (equity) rather than equity (debt) when they need to raise external capital*. This action, that when firms need finance externally they prefer less risky debt to equity and when there are growing numbers of analysts following they are more likely to issue equity, is guided by Chang et al. (2006) and Ang and Cheng (2011). Fewer analysts following results in higher levels of information asymmetry between managers and investors, and firms experience higher adverse selection cost of equity and, consequently, choose cheaper security to act in the interests of current shareholders. The model is estimated as follows:

$$\Pr[\text{Equity issue} = 1] = \mathrm{F}(\alpha + \beta X_i + \gamma AC_i) \tag{2.4}$$

where the dependent variable is the equity issue dummy, it takes 1 when firms issue equity and 0 if debt is issued.[45] F contributes to the logistic cumulative distribution function. X_i is the vector of control variables, which considers all firm-specific and market factors but allows for information asymmetry in the second-stage regression. AC_i is set as the number of analysts following firm i who make annual earnings forecasts prior to issue announcement, we expect a positive effect. We also control for the endogeneity problem by predicting the residual value of analyst coverage that could not be explained by firm size.

The two-stage nested logit model shows benefits over the multinomial model. Firstly, the random errors for each choice are independent and identically distributed with the extreme value distribution (Gomes and Phillips, 2012). Second, the multinomial model does not perform fit in estimating capital structure decisions. Gomes and Phillips (2012) argue that in the context of independence of irrelevant alternatives assumption, their test results do not support alternative samples of security issues. The problem of simultaneity appears more serious from multinomial logit regression than nested logit regression, which is why nested logit technique has become increasingly attractive in security issues research. The nested logit model relaxes the strong independent irrelevant alternatives assumption and has good fit in the estimation of security issue choice (Hovakimian et al., 2001; Chang et al., 2006; Huang and Ritter, 2009). Third, the computation of Akaike information criterion (AIC) for the comparison of two different classifications of two-stage logit models in Gomes and Phillips (2012) is statistically and significantly lower for the nested logit model than the multinomial logit model. Furthermore, according to Hoffman and Duncan (1988) and Heiss (2002), the nested logit model is relatively computationally feasible and straightforward, and much faster than the multinomial logit model because it is improved by the closed-form equation for the estimation of likelihood, thus making it more applicable and comfortable for programming procedure.

[45] We define issuing firms as those with net equity (debt) issued accounting for more than 1% of total assets at the end of fiscal year.

2.6.2 Measurement of Abnormal Changes in Share Price

Univariate Analysis

Following Ang and Cheng (2011), we measure abnormal returns of security issues by using popular models for event studies on financing decisions. We estimate abnormal return concerning equity/debt issue announcement to measure the influence of information asymmetry in univariate and multivariate frameworks. These analyses elaborate the research question *"(5) Is market reaction to financing choice dependent on the level of information asymmetry?"* We conduct univariate analysis to test *Hypothesis 2.3: Among equity issuers, firms with higher (lower) levels of information asymmetry experience larger (smaller) drops in share price*. First, in a univariate framework we estimate abnormal return using market adjusted return:

$$AR_{it} = R_{it} - R_{mt} \tag{2.5}$$

where AR_{it} is the abnormal return for firm i at time t, R_{it} is realized return for firm i at time t, and R_{mt} is the realized return for the market at time t. The announcement period cumulative abnormal return is the sum of the abnormal returns in an event window (-5, +5 and -2, +2) surrounding the day of announcement of issue, day 0, as follows:

$$CAR_t = \sum_{t=-5\ or -2}^{t=+5\ or\ \ 2} AR_{it} \tag{2.6}$$

According to Campbell et al. (1998), changes in share price will immediately reflect the effect of an event due to investors' rationality in financial markets.[46] Thus share price performance observed in a relatively short time could be used to measure an event's economic impact. It has been widely used in the field of corporate finance, and some firm-specific events such as announcement of new security issues, merger and acquisition, and earnings are abundantly linked with event studies.[47] As summarized in Campbell et al. (1998), there are two commonly used techniques to

[46] Event studies were firstly applied by Dolley (1933) who investigated the price effects of stock splits by testing nominal price changes at the announcement of splits. Fama et al. (1969), among others (e.g., Ashley, 1962; Ball and Brown, 1968), improved Dolley's work by testing the effect of stock splits with the consideration of the effects of simultaneous dividend increases.

[47] Research on the applications of event studies are developed with modifications to deal with complications caused by violations of statistical assumptions and to adapt more specific hypotheses (Brown and Warner, 1980, 1985; Campbell et al., 1998) respectively discuss the practical application on monthly data and daily data, adding evidence to the practical importance of event studies.

test normal performance, constant-mean-return model and market model. The former assumes the mean return of a given security is constant, while the latter assumes a linear relation between the market return and security return.

The market model outperforms the constant-mean-return model in terms of an important improvement by excluding the portion of the return that relates to the variance in the return of market portfolio to reduce the variance of abnormal return. As a result, it enhances the market model's validity in testing the effect of an event on share prices. T-test of mean equalling zero versus not equalling to zero is applied to examine the significance of the excess returns. Although there are other statistical models providing such benefit as reducing variance of abnormal return, the multifactor model, which includes additional industry indexes, is one of those that shows limited benefits since additional industry factors express weak marginal explanatory power in reducing the variance of abnormal return (Campbell et al., 1998).

Multivariate Analysis

A multivariate regression is used to test for the magnitude and significance of share price changes around the event window. We test *"Hypothesis 2.3: Among equity issuers, firms with higher (lower) levels of information asymmetry experience larger (smaller) drops in share price"* by using the following equation*:*

$$CAR_t = \beta_0 + \beta_1 AC + \beta_2 c_2 + \beta_3 c_3 + \cdots + \beta_n c_n \tag{2.7}$$

Where CAR is cumulative market-adjusted abnormal return at time t, *AC* is analyst coverage, the measure of information asymmetry and $c_{2,}\ldots,c_n$ are control variables that are identical to those employed in the logistics regression model mentioned earlier. As discussed in the earlier sections, we expect a positive sign for AC after the announcement of equity issue and a non-negative sign for AC after the announcement of debt issue.[48] A positive coefficient of AC means that firm performance after equity announcement is negatively related to the level of information asymmetry. This is because firms experiencing lower level of information asymmetry tend to issue equity relative to debt. When they issue equity, the market is less likely to penalize the firm with a decrease on share price.

[48] Due to a lack of availability on debt issue date data, this chapter conducts empirical analysis of stock price performance mainly for equity issues.

According to the pecking order theory, given information asymmetry, debt issuances are less likely to destroy interests of existing shareholders. Hence, information asymmetry leads to less severe adverse market reactions after the announcement of debt issue. Based on the argument in Campbell et al. (1998), an aggregation of abnormal return observations must be conducted to make overall inferences for the specific event. Multivariate analysis consists of two procedures of modelling, namely, aggregation of abnormal return observations through time for individual security and aggregation of abnormal return observations through time and across securities. These aggregations are progressed on the premise that no overlap is allowed in the event windows of different securities through time and across securities, implying that neither abnormal returns nor cumulative abnormal returns are correlated across securities.

2.6.3 Tests of Long-run Abnormal Stock Returns

Investigations of the performance of the firm in the long-term horizon provides further action to answer research question *"(5) Is market reaction to financing choice dependent on the level of information asymmetry?"* Given that long-term returns are more skewed, a calendar time portfolio model is used to mitigate the skewness distraction, which is in accordance with Grullon and Michaely (2004) and Leng and Noronha (2013). The long term performance of equity issuers is measured by one- and five-year holding period abnormal returns. Following Barbopoulos et al. (2012), the long-term performance of equity issuers is estimated with the calendar time portfolio framework. Robustness of estimations is tested with buy-and-hold abnormal returns. First, we apply a calendar time portfolio regression model to estimate risk adjusted average monthly post-issue abnormal returns for 12 and 60 months (i.e., one year and five years).

$$R_{p,\mathrm{t}} - R_{f,t} = a_p + b_p\left(R_{m,t} - R_{f,t}\right) + s_p SMB_t + h_p HML_t + e_{p,t} \qquad (2.8)$$

where the intercept a_p measures the monthly average risk-adjusted abnormal returns of equity issuer portfolio after controlling for the three Fama and French risk factors (Fama and French, 1996), which is zero under the null of no abnormal performance. The three factors are zero-investment portfolios representing the abnormal return of the market; the difference between a portfolio of "small" stocks and "big" stocks, SMB, and the difference between a portfolio of "high" BE/ME stocks and "low" BE/ME stocks, HML. $R_{m,t} - R_{f,t}$ is the abnormal return of the market portfolio. Data for the three factors are available from Kenneth R. French's *"Data Library"*.[49] $R_{p,\mathrm{t}}$ is the calendar time portfolio return in month t. $R_{f,t}$ is the risk free rate, which is measured by one-month T-bill return in month t.

Alternatively, we use buy-and-hold abnormal returns to measure long-term performance of equity issues in one year and five years respectively.

$$BHAR_t = \prod_{t=1}^{T}\left(1 + R_{i,t}\right) - \prod_{t=1}^{T}(1 + R_{benchmark,t}) \tag{2.9}$$

where $R_{i,t}$ and $R_{benchmark,t}$ are the monthly return on the stock i and the equally-weighted market return in month *t* respectively.[50]

Multivariate analysis is applied to estimate *BHAR* of equity issuers for one and for five years with the following expression.

$$BHAR_t = \alpha_{LP} + \sum_{i=1}^{N} X_i + \varepsilon_i \tag{2.10}$$

where α_{LP} measures monthly average long-term abnormal returns of equity issuers after controlling for a set of variables. The vector of variables X_i includes consistent variables with those we controlled in *Equation (2.7)*. These control variables consider all firm-specific characteristics but allow information asymmetry, market factors, and macroeconomic conditions to ensure comprehension.

2.7 Empirical Results

2.7.1 Internal Funds vs. External Capital

As the first step of examining corporate financing decisions, analysis of the choice between internal funds and external capital for positive NPV projects are conducted for full sample and for all sub-samples. We intend to examine *Hypothesis 2.1* with *Equation (2.2)* in this sub-section. *Hypothesis 2.1* refers to: "*Firms that need funds for investments prefer internal to external funds.*" The analysis below is aimed to

[49] The accessible online address is:
http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.
[50] According to Fama (1998), equally-weighted market returns produce different inference from those derived from value-weighted returns. Equally-weighted market returns are much easier to understand and outperform value-weighted market returns in the long term.

answer research question (2) "*Is the decision to raise capital dependent on the level of information asymmetry?*" and (3) "*Do firms prefer internal to external funds?*" regarding the internal-external choice of the firm that needs funding.

Table 2.4 shows logit regression output for the full and all five sub-samples. Given that the key role of financial analysts to managers of the firm is to mitigate information asymmetry between managers and market participants, the information asymmetry proxy (i.e., analyst coverage) considers both manager-shareholder and manager-debtholder relationships regarding the choice between internal funds and external capital. According to Francis and Soffer (1997), analysts' reports regarding forecasts and recommendations could be useful references to both debtholders and stockholders although the overall value of the firm is reflected on share price. This estimate method is used to test whether to raise external capital or not given information asymmetry since external financing is more affected by information asymmetry than internal funds. Similarly, equity is more affected by information asymmetry than debt. We find that the probability of external financing is positively affected by analyst coverage and is significant at the 1% level. The coefficient for residual value of analyst coverage is also statistically significant and shows a positive effect. This means firms with low levels of information asymmetry raise external capital. Seen among sub-samples, larger firms have more analysts following, thus leading to lower levels of information asymmetry and higher probability of issuing securities. Evidence can particularly be seen among smaller firms (*sub-sample 1, sub-sample 2, and sub-sample 3*) that the information asymmetry problem is much more severe. The effect of analyst coverage decreases for larger firms (coefficients for *sub-sample 1*, *sub-sample 2*, and *sub-sample 3* are 0.350, 0.069, and 0.045 respectively) and the effect of analyst coverage on the choice of security to issue is the weakest for largest firms (coefficient 0.003) and significant at the 10% level. Our results are consistent with those in Chang et al. (2006), Bessler et al. (2011), and Ang and Cheng (2011). Findings in the difference between sub-samples can be explained on the following aspects. One explanation is that small firms see fewer institutional investors that have sufficient resources and embark on cost-efficient information dissemination activities, and have less spending on recruiting award-winning public relations managers to disseminate corporate information to the public and to help with attainment of equilibrium on the value of the firm. Another explanation is that large firms experience less pressure on the communication with the public and remain more visible in the market. Hence, a low level of information asymmetry is likely to be seen among large firms. Moreover, Firms can easily attract more investments due to their reputation in the market. To fund these investments, external capital may be needed. Given that large firms experience low (or no) levels of information asymmetry, the financing choice between debt and equity will be less likely to be affected by information asymmetry. Hence, we argue that large firms that have low (or no) information asymmetry raise external capital for investments, and issue large amounts of securities if they need to.

With respect to the explanatory variable analyst coverage, according to Draper and Paudyal (2008), analysts search for information related to asset value and risk and disclose it to the public. As a result, this reduces information asymmetry and is conducive to equilibrium to the value of the firm. Firms with more analysts following do not commonly invoke costly information dissemination actions to appeal to external investors. Those with few analysts following experience higher levels of information asymmetry and conduct information dissemination activities to attract the interest of the market. Compared to firms with high analyst coverage, this series of activities incurs additional costs. This is based on the premise that firms need funds to cover financial deficit. Hence, firms with low analyst coverage suffer greater asymmetric information problems and tend to use internal funds to finance financial deficit. Therefore, our results support *Hypothesis 2.1: Firms that need funds for investments prefer internal to external funds given information asymmetry.*

Among control variables, we find that book leverage, age, cash, capital structure, deviation from target and share price performance are significant for the full and all sub-samples. Particularly, age (negative) and share price performance (positive) are consistently significant across sub-samples and show the strongest effect on the choice of external financing to internal funds for the smallest firms. One the one hand, this is because older firms have larger reputations and better capacity for sufficient cash flow. On the other hand, price run-up indicates favourable information about a firm's future performance, thus attracting more external investors. The (negative) effect of cash ratio on the probability of raising external capital relative to internal funds decreases with firm size among firms with higher levels of information asymmetry (*sub-sample 1, sub-sample 2, and sub-sample 3*).

The results suggest that smaller firms that experience much more severe cash problems are likely to raise external capital. In supporting financing deficits firms experiencing lower levels of information asymmetry are more likely to raise external funds. These firms are also older and less sensitive to share price performance prior to issue announcement. Firms experiencing less profitability, larger tangibility, or observing decreasing term structure of interest rates are more likely to raise external funds. Credit rating is statistically and significantly related to the preference of external financing to internal funds as firms with credit ratings are less constrained by debt capacity and are able to raise capital at least with debt issue (Lemmon and Zender. 2010). Moreover, debt ratings deliver information regarding risk and value of the firm revealed by the rating agency. This implies that firms that have high debt ratings experience less adverse selection problem and would increase the issue of equity too. The coefficient of tangibility is positive, meaning a stronger debt capacity of issuers. Firms with no credit ratings are small, high-growth firms, and are reliant on internal funds to cover financial deficit. Negative signs on profitability means that profitable firms are less likely to use external capital to cover financial deficit as cheaper funds are preferred, according to pecking order theory (Myers and Majluf, 1984). Profitable firms with debt issue benefit from interest tax shields (Frank and Goyal, 2007). Debt issued by profitable firms can mitigate agency costs as profitable firms appear to have severe free cash flow problems (Jensen, 1986). Note that stock volatility does not have any influence on firms' first-stage choice between internal funds and external capital.

Table 2.4 Issuing/Non-issuing Choice and Information Asymmetry

	Full sample				Sub-sample 1		Sub-sample 2		Sub-sample 3		Sub-sample 4		Sub-sample 5	
External Financing Dummy	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z
Analyst coverage(AC)	0.007	(4.27)***			0.350	(4.03)***	0.069	(3.35)***	0.045	(5.59)***	0.008	(2.12)**	0.003	(1.69)*
AC_residual			0.305	(13.98)***										
Profitability	-1.110	(-30.15)***	-1.221	(-31.87)***	-1.593	(-20.59)***	-1.184	(-15.84)***	-0.694	(-7.76)***	-0.485	(-4.06)***	-0.146	(-1.04)
Tangibility	0.173	(6.09)***	0.166	(5.92)***	0.062	(0.85)	0.259	(3.95)***	0.189	(2.85)***	0.064	(1.08)	0.058	(0.9)
Book leverage	0.575	(12.65)***	0.532	(11.76)***	0.199	(2.58)***	0.697	(6.83)***	0.498	(4.91)***	0.694	(6.83)***	0.768	(6.77)***
Age	-0.020	(-29.13)***	-0.021	(-30.65)***	-0.034	(-10.59)***	-0.033	(-15.83)***	-0.027	(-15.39)***	-0.025	(-16.78)***	-0.007	(-6.35)***
Cash	-0.536	(-11.93)***	-0.596	(-13.19)***	-1.168	(-10.6)***	-0.455	(-4.94)***	-0.340	(-3.73)***	-0.782	(-7.49)***	-0.963	(-6.26)***
Capital expenditure	3.270	(22.79)***	3.252	(22.85)***	1.767	(5.56)***	2.460	(8.32)***	3.406	(11.15)***	4.113	(12.93)***	4.717	(12.56)***
Deviation from target	-1.237	(-24.51)***	-0.996	(-18.6)***	-1.108	(-9.39)***	-1.222	(-11.33)***	-1.013	(-8.97)***	-1.085	(-9.1)***	-0.756	(-5.95)***
Share price performance	0.010	(13.42)***	0.009	(13.07)***	0.063	(6.81)***	0.056	(13.3)***	0.030	(13.57)***	0.012	(8.47)***	0.002	(2.22)**
Term structure of interest rates	-0.024	(-3.57)***	-0.026	(-3.9)***	0.045	(2.34)**	-0.019	(-1.28)	-0.013	(-0.87)	-0.007	(-0.51)	-0.068	(-4.76)***
Volatility	0.002	(0.82)	0.002	(1.22)	-0.002	(-0.43)	0.001	(0.23)	0.005	(1.18)	-0.006	(-1.24)	0.002	(0.45)
Debt rating	0.076	(3.32)***	-0.081	(-3.16)***	0.000		-3.438	(-1.95)*	-0.057	(-0.52)	0.057	(1.24)	0.039	(0.99)
Intercept	-0.030	(3.1)***	-0.007	(-0.27)***	0.502	(7.37)***	0.223	(3.83)***	0.007	(0.12)	-0.021	(-0.34)	-0.352	(-5.04)***
Pseudo-R2(%)/firm-years	4.52/69,530		4.71/69,530		9.37/8,849		6.30/14,000		4.84/15,484		4.81/15,480		2.79/15,717	

This table shows the choice between internal funds and external capital. Data are collected from Compustat, CRSP, I/B/E/S, and Federal Reserve for the period of 1990 to 2011. The full sample is equally split into five sub-samples according to market capitalization at the beginning of the fiscal year. The dependent variable equals 1 if either debt or equity is issued in a given year, otherwise 0. Firms are defined as issuing firms when the net amount issued divided by the book value of assets at the beginning of the fiscal year exceeds 1%. Net equity issues equal the sale of common and preferred stock minus the purchase of common and preferred stock. Net debt issues equal long-term debt issuance minus long-term debt reduction plus changes in current debt. *Analyst coverage* is defined as the number of analysts following a firm who make annual earnings forecasts in any month over a 12-month period prior to issue decisions. *Tangibility* is the ratio of net PPE to book value of total assets at the beginning of the fiscal year. *Profitability* is the ratio of operating income before depreciation, to total assets at the beginning of the fiscal year. *Book leverage* is the ratio of total debt (debt in current liabilities + long-term debt) to total assets. *Capital expenditure* is the ratio of capital expenditure to total assets. *Stock volatility* is the standard deviation of the daily stock return for the past 12 months prior to the announcement of issue. *Term structure of interest rates* equals the difference between the month-end yields on ten-year government bond and the one-year treasury-bills, with a six-month lag, matched to the month of a firm's fiscal year-end. *Deviation from target* is the deviation of a firm's market leverage minus median value of total debt to market value of assets by SIC code and by year. *Debt rating* equals 1 if the firm has a debt rating assigned by Standard & Poor, 0 otherwise. *Share price performance* which is the annual change in the share price is matched to the month of the firm's fiscal year end. *Age* is the number of years since a firm's data became available on Compustat. *Cash* equals the ratio of cash or cash equivalent and short-term investment to total assets. All variables are lagged one period. Coef is abbreviated for coefficients. Standard errors are robust to heteroscedasticity and clustered. Z-statistics that are respectively marked with *, **, and *** indicate coefficient significance at 10%, 5%, and 1% level.

2.7.2 Debt Issue vs. Equity Issue

Having found the probability of issuing security relative to internal funds decreases with the level of information asymmetry, we conduct estimations on the choice between equity issue and debt issue given information asymmetry for the full and sub-samples in this sub-section. We intend to test *Hypothesis 2.2: Firms with higher (lower) information asymmetry prefer to issue (less) debt than equity when they need to raise external capital* with *Equation (2.4)* in this section. The analysis below is aimed to answer research question (4) regarding the debt-equity choice of the firm raising external capital that *"if external capital is needed, how does information asymmetry affect the choice of security to issue".*

Coefficients resulted from logit regressions on debt-equity choice for the full and sub-sized groups are reported in Table 2.5. Similarly, forecasts and recommendations reported by financial analysts provide important information to market participants (i.e., debt holders and equity holders) to mitigate information asymmetry. For the full sample, the negative coefficient (-0.014) of analyst coverage indicates that a lower analyst coverage leads to higher likelihood of equity issue relative to debt issue, implying that firms covered by fewer analysts issue equity more frequently. The explanatory power of incremental analyst coverage is statistically and significantly consistent with that of analyst coverage on probability of equity issue to debt issue. This could not be explained by static pecking order theory.[51] However, this finding is, to some extent, not surprising. For example, Leary and Roberts (2010) document in their estimation that more than two thirds of their sample firms prefer internal funds to external financing and less than one fifth of those follow a pecking order in choosing between debt and equity.[52] Unlike Chang et al (2006) and Bessler et al (2011), who find that information asymmetry explains external financing decisions in the pecking order, in our study the effect of the main explanatory variable (i.e., information asymmetry) on the choice of security to issue is not explained by the pecking order theory we test if information asymmetry affects the choice of security to issue after controlling for the effects of

[51] The finding is against the work of many authors (e.g., Hovakimian et al., 2001; Chang et al., 2006; Ang and Cheng, 2011; Naranjo et al., 2012).
[52] The sample covers 34,470 firm-year American observations over the period 1980-2005.

other (control) factors. Given that we test if information asymmetry affects the choice of security to issue after controlling for the effects of other (control) factors, we now focus on control variables for the choice of security to issue.

The negative sign on debt ratings means that firms with no debt ratings are more likely to issue equity as firms without debt ratings have restricted access to debt markets, other things being equal, and choose to issue equity (Faulkender and Petersen, 2006; Lemmon and Zender, 2010). Conversely, those with debt ratings take advantage of debt capacity to raise external capital and prefer to issue debt. We find that price run-up prior to the announcement of equity issue has a significantly positive effect on the probability of equity issue to debt issue in our results.

Our results are supported by existing studies. Welch (2004) argues that stock price shocks are likely to play a more important role in explaining the choice between debt and equity than other existing identified variables. This can be explained by the market timing model (Baker and Wurgler, 2002) where managers of the firm postpone issuing equity to finance profitable projects if the firm is undervalued. Whilst awaiting to undertake the project, the share price increases either because the market receives positive news about the project one period later or the firm has obtained more profitable opportunities one period later (Bessler et al., 2011). Price run-up may also be associated with lower levels of information asymmetry as the positive share price performance may be boosted by time-varying lower information asymmetry (Lucas and McDonald, 1990). Given the positive association of term spread with economic performance and profitable opportunities (Antoniou et al., 2008a), the positive coefficient of term spread in our results means that equity issuance increases with term spread. The favourable market condition triggers an increase in equity issue.

An absolute value of the capital expenditure coefficient appears as 2.056, which shows a change of 2.056 units on equity issue with one unit capital expenditure, other things being equal. The negative sign of capital expenditure shows a negative relationship between probability of equity issue to debt issue and growth opportunities. Bessler et al. (2011) argue that growth opportunities are relevant to misevaluation and potential timing considerations. Higher growth opportunities may indicate overvaluation that firms tend to issue equity relative to debt. Early studies demonstrate that highly levered companies are more likely to pass up profitable investment opportunities (e.g., Myers, 1977). Hence, those firms that are expecting high future growth will use a greater weight of equity finance when their share price is high relative to earnings or book value (Leary and Roberts, 2010). Furthermore, Agarwal and O'Hara (2007) also argue that growth opportunities have a negative effect on a firm's debt issue. Firms with high growth or good investment opportunity sets are not likely to favour the disciplinary role of debt to restrict the problems associated with excess free cash flow and, thus, would appear to issue equity. Profitability with a negative sign also shows significance in explaining the probability of equity issue relative to debt issue. It is argued by Harris and Raviv (1990) that debt issue can reduce agency cost of free cash flow if managers work in the interests of current shareholders and make the correct investment decisions to mitigate bankruptcy risk. Conversely, such firms could also benefit from higher leverage in terms of the larger interest tax shields available, lower probability of financial distress and reduction of agency costs (Jensen, 1986). On the supply side, credit suppliers should be more willing to lend to firms with current cash flows (Rajan and Zingales, 1995).

Therefore, our results for the full sample do not support *Hypothesis 2.2;* however they lead to elaboration to research question (4). In the data it is evident that the level of information asymmetry does not drive debt issue against equity issue. This violates the pecking order theory. Significant analyst coverage and analyst coverage residual also indicates that information asymmetry is an important determinant of external financing decisions although it does not relate a pecking order to security issues for the full sample. Equity issuers are firms with higher information asymmetry, firms with no debt ratings, firms issuing with good term structure of interest rates, firms with lower growth, and firms with low profitability.

Table 2.5 Debt/Equity Choice and Information Asymmetry

	Full sample				Sub-sample 1		Sub-sample 2		Sub-sample 3		Sub-sample 4		Sub-sample 5	
Equity Issue Dummy	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z
Analyst coverage(AC)	-0.014	(-4.94)***			0.311	(1.66)*	0.089	(1.89)*	0.067	(4.14)***	0.027	(3.84)***	0.004	(0.96)
AC_residual			-0.120	(-16.49)***										
Profitability	-0.986	(-16.08)***	-0.734	(-12.02)***	-0.905	(-7.45)***	-0.562	(-4.77)***	-0.102	(-0.85)	0.455	(2.35)**	-0.613	(-1.93)*
Tangibility	-0.012	(-4.95)***	-0.008	(-3.41)***	-0.010	(-1.56)	-0.059	(-0.78)	-0.098	(-1.17)	-0.202	(-2.34)**	0.112	(1.03)
Book leverage	-0.605	(-8.28)***	-0.494	(-6.88)***	-0.068	(-0.93)	-0.629	(-3.86)***	-1.038	(-5.5)***	-1.093	(-6.01)***	-0.626	(-2.96)
Age	-0.024	(-18.72)***	-0.022	(-16.63)***	-0.034	(-5.72)***	-0.036	(-9.24)***	-0.029	(-9.02)***	-0.016	(-5.89)***	-0.006	(-2.74)***
Cash	4.460	(43.91)***	4.684	(45.37)***	1.775	(7.34)***	3.767	(17.44)***	4.883	(22.79)***	5.664	(24.99)***	4.376	(15.78)***
Capital expenditure	-2.056	(-11.46)***	-2.065	(-11.55)***	-1.231	(-3.34)***	-2.468	(-5.94)***	-2.206	(-5.02)***	-1.477	(-3.25)***	-2.284	(-3.44)***
Deviation from target	-0.085	(-0.99)	-0.601	(-6.57)***	-1.504	(-7.24)***	-0.669	(-3.6)***	0.371	(1.88)	1.026	(5.06)***	1.718	(7.08)***
Share price performance	0.006	(5.11)***	0.007	(5.54)***	0.034	(2.08)**	0.047	(6.07)***	0.019	(4.89)***	0.007	(2.98)***	0.003	(2.07)**
Term structure of interest rates	0.129	(10.84)***	0.133	(11.1)***	0.108	(2.99)***	0.077	(2.81)***	0.106	(4.16)***	0.131	(5.27)***	0.276	(9.86)***
Volatility	0.008	(2.41)**	0.006	(2)**	0.005	(0.83)	0.009	(1.33)	0.005	(0.62)	0.004	(0.46)	-0.005	(-0.56)
Debt rating	-0.645	(-15.95)***	-0.319	(-7.08)***	0.000		0.000		0.281	(1.32)	-0.131	(-1.66)*	-0.116	(-1.56)
Intercept	-0.071	(-1.63)	0.012	(0.27)	0.973	(8.62)***	0.525	(5.27)***	-0.129	(-1.28)	-0.830	(-8.08)***	-1.739	(-12.63)***
Pseudo-R2(%)/firm-years	21.89/28,553		22.53/28,553		11.65/3,662		18.74/5,620		21.99/6,213		18.67/6,537		9.07/6,520	

This table shows the choice between debt and equity. Data are collected from Compustat, CRSP, I/B/E/S, and Federal Reserve for the period of 1990 to 2011. The full sample is equally split into five sub-samples according to market capitalization at the beginning of the fiscal year. The dependent variable equals 1 if equity is issued and debt is not issued in a given year, otherwise 0. Firms are defined as issuing firms when the net amount issued divided by the book value of assets at the beginning of the fiscal year exceeds 1%. Equity issues equals the sale of common and preferred stock minus the purchase of common and preferred stock, and debt issues equal long-term debt issuance minus long-term debt reduction plus changes in current debt. *Analyst coverage* is defined as the number of analysts following a firm who make annual earnings forecasts in any month over a 12-month period prior to issue decisions. *Tangibility* is the ratio of net PPE to book value of total assets at the beginning of the fiscal year. *Profitability* is the ratio of operating income before depreciation, to total assets at the beginning of the fiscal year. *Book leverage* is the ratio of total debt (debt in current liabilities + long-term debt) to total assets. *Capital expenditure* is the ratio of capital expenditure to total assets. *Stock volatility* is the standard deviation of the daily stock return for the past 12 months prior to the announcement of issue. *Term structure of interest rates* equals to the difference between the month-end yields on ten-year government bond and the one-year treasury-bills, with a six-month lag, matched to the month of a firm's fiscal year-end. *Deviation from target leverage* is the deviation of a firm's market leverage minus median value of total debt to market value of assets by SIC code and by year. *Debt rating* equals 1 if the firm has a debt rating assigned by Standard & Poor, 0 otherwise. *Share price performance* which is the annual change in the share price is matched to the month of the firm's fiscal year end. *Age* is the number of years since a firm's data became available on Compustat. Cash equals the ratio of cash or cash equivalent and short-term investment to total assets. All variables are lagged one period. Coef is abbreviated for coefficients. Standard errors are robust to heteroscedasticity and clustered. Z-statistics that are respectively marked with *, **, and *** indicate coefficient significance at 10%, 5%, and 1% level.

In the sub-samples, we find different signs on the measure of information asymmetry from that for the full sample. The coefficients of analyst coverage for smaller firms as shown in *sub-sample 1*, *sub-sample 2*, and *sub-sample 3* present significant positive values of 0.311, 0.089, and 0.067 respectively, which mean that among smaller firms probability of equity issue has an increasing function of analyst coverage. This illustrates that the probability of issuing equity to debt is negatively related to the level of information asymmetry. Conversely, debt is preferred to equity among firms experiencing severe information problems, which is consistent with the assumptions of pecking order theory. Our results indicate that information asymmetry is more severe among smaller firms. This is in line with the work of Hovakimian et al. (2001), Chang et al. (2006), and Bessler et al. (2011). We present the following arguments to explain our results.

According to Draper and Paudyal (2008), information dissemination activities are more active among firms with higher analyst coverage. Analysts collect information, analyse data, and disseminate valuable information to clients, thus ensuring that the value of the firm is attained with equilibrium and firm information is visible to the market, attracting more attention from the equity market. Moreover, firms with fewer analysts following have more severe asymmetric information problems, which is unfavourable to attract investment in the equity market. However, debt issue, which is safer than equity issue, incurs lower adverse selection cost (Myers and Majluf, 1984) for firms with lower analyst coverage. Therefore, the results suggest that firms with higher levels of information asymmetry prefer debt to equity. This supports *Hypothesis 2.2: Firms with higher (lower) information asymmetry prefer to issue debt (equity) rather than equity (debt) when they need to raise external capital*. The effect of information asymmetry on the probability of issuing equity to debt (in magnitude) weakens among larger firms, becoming insignificant among largest firms. At this stage, recall the negative sign of analyst coverage coefficient for the full sample, which may be explained by the fact that the largest firms experience weak or no information asymmetry problems and prefer equity to debt. This, in turn, provides evidence that is consistent with the dynamics of pecking order theory. Chang et al. (2006) and Bessler et al. (2011) also argue that when firms have lower information asymmetry, they prefer to issue equity and issue a larger volume of equity.

Among control variables for sub-samples, age, cash ratio, capital expenditure ratio, share price performance, and term structure of interest rates have significant effects on the choice of security to issue.[53] Age and capital expenditure ratio have negative effects on equity issue probability, and share price performance and term structure have positive effects on equity issue probability. The probability of equity and firm age are inversely related. This contradicts the findings of Bessler et al. (2011) who show absence of relation between firm age and the probability of equity issue. According to Frank and Goyal (2007), older firms have a better reputation in debt markets and face lower debt related agency costs, and tend to issue debt. Diamond and Verrecchia (1991) argue that older firms have more established and time-tested financing policies and practices, and tend to issue debt as they face lower issuing cost compared to young firms. An inverse relationship between capital expenditure ratio and probability to issue equity can be explained by pecking order theory. Capital expenditure directly increases the financial deficit as measured in the work of Shyam-Sunder and Myers (1999) and Frank and Goyal (2003b). Should profitability be unchanged, the firm should accumulate more debt to cover the need for growth opportunities. We find that the probability of issuing equity increases with share price performance which is a measure of the stock market conditions. Welch (2004) discusses that the capital structure of the firm is not rebalanced. Firms take advantage of mispricing: if the stock is under-priced, managers of the firm postpone the issue of equity; if the stock is over-priced, managers of the firm issue equity and issue in a large volume (Baker and Wurgler, 2002). Whilst awaiting to undertake the project, the share price increases either because the market receives positive news about the project one period later or the firm has obtained more profitable opportunities one period later (Bessler et al., 2011). Korajczyk et al. (1990) and

[53] Debt market condition is reflected in fluctuation in term structure interest rate such that firms turn to issuing equity in order to avoid expensive adverse selection cost in obtaining debt. More practically, managers work for maximizing shareholders' interest if current shareholders could benefit from equity issue that outweigh cost of equity or excess return is possible to gain. The positive effect of share price (coefficient 0.006) on equity issue can be explained as that firms may postpone equity issue if the firm is undervalued and stock price is usually higher prior to equity issuer for firms postponing favourable projects (Baker and Wurgler, 2002; Antoniou et al., 2008a; and Autore and Kovacs, 2010).

Bayless and Chaplinsky (1991) argue that equity issue is followed by positive share price performance as the positive movement of share price is associated with time-varying lower information asymmetry. Table 2.5 also shows probability of equity issue to debt issue as an increasing function of term structure. Antoniou et al. (2008a) argue that term spread signals a booming economy and profitable investment opportunities, thus leading to equity issue. Profitability has a consistently negative effect on the tendency to issue equity among firms experiencing high levels of information asymmetry. Output results show significant negative coefficients on profitability (-0.905 and -0.562 for *sub-sample 1* and *sub-sample 2* respectively). This means that the effect of profitability on the choice of security to issue is decreasing for larger firms. For smaller firms, higher profitability means lower expected costs of financial distress than counterparts, thus benefiting more from interest tax shields (Lemmon and Zender, 2010). These firms also find discipline provided by debt issue more valuable as smaller firms are likely to have more severe cash flow problems (Jensen, 1986). Interestingly, deviation from target affects the choice to issue equity negatively significantly for *sub-samples 1* and *2* and positively significantly for *sub-samples 3*, *4*, and *5* although the coefficient for the full sample is insignificant. This suggests that when the level of information asymmetry is high, the larger the difference between the firm's leverage and the market level, the less likely the firm will issue equity. One interpretation is that managers of the firm may contemplate the firm's leverage with the industry. Smaller firms are likely to analyse their own leverage level with the industry to correct the direction of corporate development (Hovakimian et al, 2001). According to Frank and Goyal (2007), another interpretation may be that the industry average level reflects a set of other correlated but omitted considerations such as market interactions, business risk, or technology. Trade-off theory predicts that the larger the deviation from industry average level, the more debt is preferred. Large firms that are likely to be leaders of the industry in market interactions, business risk, technology, and nature of competition, tend to issue security to balance long-term target leverage.

Therefore, regarding the effect of information asymmetry on the choice between debt and equity, we summarize that *"Hypothesis 2.2: firms with higher (lower) information asymmetry prefer to issue debt (equity) rather than equity (debt) when* *they need to raise external capital"* is rejected for the full sample. However, we find evidence to statistically support *Hypothesis 2.2* for sub-samples of smaller firms that have more severe information asymmetry problems. We also summarize that older firms, firms that have a cash demand, firms that have more investment opportunities, firms experiencing price drop, and firms observing term structure of interest rates decrease, prefer debt to equity.

2.7.3 Abnormal Return, Issue Size and Information Asymmetry

Univariate Analysis

If the predictions of pecking order theory hold then the issuers of equity with high levels of information asymmetry should experience more severe stock price drops on the announcement of equity issue relative to those with low levels of information asymmetry. Firms characterised by information asymmetry avoid equity issues if possible. When the level of information asymmetry is lower, they choose to issue equity more often and when they issue they issue a large volume since they anticipate constrained equity issue in the future (Chang et al., 2006). Hence, equity issue at a low level of information asymmetry triggers an increase in stock price. We use univariate analysis to examine the stock price performance of the firm around the announcement of equity issue. This is to test *Hypothesis 2.3: Among equity issuers, firms with higher (lower) levels of information asymmetry experience larger (smaller) drops in share price* and to elaborate research *question (5) is market reaction to the choice of security to issue dependent on the level of information asymmetry*?

Table 2.6 presents results from the estimates of abnormal returns around the announcement of equity issue. The event window is the period of trading days over which abnormal returns are calculated. In the case of one day event window, only the event day itself will be included. The event day is the day a new announcement is made, and event window is an interval of varying length surrounding the event day. The majority of previous studies (e.g., Brown and Warner, 1985) document that if event studies are focused on a single day abnormal returns the means of all tests are centred to zero. In other words, a single day event window would lead to tremendously different results. Literally, in the case of focus on event day only, the event window is [0] and there is no "event window". Hauswald (2003) also argues that zero day event window causes problem of fully capturing the event-specific events. Instead, longer event windows capture the significant effect of the event. However, when the event window is wider, the mean value deviates from zero.

We find that abnormal returns of the firm around equity announcement periods for the full sample of equity issuers are positive (0.330% for the five-day window and 0.717% for eleven-day window). This indicates that the announcement of equity issue enhances firm value around announcement date, namely, firms gain. This further reflects that when an equity issue announcement enhances firm value, the announcement associates with more favourable information about risk and firm value disclosed to the market. Unlike prior studies, the evidence of positive returns over announcement period suggests that equity issue does not always convey "bad news". According to Cooney and Kalay (1993), if the firm has no information asymmetry problem (i.e., the market has recognized the value of the firm) and the firm raises capital to finance a positive NPV project the market reaction is expected to be positive. One possible explanation is that the NPV of the project is higher than the share price discount which is caused by the perceived bad news, thus leading to net benefit. Moreover, the average abnormal return over the announcement period for full sample masks the effect of information. Another explanation is that the overall economic conditions are favourable and firms have an increasing number of positive NPV projects, thus leading to positive abnormal returns. Additionally, we find a higher abnormal return in a wider window than that in a narrower window. This indicates that the market takes time to digest the effect of news and react slower to equity issue.

For firms with a high analyst coverage (i.e., low information asymmetry), the mean value of abnormal returns is negative for large issuers although insignificant abnormal returns are observed for the full sample. This implies that, in general, issuing equity at low levels of information asymmetry does not necessarily affect the value of the firm. However, this is plausible because for such firms the announcement of issue does not signal any good or bad news. Our results show stable changes in different windows for large issues: -0.025% drops on the stock price for the five-day event window and -0.023% drops on the stock price for the eleven-day event window. We summarize explanations of our results as follows.

Table 2.6 Abnormal Return, Issue Size and Information Asymmetry

				Equity Issue Size			
				Small Issue		Large Issue	
All			t-stat.		t-stat.		t-stat.
5 (-2 to 2) days	Mean	0.330**	2.182	0.629	0.950	0.184	1.139
11 (-5 to 5) days	Mean	0.717**	2.343	1.409	0.968	0.401	1.343
	N	5,167		582		1,383	
Size (small)							
5 (-2 to 2) days	Mean	0.561**	1.994	-0.027***	-2.905	0.508	1.315
11 (-5 to 5) days	Mean	1.107**	1.988	-0.050***	-3.453	0.967	1.351
	N	2,231		209		576	
Size (large)							
5 (-2 to 2) days	Mean	0.155	0.975	0.996	0.965	-0.048***	-4.469
11 (-5 to 5) days	Mean	0.420	1.262	2.226	0.980	-0.002	-0.051
	N	2,936		373		807	
Analyst coverage (low)							
5 (-2 to 2) days	Mean	0.431**	2.026	-0.028***	-4.546	0.261	1.181
11 (-5 to 5) days	Mean	0.914**	2.191	-0.039***	-4.350	0.559	1.365
	N	3,200		306		1,008	
Analyst coverage(high)							
5 (-2 to 2) days	Mean	0.166	0.849	1.356	0.972	-0.025***	-3.644
11 (-5 to 5) days	Mean	0.396	0.920	3.014	0.982	-0.023**	-1.977
	N	1,967		276		375	

This table shows results from event study on post-issue performance around announcement period. Data are collected from CRSP, Compustat, and Thomson One Banker for the period of 1990 to 2011. Announcement period abnormal return to all equity issuers are reported for two windows surrounding the announcement day (five days and eleven days). "Equity Issue Size" refers to the ratio of net equity issued to book assets. Net equity issued is the sale of common stock minus the purchase of common stock. "Small Issue" refers to those equity issue sizes exceeding 1% and up to 10% of total assets at the beginning of the fiscal year. "Large Issue" refers to those equity issue sizes exceeding 10% of total assets at the beginning of the fiscal year. "N" is the number of equity announcement events. The abnormal return equals realized return for firm i at time t minus the realized return for the market at time t. Firms that have capitalization less/more than median value are classified in "size (small/large)". Analyst coverage (low/high) describes the number of analysts following a firm, and low/high analyst coverage group covers firms with number of analysts following less/more than median value. T-test of mean equal to zero versus not equal to zero is applied to examine the significance of the abnormal return. The mean value is tested for those equity issues with announcement dates available from Thomson One Banker. Mean significant at 1%, 5%, and 10% are marked respectively as ***, **, and *.

According to Korajczyk et al. (1991) rational investors, in general, value firms correctly, but single cases could be mispriced, contingent on managers' private information. Assuming that managers of firms act in the interests of existing shareholders, overpriced firms have an incentive to sell new equity, but convey unfavourable information to the market with the announcement of equity issue. Thus, the stock price of the firm drops. Lucas and McDonald (1990) argue that the market value of the firm may be mispriced temporarily by the market. However, the misevaluation is to be corrected by the market over time after announcement of equity issue, thus leading to share price drop. Additionally, implications of the market timing theory (Baker and Wurgler, 2002) also add explanation to our results. Market timing theory predicts that firms may postpone equity issue to finance profitable investment opportunities if firm values are undervalued and make choice of equity to issue if firm values are overvalued. Delaying an equity issue is, however, costly and lowers the net present values of profitable opportunities. Hence, equity issue at a large volume signals the possibility of misusing raised capital and causes stock price drop. The interpretation about the stable change is that firms with high analyst coverage are likely to be seen as information transparent. Analysts following these firms have undertaken sufficient data collection, analysis and dissemination activities to attract the attention of the market. The values of these firms are attained at their equilibrium levels (Draper and Paudyal, 2008). Hence, the announcement of equity issue leads to stable change for the five-day window abnormal return and eleven-day window abnormal return. Furthermore, the announcement of equity issue does not necessarily convey additional news that the market did not know as possible investment projects of transparent firms are already known to the market and have been incorporated in the share price prior to the announcement of equity issue. Therefore, as far as low information asymmetry firms are concerned lack of significant abnormal returns over the announcement period is consistent with theoretical expectations.

Surprisingly, for those followed by fewer analysts, equity issue decisions boost their firm value. Equity issuers make a gain of 0.431% and 0.914% for the five-day announcement period and for eleven-day announcement period respectively. This is not consistent with pecking order theory. According to Lucas and McDonald (1990), the stock price increase after announcement of equity issue when information asymmetry is high can be explained from two aspects. On the one hand, managers anticipate an increase in issuing costs and a lower net present value of profitable investment opportunities if equity issue is postponed, thus issuing equity when there are profitable investment opportunities although equity issue conveys information on the value and risk of the firm. As the market receives favourable information, the valuation of firms with low analyst coverage tends to increase. On the other hand, although the level of information asymmetry is measured high in the data it is likely the asymmetry information problem is temporarily less severe at the announcement of equity issue. The market will not penalize the equity issue of the firm. Hence, the valuation of equity issuers may be increased.

When issuing a small amount of equity relative to firm value, negative abnormal returns are found in the results. Our results show a more severe stock price drop in the wider window (eleven days). This suggests that the slower a market responds to equity issue the more severe the stock price drops as the market takes time to digest the effect of news. Firms with low analyst coverage are constrained by the ability to issue frequent equity (Chang et al., 2006). When the market conditions are favourable and leverage is higher than the unconstrained optimal level, these firms issue equity in large amounts. This implies that issuing equity in a small amount may signal the ability to issue equity at a large volume as well as limited information on the value and risk of assets disseminated by analysts to the market. Hence, the market penalizes firms issuing equity at a small volume when the level of information asymmetry is high.

Positive abnormal returns on average are seen among small firms. The wider window shows better firm performance after announcement of equity issue. This cannot be explained by pecking order theory. Myers and Majluf (1984) argue that small firms have a relatively more severe adverse selection problem and they receive negative response on stock price when equity issue is announced. However, at the univariate analysis stage, price drop after announcement of equity issue can be in relation to other explanations. One possible interpretation is that if the market can observe the arrival of firms' profitable investment opportunities, these firms are likely to experience an increase in stock price when they issue equity to finance these profitable opportunities (Korajczyk et al., 1991). Shleifer (1986) contends that firms added to a stock index such as the S&P 500 experience increases on stock price if they demand new capital from the market. These are not restricted to large firms. Frank and Goyal (2007) discuss that old firms have better reputations in the market than younger firms and face lower agency costs, and may experience price climb when they raise equity capital. Additionally, Korajczyk et al. (1991) add that a rising price among small firms after announcement of equity issue may arise from such naive trading rules as issuing equity when the market is in positive conditions or issuing after price run-up applied by managers of the firm.

Furthermore, taking a closer look at the number of observations, a larger number of firms choose to issue equity when they are followed by fewer analysts. Specifically, 3,200 firms issued equity at low analyst coverage, and 1,967 firms issued equity at high analyst coverage. When firms issue equity they tend to issue a large volume. This is consistent with the findings of Frank and Goyal (2003b), Chang et al. (2006), Frank and Goyal (2009), and Leary and Roberts (2010) where equity issuance appears among firms with high levels of information asymmetry although it violates the pecking order theory. When they issue equity, they choose a large issuance. Given that firms that have lower levels of information asymmetry but are unable to issue equity, when the market conditions are favourable and they are able to issue equity, they choose to issue large amounts.[54] In other words, firms that have more analysts following are likely to issue small amounts of equity but more frequently. This suggests that information asymmetry does not necessarily drive financing decisions with a pecking order, which is consistent with the work of Fama and French (2005). However, other factors are to be regarded as driving factors of financing decisions (Frank and Goyal, 2009). We will further explore the reasons behind changes in stock price after announcement of equity issue in the multivariate analysis.

[54] This is based on the pecking order hypothesis. In the absence of information asymmetry, firms choose to issue equity instead of debt. Large equity issue is defined as net equity issued exceeding 10% of book assets and small equity issue is defined as net equity issued between 1% and 10% of book assets.

Multivariate Analysis

Multivariate analysis is designed to examine the reliability of the findings of univariate analysis that equity issues do not result in an increase in stock price on announcement of equity issue when information asymmetry is high. This framework is also used to test *Hypothesis 2.3: among equity issuers, firms with higher (lower) levels of information asymmetry experience larger (smaller) drops in share price*.

The results of multivariate analysis for cumulative abnormal return and information asymmetry based on multivariate framework (*Equation (2.7)*) are reported in Table 2.7. The information asymmetry measure is insignificant in either analyst coverage, as information asymmetry measures, or residual values of analyst coverage as measures for the full sample, implying no effect on CAR. Noticeably, the positive coefficient of stock volatility for the full sample suggests that risk increases CAR around the announcement period. Our results neither support the pecking order explanation nor the equilibrium of Bolton and Freixas (2000). The pecking order explanation predicts that firms with volatile cash flow face more severe adverse selection problems and experience stock price drop when they issue equity at high volatility (Frank and Goyal, 2007). Bolton and Freixas (2000) discuss that under equilibrium levels on the market value firms with the highest risks are unable to access external capital markets or have constraints on equity issue, thus issuing bank debt as a preferential instrument in terms of flexibility offered by bank creditors. If firms insist on equity issue at high volatility, the value of the firm will be at the disequilibrium level, and the market should penalize the firm with a fall in stock price. Conversely, there are interpretations supporting our results. Jung et al. (1996) and Autore and Kovacs (2010) demonstrate that volatility increases distress cost so that cash flow is volatile and less likely to pay off promised bond payments, and equity issuance decisions will be made, thus being rewarded by a positive excess return over the announcement period.

Moreover, Bessler et al. (2011) provide a supporting point that equity issue should lead to positive response in the market as equity issue absorbs cash flow risk. Additionally, trade-off theory also offers an interpretation of the positive signs of volatility (Frank and Goyal, 2007). According to Frank and Goyal (2007), high volatility reduces the probability that tax shields will be utilized. High volatility could harm stakeholders' co-investments. Given the trade-off theory, firms should issue less debt but more equity. Hence, it is possible that equity issuances increase share price.

The effect of volatility on CAR for small issue size is weaker than that for large issue size. Equity issue at a small volume can be interpreted as constrained attention being attracted (Draper and Paudyal, 2008). This may be due to a complicated set of factors beyond information asymmetry although we have controlled for all firm characteristics. According to Autore and Kovacs (2010), equity issue at a smaller volume is due to the higher expected cost of financial distress and higher possibility of non-payment of promised bonds. Issue equity at a smaller volume also implies that fewer cash flow risks have been absorbed with equity issue (Bessler et al., 2011), thus resulting in weaker bounce on stock price compared to larger issue size.

Profitability, which is another factor showing significance in the test, has a negative effect on CAR for the full sample. This illustrates that firms experience a negative response on stock price in the market and firms with lower profitability make more gain from equity issue. This finding is against the explanation of the pecking order theory, which predicts that firms facing financial deficit tend to raise external capital in the means of equity as more profitable firms experience less severe adverse selection. Consequently, equity issues by profitable firms signal positive information to the market, thus increasing the stock price of the firm.

Conversely, results from multivariate analysis can be explained by the idea that firms with higher profitability issuing equity may experience more agency cost of free cash flow if managers prioritise their benefits rather than maximize shareholders' interests (Harris and Raviv, 1990; Leary and Roberts, 2010). Lucas and McDonald (1990) argue that managers of a profitable firm may postpone equity issue to finance profitable investment opportunities if the firm is undervalued.

However, postponing an equity issue decision is costly and lowers net present value of profitable investment opportunities. In the extreme, existing investors may withdraw their investment in the firm, thus leading to a stock price drop. On the other hand, although the market can value the firm correctly, in general, a firm could be mispriced temporarily. An equity issue can then cause depreciation on the value of the firm.

Table 2.7 CAR, Issue Size, and Information Asymmetry

	Full Sample				Small issuers		Large issuers	
CAR	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Analyst coverage(AC)	-0.001	-0.01			-0.089	-0.46	0.008	0.18
AC_residual			0.041	0.06				
Profitability	-2.241***	-3.27	-2.249***	-3.24	-2.844***	-3.24	0.412	0.29
Tangibility	-0.227	-0.31	-0.228	-0.31	-0.592	-0.39	-0.454	-0.61
Book leverage	0.217	0.18	0.205	0.16	2.107	1.04	-1.443	-0.98
Age	-0.003	-0.11	-0.003	-0.13	0.030	0.61	-0.022	-0.95
Cash	-0.983	-0.83	-0.992	-0.84	-0.274	-0.15	-0.643	-0.39
Capital expenditure	-1.969	-0.57	-1.973	-0.57	-0.774	-0.13	-1.937	-0.50
Deviation from target	1.776	1.04	1.824	0.98	0.259	0.09	5.520**	2.39
Share price performance	0.021	1.15	0.021	1.14	0.095	1.49	0.015	0.90
Term structure of interest rates	-0.097	-0.48	-0.096	-0.48	-0.054	-0.17	-0.128	-0.53
Volatility	0.406***	6.42	0.406***	6.43	0.300***	3.37	0.576***	6.26
Debt rating	0.023	0.03	-0.003	0.00	-1.015	-0.6	0.236	0.33
Intercept	0.850	1.04	0.83	0.94	0.08	0.06	1.29	1.17
R-Squared(%)	1.86		1.86		1.98		2.91	
N	3,248		3,248		1,613		1,635	

This table shows the results from multivariate analysis of the announcement period effect. Data are collected from CRSP, Compustat, and Thomson One Banker for the period of 1990 to 2011. The sample is split into two size sub-samples according to the market capitalization at the beginning of the fiscal year. Small/large size includes firms shere market capitalization is less/more than the median value. Announcement period abnormal return to all equity issuers is reported for the window surrounding the announcement day (two days) by two size sub-samples. "N" is the number of observations. *Analyst coverage* is defined as the number of analysts following a firm who make annual earnings forecasts in any month over a 12-month period prior to issue decisions. *Tangibility* is the ratio of net PPE to book value of total assets at the beginning of the fiscal year. *Profitability* is the ratio of operating income before depreciation, to total assets at the beginning of the fiscal year. *Book leverage* is the ratio of total debt (debt in current liabilities + long-term debt) to total assets. *Capital expenditure* is the ratio of capital expenditure to total assets. *Stock volatility* is the standard deviation of the daily stock return for the past 12 months prior to the announcement of issue. *Term structure of interest rates* equals the difference between the month-end yields on ten-year government bond and the one-year treasury-bills, with a six-month lag, matched to the month of a firm's fiscal year-end. *Deviation from target leverage* is the deviation of a firm's market leverage minus median value of total debt to market value of assets by SIC code and by year. *Debt rating* equals 1 if the firm has a debt rating assigned by Standard & Poor, 0 otherwise. *Share price performance* which is the annual change in the share price is matched to the month of the firm's fiscal year end. *Age* is the number of years since a firm's data are available on Compustat. *Cash* equals the ratio of cash or cash equivalent and short-term investment to total assets. All variables are lagged by one period. Note that the observations only cover equity issues whose announcement dates are available in the Thomson One Banker database. Standard errors are robust to heteroscedasticity and clustered. Coefficient significant at 1%, 5%, and 10% are marked respectively as ***, **, and *.

Furthermore, with respect to tax and expected cost of financial distress and bankruptcy, profitable firms prefer debt to equity as profitable firms benefit more from interest tax shield and experience lower expected costs of bankruptcy (Rajan and Zingales, 1995; Antoniou et al., 2008a). Issuing equity incurs additional costs to the firm, leading to negative performance to the firm. Therefore, we are unable to summarize that the change in value of the firms and the level of information asymmetry are inversely related and our findings reject *Hypothesis 2.3*.

2.7.4 Long-term Performance of Equity Issuers

If the observed cumulative abnormal returns over the period of equity issue announcement reflect the long-run effects of information asymmetry on the performance of the firm, then we should expect no significant difference in the long-term performance of equity issuers regardless of the size of equity issues. Otherwise, we would observe significant difference in the long-term performance of equity issuers from announcement period performance. To test the long-term performance of equity issuers, we use the calendar-time model as specified in *equation (2.8)* for one- and five-year holding periods. We aim to provide analysis for research *question (5) "is market reaction to the choice of security to issue dependent on the level of information asymmetry?"* and *Hypothesis 2.3: among equity issuers, firms with higher (lower) levels of information asymmetry experience larger (smaller) drops in share price*. The results of calendar-time estimations for the full sample and classified issue size sub-samples are shown in Table 2.8. Return of equity issuers drops 0.3% on average in one year after announcement of the equity issue, and issuing at a small and large volume results in similar results (-0.293% for small issue size vs. -0.290% for large issue size). Firm performance in five years after completion of equity issue (i.e., -0.297%) remains similar as that in one year after completion of equity issue (i.e., -0.3%). In five years after announcement of equity issue, similar effects at a small (i.e., -0.297%) and large volume (i.e., -0.292%) are observed.

Table 2.8 Long Term Performance of Equity Issuers

	Full sample		Small Issuers		Large Issuers	
One year after the completion of equity issue	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.
Constant	-0.300***	(-27.62)	-0.293***	(-26.63)	-0.290***	(-26.85)
R-Squared (%)	21.71		16.91		23.49	
Cal. month	251		251		251	
N	7,113		528		1,834	
Five years after the completion of equity issue						
Constant	-0.297***	(-27.38)	-0.297***	(-27.55)	-0.292***	(-27.04)
R-Squared (%)	19.17		16.8		21.94	
Cal. month	251		251		251	
N	4,065		360		1,121	

Results from estimation of monthly abnormal return for calendar month portfolio of equity issuers, measured by the constant for one year and five years after equity announcement are reported here. Data are collected from CRSP, Compustat, and Thomson One Banker for the period 1990 to 2011. The sample is split into two size sub-samples according to the market capitalization at the beginning of the fiscal year. Small/large size includes firms that have market capitalization less/more than median value. Equity issuers enter the portfolio on the month following announcement of equity issue and remain in the portfolio for 12 and 60 months. Coef. is abbreviated for coefficient. Coefficient significant at 10%, 5%, and 1% are marked as *, **, and *** respectively.

Compared to the effects of different issue sizes, we find that the long-term performances of one- and five-year holding periods are surprisingly consistent. The evidence of long-term performance after equity issue announcement contradicts the abnormal returns over the announcement period, which sees positive responses in the market. Our results show that the performance of equity issuers within the small issue sub-sample and large issue sub-sample are consistent with the full sample in the data in the one-year holding period and subsequent years. The evidence of long-term post performance of equity issue is not supportive to the argument of Chang et al. (2006) that, in spite of no adverse selection cost, the ability in issuing equity may be limited. When the market is favourable firms do issue equity, and choose to issue large amounts to fund under-investment projects. The expected share price in the long-run reflects the normal return. If the efficiency market hypothesis holds, we do not expect any abnormal return. If those that raise equity capital will have invested in profitable projects, all else equal, there are no expected changes in share price in the long-run. This holds on the assumption of market efficiency and symmetric information. Conversely, adverse performance after completion of equity issue in the long term can be explained in three ways. Firstly, Spiess and Affleck-Graves (1995) assume that external investors are optimistic about issuing firms' prospects at the announcement of equity issue but under-react to the information conveyed to the market. Over time after completion of equity issue, more valuable information will be disseminated to the market, and firms that time equity issues to take advantage of "windows of opportunity" to issue overpriced equity will experience a price drop in the long term. Secondly, the contradictory difference between long-term performance and abnormal returns over the announcement period results from normal random variations that are allowed in efficient markets (Fama, 1998). Thirdly, Loughran and Ritter (1997) explain that the long-term variation from positive post-performance after announcement of equity issue is a result of behavioural tendency. According to behavioural finance theory, external investors are over-optimistic about the firms' prospects at the time of equity issue, and suffer costly sacrifice with a drop in the stock price in the long term. Another explanation is related to agency theory. Managers of the firm may pursue value-destroying strategies to invest equity capital on projects with non-positive net present value to satisfy their own interests at the expense of shareholders (Jung et al., 1996). In the long-term, with the awareness of destroying usage by external investors, the stock price drops.

Following Barbopoulos et al. (2012), estimations for buy-and-hold abnormal returns will be adopted. Multivariate analysis for BHAR with *equation (2.10)* is used to test *Hypothesis 2.3: Among equity issuers, firms with higher (lower) levels of information asymmetry experience larger (smaller) drops in share price*.

We report the estimation results in Table 2.9. Similar to the results of the multivariate analysis for CAR over the announcement period, evidence on multivariate analysis for BHAR show that all variables are insignificant except stock volatility, which has a negative statistical and a positive economic influence on equity issuers' performance in one year after completion of equity issue. The coefficient shows a huge magnitude in the role. This finding does not support the implication of pecking order hypothesis that firms issue equity when information asymmetry is low and by doing this they enhance the value of the firm. The work of Morellec and Schürhoff (2011) provides explanation for this: the reason for equity-issuing companies to make a decision is not necessarily due to adverse selection cost, but the need to fund investments in intangible assets and internally developed investment opportunities and they may not follow pecking order financing hierarchy. In this situation, risk may dominate equity financing decisions, thus influencing stock performance (both short term and long term). Tsai (2008) uses a dynamic approach and also reaches consistent results. Tsai documents that one principal motivation of equity issue, even when the firm is undervalued, is to finance a shortfall. This implies that the weight of potential on growth opportunities track more closely on financing decisions than that of the information asymmetry problem. From these points of view, it is not surprising to observe insignificant information asymmetry coefficients on both short term and long term multivariate analysis of issuers' performance. Furthermore, the evidence is under expectation since gauging the effect of equity announcement on the firm's future performance takes some years but it is difficult to isolate the effect of a single event (Fama, 1998; Gompers and Lerner, 2003; Moeller et al., 2004).

Table 2.9 Long Term Performance of Equity Issuers: Multivariate Analysis

	Full Sample				Small issuers		Large issuers	
BHAR	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Analyst coverage(AC)	-0.004	-0.04			0.006	0.15	-0.085	-0.40
AC_residual			-0.023	-0.07				
Profitability	-4.462***	-3.22	0.430	0.31	-0.238	-0.13	-2.465***	-2.77
Tangibility	-0.579	-0.39	-0.457	-0.62	-0.463	-0.68	-0.103	-0.06
Book leverage	0.582	0.23	-1.448	-0.98	-0.525	-0.38	0.794	0.37
Age	-0.009	-0.19	-0.021	-0.88	-0.015	-0.72	0.036	0.58
Cash	-2.047	-0.86	-0.626	-0.38	-0.139	-0.08	-0.645	-0.35
Capital expenditure	-4.065	-0.58	-1.865	-0.48	-1.697	-0.49	-1.915	-0.27
Deviation from target	3.305	0.96	5.458**	2.29	1.782	0.97	2.230	0.71
Share price performance	0.043	1.19	0.015	0.90	0.016	1.02	0.042	0.79
Term structure of interest rates	-0.116	-0.28	-0.133	-0.55	-0.084	-0.38	-0.051	-0.14
Volatility	-0.784***	-6.13	-0.575***	-6.26	-0.602***	-6.79	-0.317***	-3.40
Debt rating	0.137	0.10	0.284	0.37	0.351	0.58	-4.007	-0.64
Intercept	1.687	1.02	1.455	0.67	0.726	0.74	0.242	0.16
R-Squared(%)	1.74		2.91		2.82		1.70	
N	6,852		6,852		1,747		5,105	

This table shows the results from multivariate analysis of long-term performance (one year). Data are collected from CRSP, Compustat, and Thomson One Banker for the period of 1990 to 2011. The sample is split into two size sub-samples according to the market capitalization at the beginning of the fiscal year. Small/large size includes firms shere market capitalization is less/more than the median value. BHAR to all equity issuers is reported for one year after completion of equity issue by two size sub-samples. "N" is the number of observations. *Analyst coverage* is defined as the number of analysts following a firm who make annual earnings forecasts in any month over a 12-month period prior to issue decisions. *Tangibility* is the ratio of net PPE to book value of total assets at the beginning of the fiscal year. *Profitability* is the ratio of operating income before depreciation, to total assets at the beginning of the fiscal year. *Book leverage* is the ratio of total debt (debt in current liabilities + long-term debt) to total assets. *Capital expenditure* is the ratio of capital expenditure to total assets. *Stock volatility* is the standard deviation of the daily stock return for the past 12 months prior to the announcement of issue. *Term structure of interest rates* equals the difference between the month-end yields on ten-year government bond and the one-year treasury-bills, with a six-month lag, matched to the month of a firm's fiscal year-end. *Deviation from target leverage* is the deviation of a firm's market leverage minus median value of total debt to market value of assets by SIC code and by year. *Debt rating* equals 1 if the firm has a debt rating assigned by Standard & Poor, 0 otherwise. *Share price performance* which is the annual change in the share price is matched to the month of the firm's fiscal year end. *Age* is the number of years since a firm's data are available on Compustat. *Cash* equals the ratio of cash or cash equivalent and short-term investment to total assets. All variables are lagged by one period. Note that the observations only cover equity issues whose announcement dates are available in the Thomson One Banker database. Coef. is abbreviated for coefficient. Standard errors are robust to heteroscedasticity and clustered. Coefficient significant at 1%, 5%, and 10% are marked respectively as ***, **, and *.

A negative relationship between volatility and long-term firm performance can be interpreted from the following aspects. Fama and Jensen (1983) address that firms with high volatility tend to have more specific information that is unknown to external investors. Although equity issue may signal positive information to the market (Leland and Pyle, 1977; Jung et al., 1996), after completion of equity issue the firm's prospects may be disseminated to the market thus leading to negative performance to the firm. Furthermore, high volatility is associated with high expected cost of financial distress and bankruptcy (Jung et al., 1996). Although equity issues could absorb some risk as measured by volatility (Bessler et al., 2011), this could not completely eliminate such risk faced by outsiders and is likely to result in detrimental sequence to stakeholders including both existing shareholders and new investors in subsequent years (Frank and Goyal, 2007). Additionally, volatility is associated with direct communication (Ang and Cheng, 2011). Although firms cannot forecast future returns after completion of equity issue, issuing equity when stock price runs up leads to positive reactions in the market (Schultz, 2003). As volatility becomes higher, increasingly limited direct communication exists between the firm and outsiders, and the value of the firm in the long term is likely to be a decreasing function of volatility. Therefore, we summarize that the evidence of long-term performance estimations reject *Hypothesis 2.3* and we observe a negative relation between volatility and long-term performance.

2.8 Conclusion

This chapter examined the core assumption of pecking order theory where information asymmetry is an important determinant of external financing, and the influential implications of security issue choice on the value of the firm that the market penalizes the information-sensitive security issue choice given the level of information asymmetry is high. Specifically, the first part of this chapter involves a two stage examination. The first stage focused on the financing choice between internal funds and external capital and examined, when there is a need for funds for investment, whether managers prefer internal funds or external capital. The second stage of the first part focused on the choice of security to issue and examined whether a firm's choice between debt and equity is dependent on the level of information asymmetry. The second part of this chapter emphasized the post-issue performance (announcement period and long-term) and examined whether a financing decision is correct for the firm.

We conclude our findings from the following four aspects.

At first, we find that when the level of information asymmetry between managers and investors is high, firms rely on internal funds for financing financial deficit and they are less likely to make external (neither debt nor equity) financing decisions. Our findings are consistent with the prediction on the first-order of pecking order theory. We also find that firms issuing securities relative to internal funds are those with lower profitability, those with higher tangibility, those with credit ratings, and those issuing with a declining term structure of interest rates.

Secondly, regarding the choice of security to issue, results from the second stage estimations of the two-stage logit regression framework show that the probability of equity issue relative to debt issue is an increasing function of the level of information asymmetry for the full sample in the data, which is not consistent with pecking order theory. However, we find that the level of information asymmetry has a negative relation to the probability of equity issue to debt issue for sub-samples of smaller firms (*sub-sample 1, sub-sample 2, and sub-sample 3*), which is supportive of pecking order theory. The results show that information asymmetry has the strongest negative effect on the choice of equity issue relative to debt issue for the smallest firms compared to larger firms. Information asymmetry seems to have no significant influence on the choice of security to issue for the sub-sample of the largest firms. Additionally, we find that older firms, firms with cash need, firms with more investment opportunities, firms experiencing price drop prior to announcement, firms issuing with a declining term structure of interest rates, are likely to issue debt relative to equity.

Thirdly, results from univariate analysis of the subsequent performance after the announcement of security issues shows that the share price of the firm increases after the announcement of an equity issue. However, we find that the level of information asymmetry has no significant effect on firm performance after firms announce the choice of security to issue in the multivariate analysis. The results violate the implication of pecking order theory. Our results are explained by stock volatility of the firm, which is found in a positive relation to an increase in share price after announcement of equity issue in our analysis. Additionally, we find that an increase in share price of the firm after equity issue announcement is negatively related to profitability.

Finally, in the long term, we find a decrease in share price of the firm in one year and five years after completion of the equity issue. We find the amplitude of decrease in share price for one year after completion of the equity issue and for five years after completion of equity issue are similar. Our results show that there is only a weak difference in price drop between small equity issuers and large equity issuers for one year after the completion of equity issue and for five years after the completion of equity issue. We also find that firm performance in the long term cannot be explained by information asymmetry between managers and investors. However, we find that stock volatility of the firm negatively affects a decrease in share price of the firm in one year after completion of equity issue.

The contributions of this research are twofold. On the one hand, this research differentiates from others by focusing on both the core assumption and corresponding implication of pecking order theory in a single research for a correct corporate financing decision. This chapter provides new evidence to the literature of two-stage examination, of external financing, of post-issue performance. This study extends our understanding of the importance of emphasizing some aspects of a stand-alone capital structure theory as suggested by Fama and French (2005). On the other hand, we provide novel evidence to support the correct choice of security to issue to enhance firm value over the announcement period and in the long-run after completion of security issue. This adds understanding to the sequence of information asymmetry driving the choice of security to issue and of the choice of security to issue on firm performance.

Research Implications

This chapter has implications for managers of the firm. We suggest managers of small firms to be aware of the importance of considering information asymmetry between managers and investors on the corporate external financial decisions. Managers of large firms should be aware that information asymmetry between managers and investors may not have any effect on their financing decisions. Contrary to the conventional view, it also widens the understanding and recognition of firm performance responding to the announcement of equity issue beyond intrinsic information asymmetry. This suggests managers of the firm should value the long-term firm value with a comprehension of various (corporate, market, and macro) events. Additionally, managers should be aware of the relevance of the correct corporate financing decision on their performance.

From the perspective of investors, our findings imply that for those who prefer abnormal returns (either short- or long-term) other factors such as agency conflict, cost of equity issuance, or (inter)temporary variance of information asymmetry other than information asymmetry between managers and investors should be considered in the observation of investments. Investors should be aware that comprehensive analysis of the long-term firm performance should not be limited to a single corporate event but be based on various time-varying shocks from all corporate events. We suggest investors refer to relevant analyst reports that may disclose important information within their interest before making investment decisions.

Future Research

Future research on external financing and information asymmetry from various concerns can be extended. For example, external financing and information asymmetry among external investors; abnormal returns-external financing and information asymmetry using international data; and the role of other events (e.g., earnings announcement, M&A) on corporate financing decisions with the concern of information asymmetry. Additionally, alternative proxies of information asymmetry and other control variables could be examined for additional robustness.

CHAPTER THREE

DETERMINANTS OF THE SOURCES OF DEBT: WHAT MATTERS?

3 Determinants of the Sources of Debt: What Matters?

3.1 Introduction

Debt is a predominant external financing instrument among firms with external financing. The mean leverage ratio for US non-financial sectors (i.e., asset/equity) reached 2.5 prior to the 2007/2008 global financial crisis, which is at a historic high (Kalemli-Ozcan et al., 2012). Reports on increased borrowing are also appearing in the popular media. For example, Russ Koesterich, global chief investment strategist of BlackRock, writes in an article in *BlackRock Blog* (2014) that US non-financial debt has increased significantly from 227% of GDP to 250% in 2014, as shown in Figure 3-1.[55]

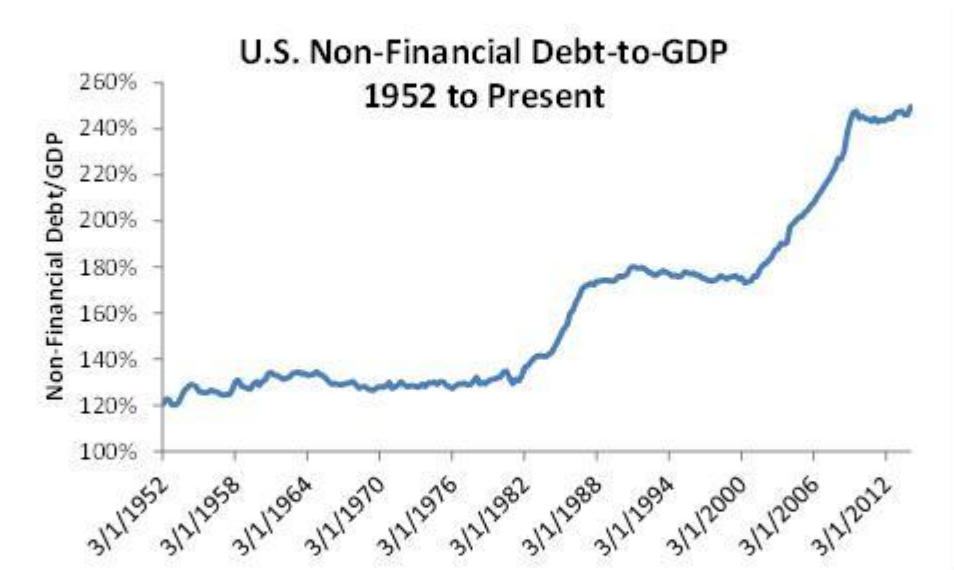

Figure 3-1 US Non-financial Debt-to-GDP

Note: Adapted from "The 'Great Deleveraging' that Never Happened: Why the US Still Has a Debt Problem" by Russ Koesterich, 2014, *BlackRock Blog*. Copyright 2014 by BlackRock Research. Adapted with permission.
This figure plots the change of average US non-financial debt-to-GDP ratio for the period between 1952 and 2014. Debt-to-GDP ratio is calculated as the sum of total debt (short-term and long-term) for all non-financial firms divided by GDP.

[55] Russ Koesterich, "The 'Great Deleveraging' That Never Happened: Why The US Still Has A Debt Problem", *BlackRock Blog*, 7 August. 2014. Web. 19 August. 2015.

Although an increase in debt financing indicates that corporations are "*more confident about taking risks as a strengthening economy makes the debt more manageable*", as pointed out in an article in *Wall Street Journal*, firms that need external financing face stark choices between raising equity capital and debt capital.[56] Myers and Majluf (1984) argue that firms experiencing information asymmetry problems tend to avoid issuing information-sensitive security (i.e., equity) and prefer to issue debt. In their model, among debt sources, safer debt is issued first, for example, bank debt is raised before public debt. Extension from debt-equity choice, which was studied in Chapter 2, to financing choice between debt sources, has produced some fruitful studies on determinants of debt claims (e.g., Denis and Mihov, 2003; Altunbaş et al., 2010). The analysis of the driving forces of debt choices among various sources is an important matter for firms. However, despite extensive research on financing mix of corporations the question "what determines the choice between the debts" is not fully addressed.

This chapter aims to fill the above void by investigating the determinants of the firm's financing decision between debt sources, specifically focusing on credit quality, information asymmetry, market factors, and macroeconomic conditions while controlling for all other firm-specific characteristics. Unlike prior studies (e.g., Denis and Mihov, 2003; Arena, 2011; Khang et al., 2015), in our analysis we include a far more comprehensive set of sources of debt, including syndicated bank loans, bilateral bank loans, public debt, traditional non-bank private debt, and 144A private debt placement.[57] Syndicated loans are distinguished with bilateral loans within the category of bank loans. The corporate debt market has developed extensively since the most recent global financial crisis (2007/2008), and syndicated loans have become a powerful substitute for corporate bonds regarding the amount of proceeds raised and the maturity period of the debt (Altunbaş et al., 2010; De Fiore and Uhlig, 2011; Gwatidzo and Ojah, 2014). We take a direct look at both syndicated and bilateral categories of bank loans,

[56] Dan Strumpf, "U.S. Firms Shoulder Rising Debt", *Wall Street Journal*, 3 May. 2015. Web. 19 August. 2015.
[57] Rule 144A allows firms to offer or resell qualifying securities to qualified institutional buyers without being constrained by the registration requirements of Section 5 of the Securities Act.

which have rarely been studied in a single research, along with alternatives including public debt, non-bank private debt placement, and 144A private debt. This chapter studies the marginal financial decisions of the firm and empirically examines the fit of incremental logistic model on a firm's choice between the five different debt sources. The position of specific debt sources for this chapter is shown in Diagram 3.1, below.[58]

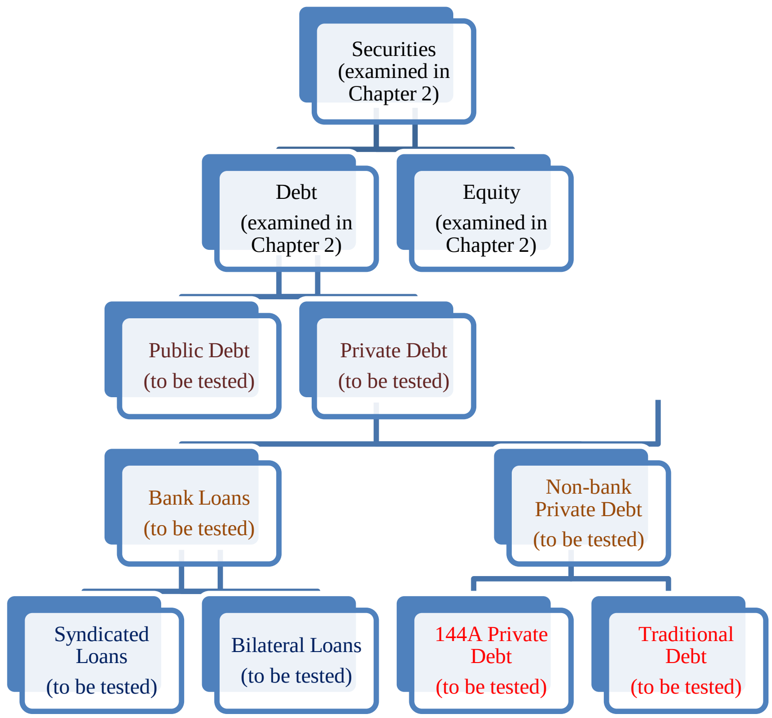

Diagram 3.1 Research Focus of Debt Choices

Specifically, this chapter positions the choice puzzle on the following aspects:

- Public debt vs. private debt
- Bank loans vs. non-bank private debt
- Syndicated loans vs. bilateral loans, and/or 144A private debt vs. traditional private debt.

[58] The choice between debt and equity is examined in Chapter 2.

Firms' new debt issue choice between public bonds and private debt can be explained by some existing theories. At first, the information asymmetry and moral hazard theory (Myers and Majluf, 1984; Fama, 1985) suggest that for firms with information asymmetry problems private debt borrowings produce less borrowing costs than public issuances as additional expensive costs incurred in the public channels relative to private channels such as SEC registration cost and regulation fee. Moreover, compared to private debt issuers, public debt issuers are required to consider relatively costly expense in monitoring firms with information asymmetry problems. This cost involves additional financial burdens for both issuers and borrowers (Diamond, 1984; Fama, 1985; Denis and Mihov, 2003). On the one hand, in the event creditors are unable to monitor borrowers' behaviour, they would demand a higher yield to compensate for such a risk consequently causing higher contracting costs to the firm. On the other hand, Antoniou et al. (2008b) and Altunbaş et al. (2010) argue that informational problems also lead to problems of moral hazard that are concerned with asset substitution and under-investment. Managers who may work in their own interests borrow from private lenders to mitigate problems of moral hazard and to avoid informational exposure by public creditors (Fama, 1985; Denis and Mihov, 2003; Antoniou et al., 2008b). This is reflected in the covenants and agreements that are associated with private debt, not with public borrowings.

Secondly, renegotiation and liquidation theory (Chemmanur and Fulghieri, 1994; Antoniou et al., 2008b) recognise that private debt holders offer renegotiation flexibility to borrowers when the firm's financial situation changes. In other words, public debt holders' rigorous regulatory requirements on debt borrowings also restrict renegotiation which is demanded by borrowers in financial distress (Denis and Mihov, 2003; Rauh and Sufi, 2010). Regulations and rules over public debt issuance process restrict effectiveness and efficiency of renegotiation, especially after the 2007/2008 global financial crisis and when borrowers are struggling with financial distress. Moreover, the bargaining power on debt issues is also determined by the supply of credit since creditors' capacity in lending sufficient amounts of debt to the public enable them to have certain flexibility on renegotiation and liquidation with borrowers (Morellec et al., 2012). Banks and other private debt providers are likely to have an advantageous supply of credit over public debt issuers given less restrictions on regulations and rules of issuing processes.

Thirdly, flotation cost theory (Blackwell and Kidwell, 1988) posits that borrowings in the public debt market involve substantial issuance costs, including a large amount of fixed cost components such as investment banker fees, filing and legal fees, trustees' and accountants' fees, and other costs related to issuance and transaction. Although the interest rate is lower in the use of public debt, these fixed cost components in public debt far exceed those of private debt. Hence, firms hardly benefit from use of public debt without economies of scale (Altunbaş et al., 2010; Arena, 2011).

The second strand of studies focuses on the choice between bank loans and non-bank private debt.[59] Given that firms may have limited access to public debt or hesitate to issue public bonds for strategic or financial reasons, bank loans and non-bank private debt could be regarded as alternatives. Most bank loans involve some form of a line of credit. Banks also make term loans which are conjunct with a line of credit. Some distinctive characteristics of bank loans include that bank loans are collateralized, agreements cover strict covenants, and maturities typically show as short-term. These features distinguish bank loans from non-bank private debt mainly due to bank loans' informational monitoring advantages. Hence, banks have cost advantages in re-contacting settings where they can benefit from legal rights, deterrence effectiveness, and local enforcement to protect lending. Unlike non-bank private debt holders, banks maintain a debtor-creditor relationship as well as reputation by duly assessing investment grades and handling borrowing requests from firms that experience financial distress instead of exerting pressures to borrowers regularly (Carey et al., 1998). Gwatidzo and Ojah (2014) argue that a long-term healthy debtor-creditor relationship leads to a trustworthy profile. A historic firm-client relationship could then be served as

[59] Banks are special in several respects. Besides the arguments presented in this chapter, see, e.g., James and Smith (2000) and Sauders and Cornett (2008) for a comprehensive analysis of the reasons.

a collateral substitute, resulting in competitive interest rates on borrowings and optimizing rationing of credit ratings. Borrowing bank loans also signal a trustworthy and positive sign regarding the limited consequence information asymmetry and high liquidity due to the comparative advantages of banks' roles in evaluating credit quality.

The third set of literature considers the choice of non-bank private debts, particularly between 144A private debt and traditional non-bank private debt. 144A debt, which accounts for an important proportion among non-bank private debt, has shown increasing popularity in the past two decades since it was introduced into the US. *Thomson One* defines that a 144A private debt is private placement issued under rule 144A. This is an amendment to Rule 144 for Qualified Institutional Buyers (QIB) which, upon qualification as a QIB, allows the holders to trade such securities prior to the holding period established by Rule 144. Traditional private placement is the unregistered private debt sold by public firms to a selected individual or group of investors. 144A private debt issues ensure a healthier and more flourishing debt market with the involvement of foreign participants. The market has gradually characterized 144A private debt as an alternative option beyond bank loans under high levels of information asymmetry. It differentiates from traditional private debt on two unique aspects (Arena, 2011). Firstly, given that no holding time is required by 144A, both Pan-American and foreign qualified institutional buyers can trade unrestrictedly without accessing and processing information through SEC. Secondly, a post-issuance period of 60 days until registration with SEC for public trade among individual investors provides borrowers with an additional channel of debt financing that is similar to a public instrument after registration, especially for high-yield domestic borrowers to release pressure from tediously protracted registration requirements, for junk-rated firms to except from SEC's shelf registration requirement.

Denis and Mihov (2003) also identify some key advantages of a 144A debt contracts to differentiate from traditional non-bank private debt in terms of regulatory requirements, maturity, placement structure, and the concentration and identity of debt-holders. Specifically, 144A debt (i) provides opportunities to directly trade to private institutional investors instead of coping with the complex and time-consuming public debt process; (ii) is tightly held and relatively illiquid; (iii) has lower flotation costs along with lender-oriented covenants; (iv) suits borrowers who have low credit quality in terms of the combined characteristics of both bank loans and low-grade public debt and enhances the ability to raise capital from public resources (Diamond, 1991); (v) avoids the costs of bank monitoring and offering access to information to a bank; and (vi) has higher ownership concentration and more flexible renegotiation in case of financial difficulty.

Distinctive features of 144A private debt also reflect benefits for lenders (i.e., QIBs). First, lenders of 144A private debt have the advantage of obtaining and producing information over borrowers. Conversely, holders of traditional non-bank private debt hold less borrower information as the covenant of traditional non-bank private debt allows less sensitive information exposed to the creditor (Arena, 2011). Second, compared to public lenders, 144A private debt lenders can economically and efficiently monitor borrowers' actions. Third, lenders of 144A private debt have an advantage over banks in dealing with credit risk because 144A lenders have the opportunity to trade and access borrower information prior to the holding period in order to experience lower risk of default if borrowers become distressed. Hence, 144A private debt holders tend to lend for more than one year while traditional non-bank private debt holders preferably lend for less than one year. Finally, given the speed of issuance associated with 144A private debt, the underwriter's ability to certify the quality of issue could be reduced (Denis, 1991). Hence, in the short term highly sophisticated 144A private debt holders are better at performing rapid due diligence by themselves at issuance than their less sophisticated counterparts (Huang and Ramirez, 2010).

The fourth strand of literature mirrors the fact that studies on syndicated loans are gaining currency in recent years (e.g., Kaya, 2011; Lin et al., 2012). In a syndicated loan, two or more lenders jointly supply credit to a borrower. The lead lender approaches other interested members to contribute to supply part of the loan to the borrower. The lead lender often holds a memorandum which includes borrower-specific information as interested banks look to take exposure in certain corporate borrowers

(Altunbaş et al., 2010). Under mandatory conditions, the individual lender of the syndicated loan is responsible only for the part of the loan to which they have contributed. Syndicated loans have become the largest external financing options for firms worldwide (Ivashina, 2009). A reason for the popularity of such a loan is its ownership structure – the loan is supplied by two to two hundred banks which are in a pyramid framework, and the risk of lending is shared by the syndicate group (Esty and Megginson, 2003). These syndicated loan providers usually support more funding than individual finance providers, thus leading to higher liquidity of the firm. Another reason lays in the increased credit rating assigned by relevant agencies. Investors have treated the syndicated loan as an alternative to public debt (Armstrong, 2003). Altunbaş et al. (2010) add that the fast development of the syndicated loan has reflected its capacity to provide large volumes, to provide medium and long-term maturity, to ensure transparency. This financial innovation provides funds to meet the various needs of the borrower and maintains financial stability.

Although "*syndicated loans are a large and increasingly important source of corporate finance*" (Sufi, 2007, p. 629) and "*... are the main alternative to direct corporate bond financing*" (Altunbaş et al., 2010, p. 437), it does not mean ordinary bilateral loans are to be ignored when a choice of debt issue has to be considered. The position of bilateral loans among various debt sources has been recognized by past studies as a significant source of a firm's debt capital (e.g., Cantillo and Wright, 2000; Esho et al., 2001; Denis and Mihov, 2003). In line with earlier discussions, influencing factors such as flotation cost, information-monitoring cost, and flexibility of renegotiation make a special role of bilateral loans. The marginal choice of syndicated loans and/or bilateral loans among alternatives is not well understood, and the demand for a comprehensive and better understanding of both syndicated loans and bilateral loans among debt sources to a firm is urgent in order for managers to raise more capital with a low and efficient cost and to gain debt selection advantages among competitors. Unlike others (e.g., Denis and Mihov, 2003; Rauh and Sufi, 2010; Arena, 2011), this chapter distinguishes syndicated loans from the other four sources of debt (i.e., bilateral loans, public debt, 144A private debt, and traditional non-bank private debt).

Prior studies find that the firms' choice of debt instruments is dependent on firm-specific characteristics (e.g., Esho et al., 2001; Antoniou et al., 2008b; Altunbaş et al., 2010), market factors (e.g., Antoniou et al., 2008b; King et al., 2011), and macroeconomic conditions (e.g., Julio et al., 2007; Arena, 2011; Khang et al., 2015). In this chapter, we examine whether information asymmetry, credit quality, market conditions, and macroeconomic conditions affect the firms' choice of debt sources.

The level of information asymmetry is a key factor in determining the choice of debt for a firm. Leland and Pyle (1977) argue that creditors who have difficulty in monitoring a firm's activities may require a higher yield from debt in order to offset the risk associated with the moral hazard of asset substitution. Firms with higher levels of information asymmetry between managers and external providers of capital tend to substitute at bondholders' expense issue private debt to reduce the cost of debt (Krishnaswami and Subramaniam, 1999). Firms with low levels of information asymmetry face a lower cost of debt by issuing public bonds as they are less likely to substitute at the bondholder's expense. Hadlock and James (2002) discuss that firms with high levels of information asymmetry prefer to borrow privately due to the lower borrowing cost and monitoring cost.[60] Borrowing from private debt holders also mitigates problems of moral hazard between shareholders and debt holders (Diamond, 1991). Moreover, according to Antoniou et al. (2008b), a high level of information asymmetry is relevant in high growth firms and those with potential agency problems. One aspect is that borrowing from the public involves the expensive cost of conveying sensitive information regarding future growth projects to the public (Yosha, 1995). Another aspect is that firms with high growth opportunities are likely to substitute low-risk projects with riskier projects and are likely to issue private debt that contains more detailed restrictive covenants (Myers, 1977; Blackwell and Kidwell, 1988).

[60] Lower cost of debt is associated with less severe adverse selection problems.

Denis and Mihov (2003) suggest that when an information asymmetric problem is diminishing, the scale of safety becomes less significant, and the choice of debt source is likely to be dependent on other factors. Credit quality, among other factors, is the primary determinant of choice of debt source (Denis and Mihov, 2003; Antoniou et al., 2008b; Arena, 2011; Morellec et al., 2014). Denis and Mihov (2003) show that firms with the highest credit quality choose to borrow public bonds, firms with the lowest credit quality tend to borrow non-bank private debt, and firms with medium credit quality borrow bank debt. One explanation is that public bonds are borrowed by firms with the highest credit quality as they have established a good reputation in the credit markets (Denis and Mihov, 2003). In larger firms, higher profitability, and a higher proportion of fixed assets to total assets tends to lead to a better reputation in the credit market. Another explanation is that, although firms with high credit quality may face a temporary information asymmetry problem, choosing public bond lenders who are better-informed financiers, not banks which may be ambiguous on transparency, should lower the cost of adverse selection (Stiglitz and Weiss, 1981; MacKie-Mason, 1990).

A firm's choice of debt source is related to market conditions as suggested by Krishnaswami et al. (1999) and King et al. (2011). Firms with more specialized assets are characterized by less collateral value because of a lack of marketability of their liquidation assets, and are likely to borrow from private debt holders who require less collateral conditions relative to public debt holders (Johnson, 1997). According to Antoniou et al. (2008b), market uncertainty causes difficulties for firms that demand public debt. Kashyap et al. (1995) argue that the cost of a bank's capital increases due to tight monetary policies, thus reducing the demand for bank loans accordingly. On the supply side of bank debt, banks are less likely to lend to firms with low credit quality under conditions of tight monetary policies and an increase in the cost of bank capital as credit constraints are more pronounced (Mayer, 1994). Moreover, banks tend to lend to firms with potential collateral (Antoniou et al., 2008b). James (1996) reports that most bank loans of financially constrained firms are secured while few cases of public debt are secured. Banks are also able to lend to firms with high levels of information asymmetry at times where these firms have shown sufficient collateral (Berger and Udell, 1995).

Macroeconomic conditions have been increasingly significant in determining the choice of debt source (Altunbaş et al., 2010; Arena, 2011; Khang et al., 2015). Financially constrained firms are more likely to be affected by economic conditions relative to unconstrained firms (Korajczyk and Levy, 2003). Firms with high credit quality tend to switch from public debt issue to private debt issue when the economy is unfavourable due to high borrowing costs on public bonds or high volatility of earnings (Diamond, 1991; Julio et al., 2007). Furthermore, James and Smith (2000) argue that banks play a special role in providing liquidity to firms when the economy is depressed and there is no vitality in public capital markets. Additionally, Morellec et al. (2014) demonstrate that firms tend to issue more private debt and invest more in investment projects when the economy is doing well. Good economic conditions lead to a strong supply of private capital in credit markets as firms can relatively easily attract informed investors and the cost of private debt is lower.

The paragraphs below provide a summary of the findings of this empirical chapter on the effect of the four major factors (i.e., information asymmetry, credit quality, market conditions, and macroeconomic conditions) on the choice of debt sources.

First, regarding the choice between syndicated loans and bilateral loans, market conditions play a significantly negative role in the choice of syndicated loans against bilateral loans for the full and sub-samples of high GDP growth years. An explanation is that individual banks require larger collateral value to offset risk of debt in default associated with singly concentrated ownership (Luengnaruemitchai and Ong, 2005). According to Bhagat and Frost (1986), large collateral value provides possibilities to transform fixed assets into funding when needed. For the full sample, macroeconomic conditions are negatively related to the choice of syndicated loans against bilateral loans while, over periods of medium and high GDP growth, this relationship turns positive. Regulation and standardization in the secondary market provide syndicated loans market with greater liquidity, plus poor economy signals financial constraints and financial dilemma leads to preference of syndicated loans for firms (Diamond, 1991; Altunbaş et al., 2010). Moreover, the risks of the syndicated loan are spread over members as each member of a syndicated loan is responsible for its particular share of the loan (Armstrong, 2003). Altunbaş et al. (2010) also indicate that the syndicate loans market provides large volumes of capital. Hence, during periods of good economic conditions, syndicated loans become more popular and are preferred to bilateral loans. We, however, find no evidence of the effects of credit quality and information asymmetry on the choice between syndicated loans and bilateral loans.

Second, the findings are in respect to the comparison between 144A private debt and traditional non-bank private debt. Our results show that credit quality has a significantly negative effect on the choice of 144A private debt over traditional non-bank private debt for the full and all sub-samples. According to Arena (2011), an explanation is that compared to traditional non-bank private debt, a) 144A private debt is not associated with contractual obligations such as covenants or collateral; b) 144A private debt is usually subordinated and monitoring activities are not practically undertaken by investors; c) risk of borrowing 144A private debt is relatively lower for firms with lower credit quality; d) 144A does not require an initial registration and is potentially convertible to public bond after issue. These features apparently reveal benefits to firms with lower credit quality.

Information asymmetry has a positive effect on the choice of 144A private debt against traditional non-bank private debt for the full and sub-samples ranging from years of low GDP growth to years of high GDP growth. This could be because the 144A loan is subordinated and monitoring of 144A debt holders is less strict so that firms with high levels of information asymmetry benefit from providing less sensitive information and experience lower cost of debt (Denis and Mihov, 2003). Moreover, initial registration associated with traditional non-bank private debt leads to higher cost in producing information for firms with high levels of information asymmetry. 144A private debt that is associated with a possibility to be converted into public debt at a later date provides firms with high levels of information asymmetry with higher liquidity for future investment opportunities (Denis and Mihov, 2003).

Market conditions and the probability of 144A private debt over traditional non-bank private debt are negatively related for the full and sub-sample of low GDP growth years. The effect of market conditions on the choice of 144A private debt to traditional non-bank private debt becomes insignificant when the economy is better. We explain these results in the following way. Given that fixed assets are treated as a source of funding in the event of financial distress, traditional non-bank private debt issuers regard fixed assets as a kit to mitigate debt in default (Bhagat and Frost, 1986). Moreover, as traditional non-bank debt requires initial registration and processing information through SEC, firms with higher fixed assets ratios find it less difficult to produce information and quickly access traditional non-bank debt market (Arena, 2011). Macroeconomic conditions and the probability of 144A private debt over traditional non-bank private debt are negatively related for the full sample. These results are consistent with the view that 144A private debt issuers are characterized by low credit quality.

Third, with respect to the choice between bank loan and non-bank private debt we find that both credit quality and information asymmetry influence the choice. This is evident in the full sample as well as the three sub-samples. According to Kwan and Carleton (1995), compared to bank loans, non-bank private debt is tightly held and illiquid due to regulatory restrictions. Firms with lower credit quality also benefit from lower flotation costs and custom-designed covenants (Denis and Mihov, 2003). Monitoring of banks runs on a daily basis, leading to tremendous costs that exceed relevant benefits to firms with low credit quality (Diamond, 1991). With respect to the effect of information asymmetry, we explain as follows. This is a result of trade-off between cost of monitoring and cost of providing required information. Firms with high levels of information asymmetry experience a higher cost of monitoring and cost of producing information, hence they prefer bank loans which are associated with better monitoring efficiency. Furthermore, according to Diamond (1991), firms borrowing bank loans may wish to build reputation in the debt market. This implies that firms with high levels of information asymmetry that is due to insufficient communication with the market may need bank borrowings to build up their reputation.

The probability of issuing bank loans over non-bank private debt is negatively affected by market conditions for the full sample. In the sub-sample analysis this only appears for the sub-sample of the high GDP growth period. Chemmanur and Fulghieri (1994) explain that firms with a lower fixed assets ratio are likely to have a higher likelihood of financial distress, thus seeking for debt sources (e.g., bank loans) that are associated with efficiency of renegotiation and liquidation.

The preference of bank loans to non-bank private debt is an increasing function of macroeconomic conditions for the sub-sample of medium GDP growth period. We explain these results by linking bank loans with the ability of banks (especially syndicate) to provide large volumes of capital (Armstrong, 2003). These results are also consistent with the view that bank loan borrowers are characterized by higher credit quality.

Fourth, we present results from the comparison between public debt and private debt. The probability of public debt issue to private debt issue has an increasing function of credit quality for the full and all three sub-samples. One explanation is that monitoring and covenants associated with private debt generate a relatively lower cost of debt (Berger and Udell, 1998). These firms also build a reputation in the private debt market to attract more capital in the public debt market at a later date (Diamond, 1991). Moreover, according to Chandra and Nayar (2008), public debt issue signals positive NPV investment opportunities and creditworthiness of these firms.

Information asymmetry affects the choice of public debt to private debt inversely for the full and all three sub-samples. Public debt claim involves the expensive cost of producing information (Blackwell and Kidwell, 1988), and private debt claim involves lower cost of debt as private creditors (e.g., banks) hold information on existing borrowers (Krishnaswami et al., 1999). Private debt holders also keep issuers' sensitive corporate information confidential (Campbell, 1979; Hadlock and James, 2002). According to Diamond (1984), efficiency of one intermediary that is usually seen among private creditors outweighs that of public creditors since individuals of public creditors may have an incentive to free-ride on others' monitoring effort. Moreover, firms with higher levels of information asymmetry that cannot be fully monitored by public creditors need to pay higher expenses to compensate for the risk associated with moral hazard of asset substitution (Leland and Pyle, 1977; Krishnaswami et al., 1999).

Market conditions influence the issue of public debt over private debt favourably for the full sample. This is observed in the sub-sample of medium GDP growth years and the sub-sample of high GDP growth years as well. These results are consistent with the view that public debt issuers are characterized by high credit quality. Luengnaruemitchai and Ong (2005) suggest that use of public debt help firms build stronger reputations for future acquisition of fixed assets.

With a particular look at the effect of macroeconomic conditions on the choice for the full and all three sub-samples, we find that macroeconomic conditions negatively drive the choice of public debt relative to private debt for the full sample and sub-sample of low GDP growth years. These results are identical with the view that public debt issuers are characterized by low levels of information asymmetry. Another explanation is related to speed of issuance. Because banks require less information to process (Krishnaswami et al., 1999) and non-bank private debt (especially 144A private debt) requires no initial registration or less documentation processes (Denis and Mihov, 2003).

The main contributions of this chapter are twofold. First, we contribute to the literature by analysing both syndicate loans and bilateral loans in a single study. To our knowledge, this chapter is the first empirical study to include both syndicated loans and bilateral loans into a debt financing choice study for US firms. We started by comparing the choice between syndicated loans and bilateral loans and moved, unlike prior studies (e.g., Denis and Mihov, 2003; Arena, 2011), to compare the choice between syndicated loans/bilateral loans and another three debt categories (i.e., public debt, 144A private debt, and traditional non-bank private debt). We conduct comparative analysis of the choice between syndicated loans/bilateral loans and more general categories (e.g., non-bank private debt). Moreover, this chapter includes comparisons between 144A private debt/traditional non-bank private debt and bank loans which include both syndicated and bilateral loans. Consequently, this chapter extends our understanding of the distinction between bilateral loans and syndicated loans on the choice of debt sources and adds to the literature by offering a comprehensive comparative analysis of choices between alternative sources of debt.

Second, this chapter adds knowledge into existing studies in terms of width of determinants of debt choice. We study not only the most important determinant (i.e., credit quality) of debt choice in the literature (e.g., Denis and Mihov, 2003; Rauh and Sufi, 2010; Arena, 2011) but also three other influential factors (i.e., information asymmetry, market factors, and macroeconomic conditions). We provide novel evidence that the choice of debt sources changes with time-varying macroeconomic conditions and the effects of other major factors also change with time-varying macroeconomic conditions. This chapter demonstrates the importance of the four principal factors (i.e., credit quality, information asymmetry, market conditions, and macroeconomic conditions) in determining the choice of debt sources. Detailed analysis on the effect of the four major factors extends our understanding of reasons to issue debt and strategies to design future debt mix.

The remainder of this chapter is organised as follows. Section two reviews the related theoretical literature. The third section reviews prior empirical studies. We design research questions and hypotheses development in section four. Sample selection and descriptive statistics are developed in section five. Section six presents the methodology. The empirical results are discussed in section seven. Section eight concludes this chapter.

3.2 Theoretical Literature

Although there are different theories for explaining the debt choices firms make, in general the literature principally focuses on the following four theories: 1) information asymmetry and monitoring costs (e.g., Denis and Mihov, 2003; Kale and Meneghetti, 2011); 2) agency costs associated with asset substitution and the underinvestment problem (e.g., Denis and Mihov, 2003; Antoniou et al., 2008b); 3) the efficiency of liquidation and renegotiation in financial distress (e.g., Chemmanur and Fulghieri, 1994; Denis and Mihov, 2003); 4) flotation costs (e.g., Bhagat and Frost, 1986; Antoniou et al., 2008b; Altunbaş et al., 2010). Theoretical review of the four determinants that we have argued (i.e., information asymmetry, credit quality, market conditions, and macroeconomic conditions) is designed to be presented in terms of the four principal theories.

Information Asymmetry and Monitoring Cost

From the perspective of corporates in the situation where external debt capital is desired, documentation required by the SEC regulation to issue new public debt is related to expensive information-production costs (Kale and Meneghetti, 2011). Conversely, borrowing debt from private lenders involves fewer expenses due to banks having access to the firm's transaction accounts and non-disclosed information. Fama (1985), among others, demonstrates that the informational advantage of bank loans is less pronounced for large firms that have lower levels of information asymmetry since these firms hold more bank accounts than smaller firms and spread corporate information over individual banks. Moreover, firms with high levels of information asymmetry are likely to rely on private debt sources while those with lower levels of information asymmetry tend to borrow from the public as borrowing from private debt holders discloses less sensitive information about the value and risk of the firm to the public (Diamond, 1984; Fama, 1985). Additionally, firms experiencing low levels of information asymmetry issue debt publicly do not cause compensation costs to creditors and have lower cost of debt; and firms experiencing higher levels of information asymmetry issue debt privately also benefit from the lower cost of borrowings. According to Berger and Udell (1998), the monitoring activities and the covenants associated with private debt reduce the cost of debt issue for firms that have not shown good credit quality. This suggests that bank debt and non-bank private debt are preferred by firms with lower credit quality. Furthermore, the monitoring activities of banks might distort borrowing firms' incentives, thus leading to bank borrowings for firms with low credit quality. The implication of information-monitoring costs theory (Diamond, 1991) in relation to the state of economy is that in a good state of economy smaller firms or younger firms that have a lower reputation in credit markets tend to use public debt when possible to develop a reputation.

Agency Cost Associated With Asset Substitution and Underinvestment

Banks' monitoring abilities enable them more correctly to price borrowers' claims of repaying debt and to reduce adverse selection costs incurred with underinvestment, thus mitigating moral hazards and also attracting borrowers to focus on private debt (e.g., bank loans) against public debt (Denis and Mihov, 2003; Altunbaş et al., 2010). Conversely, asymmetric information problems could result in moral hazard problems between shareholders and debtholders such as asset substitution and underinvestment. According to Gwatidzo and Ojah (2014), specifically, a higher risk that wealth of lender being expropriated by management is likely to occur among firms with high levels of information asymmetry. Moreover, management may also have an incentive to take higher risk investments with the exchange of low risk assets under such an environment. If such investments succeed, shareholders will benefit from added profit. If such investments fail, losses are shared with debtholders. Agency cost associated with asset substitution results in higher contracting costs in the public markets to the firm since creditors who are unable to monitor the activities of the firm demand a higher risk premium due to information asymmetry. As a result, firms with high levels of information asymmetry choose to issue private debt. Given that fixed assets can be used as collateral, the value of such assets remains relatively stable when there are adverse shocks in the credit market. However, borrowing from private creditors entails a higher cost of asset substitution due to restriction of covenants associated with private debt (Krishnaswami et al., 1999). Thus, firms with a high ratio of fixed assets relative to total assets are likely to issue public debt.

Myers (1977) contends that firms characterised by uncertainty about their ability to service debt obligations may have to forego favourable investment opportunities. Firms with high leverage and firms that have high growth opportunities are likely to have high agency costs caused by the threat of the possibility of financial distress, asset substitution and underinvestment problems.[61] This gives an incentive to firms to maintain a harmonious, flexible, and sustainable relationship with debt holders. Firms are likely to have such a relationship with banks and other private debt holders, since private debt holders are more confident in monitoring borrowings and are flexible in new debt arrangements relative to public bond holders, thus experiencing fewer "free-rider" pressures. By receiving private debt, firms are able to mitigate underinvestment problem. This suggests that firms with high leverage and firms with high growth opportunities prefer private debt to public debt. This also implies that agency cost associated with asset substitution and underinvestment will be mitigated when the economy is in a good state, thus increasing the likelihood of public debt issue.

Efficiency of Liquidation and Renegotiation in Financial Distress

Efficiency theory suggests that financial distress (the threat) is positively associated with preference of private to public debt as the likelihood of renegotiation with private debt holders brings cost savings (Chemmanur and Fulghieri, 1994). Regulatory control allows private debt-holders to have more efficient negotiation than public debt holders; consequently, firms with a higher likelihood of experiencing financial distress (lower credit quality) tend to issue towards private debt lenders. Additionally, should firms request any change on material terms, all debt holders need to agree consensus as it is mandatory for them to assess the possibility of liquidating and/or the capacity of the firm's continuous operation (Denis and Mihov, 2003). Firms with financial distress (the threat) are more likely to alter material terms relative to firms that are free from financial distress (the threat) since severe financial situations urge the firm to have more renegotiation with loan providers. This, accordingly, leads to a decrease in public bonds

[61] Firms' concerns about financial distress could be distinguished by the time when it is either the threat of the possibility of financial distress (the threat) or the state of financial distress stemming from a failure to maintain the service payments stemming from the debt (the state).

and an increase in private debt demanded by firms with financial distress (the threat) due to restrictions on liquidation and renegotiation. Likewise, firms with high levels of information asymmetry tend to issue debt privately as less regulatory restriction associated with private debt allows these firms to have more efficient renegotiation opportunities (Altunbaş et al., 2010). However, if the renegotiation is based on harsh covenants, such private debts would lead to untrustworthy liquidity and premature liquidation of profitable investment projects. Hence, firms with a higher credit quality tend to borrow from public debt holders. Moreover, with respect to the market conditions, given that public debt holders are likely to be unable to distinguish between the optimality of liquidating or allowing the project to continue due to more difficulty to renegotiate the terms of debt agreements effectively, firms with a high probability of financial distress or firms with high levels of information asymmetry are more likely to rely on private debt. Additionally, when aggregate economy is strong, highly rated firms tend to issue public debt since this state of economy ensure them free from constrains of renegotiation associated with private debt. Conversely, when aggregate economy is weak, high rated firms tend to issue bank loans since this state of economy causes high interest rates or high uncertainty of profitability. Similarly, Krorajczyk and Levy (2003) argue that unconstrained firms can deviate from their target leverage. This is aimed to time their issues to periods when the relative pricing of security issued is most favourable (strong aggregate economy). Relatively, unconstrained firms are more sensitive to deviation from target, while financial constrained firms are more sensitive to macroeconomic conditions.

Flotation Cost

Bhagat and Frost (1986) contend that issuing public utilities incurs substantial issuance costs, including considerable fixed-cost components such as investment banks' fees, filing and legal fees, and other transaction costs. Given substantial issuing costs involved in public debt issue, smaller firms will choose private debt. Although these firms do not benefit from economy of scale in public debt issuances, they are able to avoid costs of financial constraints cause by being unable to raise capital (Antoniou et al., 2008b; Altunbaş et al., 2010). On the other hand, Bhagat and Frost (1986) also argue that use of public debt entails much higher costs than the fixed costs of a bank loan or private placement. This suggests that large firms that are reputable and mature and have larger financing needs could benefit from economies of scale and are likely to be cost-efficient by issuing public debt. Conversely, relatively small amounts of public debt issue are not cost efficient. Due to flotation costs associated with public debt issues, firms benefit from the efficient cost of borrowing from private debt markets even though they have a good credit standing (Arena, 2011). With the constraint of flotation costs, firms with or without high levels of information asymmetry prefer to borrow debt privately. In the event of an upturn of the economy and cost efficiency, smaller firms with large capital needs should necessarily issue public debt due to lower issuance costs.

3.3 Prior Empirical Evidence on Choice of Debt

The choice among public debt, bilateral loans, syndicated loans, 144A private debt placement, and traditional non-bank private debt is a function of multiple factors. Prior empirical evidence streams with four aspects to study the determinants of debt financing choices: (1) firm-specific characteristics (e.g., Esho et al., 2001; Antoniou et al., 2008a, 2008b; Altunbaş et al., 2010); (2) market factors (e.g., Antoniou et al., 2008a, 2008b; King et al., 2011); (3) macroeconomic conditions (e.g., Antoniou et al., 2007; Julio et al., 2007; Arena, 2011; Khang et al., 2015); (4) issue characteristics (e.g., Denis and Mihov, 2003; Arena, 2011). Referring to the theoretical frameworks as discussed in the previous section, we argue that information asymmetry, credit quality, market factors, and macroeconomic conditions are important determinants of the marginal choice of debt sources.

Information Asymmetry: Fama (1985) argues that choice of a firm's debt issue is resulted from the trade-off between the benefits of being monitored and the cost of producing information. The cost of a public issue such as mandatory transaction and contracting costs encourage firms with high levels of information to look for private debt. Fama (1985) finds that small firms with more severe informational problems tend to use private debt. In addition, the use of private debt helps mitigate the issuance cost incurred with public debt, and avoids foregoing favourable investment, thus mitigating agency problems. With respect to the pattern of dismissing economies of scale and the costs of financial distress bank loans are preferred by those with high levels of information asymmetry (Denis and Mihov, 2003; Antoniou et al., 2008b). Therefore, we use three proxies to measure information asymmetry: (1) *total assets*; (2) *net sales*; (3) *market capitalization.* All the three constitutes (i.e., total assets, net sales, capitalization) are alternative measures of size. Size is a proxy of information asymmetry for the following reasons. Draper and Paudyal (2008) suggest that market participants are more easily to collect information on large firms relative to small firms since these information are more readily available. 1) total assets: firms that have large amount of total assets are more mature, have established and time-tested disclosure policies and practices, attracting more attention in the market and conducting more communications to market participants. Hence, larger amount of total assets are associated with less information asymmetry, 2) net sales: this is consistent with the view that larger amount of total assets are associated with less information asymmetry, 3) market capitalization: it is cost efficient for investors to monitor companies activities since the majority of these companies' shares are owned by institutional investors who have sufficient resources for information.

Credit Quality is an important determinant of the choice of debt sources (Denis and Mihov, 2003; Rauh and Sufi, 2010; Arena, 2011). Credit quality can indicate a firm's ability to gain access to the public market (Faulkender and Petersen, 2006). Firms with high credit quality tend to issue public debt and firms with medium credit quality prefer bank loans (Diamond, 1991; Denis and Mihov, 2003). Firms that have the lowest credit quality have to pay the excessive cost of bank monitoring when bank loans are borrowed, instead, they choose to borrow non-bank private debt (Denis and Mihov, 2003). Non-bank private debt is preferred to public debt by lowest credit firms. 144A, which accounts for the majority of non-bank private debt, provides opportunities for low credit quality firms to avoid high costs of bank monitoring and day-to-day influences of banks. 144A debt is also associated with flexibility of renegotiation in default. Moreover, banks are encouraged not to lend money to low credit quality firms given that bank regulators require large loan loss reserves for these loans. If non-bank private debt is now available, alternatively, lowest-rated firms might also issue public bond because these firms benefit from unanimous consent to alter the material terms in the bond indenture being made by public debtholders before sending to borrowers. Additionally, it is also possible that cost of bank monitoring outweighing the benefits for lowest credit quality firms leads to issue of public debt. With payment of bank monitoring, borrowers bear cost of reserve requirement on bank certificates of deposits (James, 1987).

Other explanations include the one based on earnings performance. Bad historical earnings of a firm indicate a possibility of taking non-valuable projects. Firms with reputable earnings tend to issue public bonds to mitigate monitoring costs associated with bank loans. Firms with medium credit quality can benefit from bank monitoring. Another explanation is based on monitoring of banks. Rauh and Sufi (2010) attribute the difference between bank loans and public debt to the monitoring ability of banks. Banks can investigate future profitability of the borrower if current returns of the borrower are low or default is pending, while public debtholders always liquidate. Furthermore, lenders of a syndicated loan that share credit risk associated with lending tend to lend to firms with low credit quality relative to accredited and sophisticated traditional private debt lenders (Arena, 2011). Firms with low credit quality take advantage of syndicated loans over traditional private debt as leveraged syndicated loans show lower yield spreads than other leveraged debt sources (Angbazo et al., 1998). We use two proxies to measure credit quality: (1) *investment grade;* (2) *not rated dummy*.

Market Factors: Antoniou et al. (2008b) find that market conditions have a statistical and significant impact on the choice of debt sources. The collateral value of the firm reflects market conditions (Johnson, 1997; Antoniou et al., 2008b). Boot et al. (1991) and Antoniou et al. (2008b) argue that firms with collateral prefer to take bank loans. James (1996) demonstrates that banks allow firms with financial distress (the threat) to borrow with collaterals, while public debt holders forgive such a requirement for collaterals. Mayer (1994) finds that banks are likely to lend to firms with a high collateral value even when market uncertainty occurs or credit constraints are pronounced. We use *tangibility* to measure the fixed assets of the firm.

Macroeconomic Conditions: Diamond (1991) and Arena (2011) argue that macroeconomic variables presenting the business cycle can explain the choice puzzle of the debt. Diamond (1991) demonstrates that highly rated firms prefer public debt but become more likely to rely on bank loans when the economy is bad. Korajczyk and Levy (2003) find that financially constrained firms are more likely to be affected by the state of the economy relative to unconstrained firms. Diamond (1991) and Julio et al. (2007) document that macroeconomic conditions influence the design of public debt and the structure of private debt significantly. The work of Julio et al. (2007) also supports that macroeconomic conditions have a time-varying effect on the debt structure of a firm. We use two proxies to measure macroeconomic conditions: (1) *recession dummy*; (2) *GDP growth rates*.

3.4 Research Questions and Hypotheses Development

Modigliani and Miller (1958) contend that corporate financing behaviour is heavily affected by perfectly elastic capital supply, and suggest that corporate demands on debt dominate the capital structure of the firm. This has motivated a large number of studies to focus on determinants of firms' financing behaviour, leading to segmentation of studies on different types of capital market and relevant supply conditions of capital holders. The most recent decade sees a rising popularity in the debt choice between bank debt and public bonds (e.g., Antoniou et al., 2008b; Altunbaş et al., 2010; Altman et al., 2010). Existing literature attempts a close look at the distinction of debt sources in different supply channels, for example, some study bank loans and non-bank private debt in one single paper (e.g., Denis and Mihov, 2003; Arena, 2011), while some differentiate 144A private debt with traditional non-bank private debt and focus on both in a single paper (e.g., Arena, 2011; Gomes and Phillips, 2012), and some solely study bilateral loans (e.g., Esho et al., 2001; Denis and Mihov, 2003) or syndicated loans (e.g., Sufi, 2007; Altunbaş et al., 2010). However, these studies rarely compare syndicated loans with bilateral loans through empirical analysis. Moreover, the survey study of

Kale and Meneghetti (2011) implies that it is potentially meaningful to investigate the choice between different debt sources, rather than choice between two debt claims. Denis and Mihov (2003) focus on the effect of influential factors on the choice between public debt, bank debt, and non-bank private debt. Arena (2011) distinguishes 144A private debt with traditional non-bank private debt, and extends the work of Denis and Mihov (2003) to cover more detailed sources, including public debt, bank debt, 144A private debt, and traditional non-bank private debt. Nevertheless, these studies do not distinguish syndicated loans with bilateral loans. In this chapter, we distinguish syndicated loans with bilateral loans and regard them as a separate asset class and equal debt source with public bonds, 144A private debt, and traditional non-bank private debt. Furthermore, we argue that firms may compare debt sources in the following way: (1) public debt vs. private debt; (2) bank loans vs. non-bank private debt; (3) syndicated loans vs. bilateral loans and/or 144A private debt vs. traditional non-bank private debt. We aim to test firms' marginal financing choice in terms of these comparisons.

The next aspect is in relation to determinants of firms' marginal choice of debt source. Firm-level characteristics are the focal factors for the main stream of the literature (e.g., Denis and Mihov, 2003; Altunbaş et al., 2010; Arena, 2011). This is motivated by the prediction of Modigliani and Miller (1958) that the financing choice of the firm is predominantly determined by corporate financial conditions. We particularly look at the two main firm-specific factors (i.e., credit quality and information asymmetry) that affect the choice of debt sources and control for all other firm characteristics in accordance with the three primary explanations.[62] Moreover, market conditions are reflective of researchers' attention (Antoniou et al., 2008b; King et al., 2011; Graham and Leary, 2011), and macroeconomic conditions are recently becoming a popular issue among studies on determinants of debt financing choices (e.g., Julio et al., 2007; Antoniou et al., 2008b; Bhamra et al., 2010; Khang et al., 2015).[63] Therefore, we

[62] The three explanations are information asymmetry and moral hazard, efficiency of renegotiation and liquidation, and flotation cost, which have been discussed in the introduction and literature review.

[63] Over periods of economic recession, firms may have increasing incentives to take bank loans since the monitoring ability of the bank and the bank's ability to mitigate information asymmetry ensure bank loans to be the safer and cheaper pursuit of debt sources during recession periods (Kaya, 2013). On the other

examine the effect of the four factors (credit quality, information asymmetry, market conditions, and macroeconomic factors) on the marginal choice of the five debt sources (public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt). The main research question is as follows:

- *Is the choice of debt source dependent on credit quality, information asymmetry, market factors, or macroeconomic conditions?*

Hypotheses Development

Public Debt vs. Private Debt

Berger and Udell (1998) argue that firms with low credit quality use private debt to lower the cost of debt in terms of monitoring and covenants associated with private debt. Diamond (1991) and Faulkender and Petersen (2006) find that firms with low credit quality build reputation through the use of private debt, and that with the use of developed reputation firms have easier access to the public credit market at a later date. Chemmanur and Fulghieri (1994) add that the use of private debt allows firms with low credit quality to renegotiate with creditors regarding covenants and agreements in default. Inefficient liquidation is also likely to be avoided. According to Yosha (1995), low credit quality firms choose to borrow debt privately due to the high cost of producing proprietary information to public creditors. Additionally, the value of a high credit quality firm will be less affected by credit requirements (Faulkender and Petersen, 2006). Therefore, we hypothesize the following:

Hypothesis 3.1.1: Firms with higher credit quality prefer public debt to private debt.

Should firms have to make a financing decision between debt instruments safer claims are preferred in terms of expensive cost of debt issuance and mitigation of insider-

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hand, periods of economic expansion see a prosperity of information innovations, expectation of higher yield, and rising number of institutional investors, leading to heavy competition between different debt lenders. For example, compared to others, Altunbaş et al. (2010) find no significant difference between public debt and syndicate loans during expansion after syndicated loans gained popularity, especially in the last two decades. Additionally, the dynamics of macroeconomic conditions also affect other influencing factors (Julio et al., 2007).

outsider information asymmetry problems (Myers and Majluf, 1984). Diamond (1984) argues that private debt holders are more efficient in monitoring borrowers than arms'-length investors (i.e., public creditors). This implies that firms with high levels of information asymmetry tend to borrow debt privately. Consistent with the argument by Diamond (1984), Denis and Mihov (2003) discuss that private creditors hold borrowers' sensitive information more confidentially than public creditors do. Moreover, borrowers need to produce less sensitive information at a later borrowing date as private lenders have already held firms' information, thus reducing the cost of borrowing efficiently. Therefore, we hypothesize the following:

Hypothesis 3.1.2: Firms with higher levels of information asymmetry prefer private debt to public debt.

Firms with potential collateral tend to issue debt privately due to security associated with the collateral of private borrowings (Boot et al., 1991). James (1996) finds that most private debts of financially distressed firms are secured. Furthermore, private creditors are relatively more specialized in lending to firms with higher fixed assets ratios in terms of interest rate and collateral agreed in the covenant. Edwards and Fischer (1994) argue that private creditors' willingness to lend to borrowers is dependent on collateral value as required by rules of law. This implies that the ratio of fixed assets to total assets of the firm reflects the influence of market conditions on the choice of debt sources. Therefore, we hypothesize the following:

Hypothesis 3.1.3: Firms with higher fixed assets ratios prefer private debt to public debt.

Firms may face financing difficulties when debt capital is in short supply, particularly when the economy is experiencing recession. Towards an optimal leverage target, firms facing severe credit instability have more constrained access to the public credit market than those counterparts without credit problems over periods of economic recession and rely more on private credit markets (Diamond, 1991). Additionally, periods of economic recession see decreasing investment opportunities and increasing agency costs. This is mainly caused by volatile cash flow and higher probability of bankruptcy appearing among borrowers over these periods of poor economy (Korajczyk and Levy, 2003). This consequently leads to more barriers to access the public credit market for firms with financial constraints. Lamont (1995) argues that firms with financial constraints are more easily affected by the state of the economy than unconstrained counterparts and these firms face even more severe financial distress (the threat) over periods of recession. Moreover, firms that face financial constrains caused by the weak aggregate economy find private borrowings save money as private credit markets require relatively lower flotation costs, fewer documentation processes regarding registration, and lower cost of debt borrowings (Julio et al., 2007, Erel et al., 2012). Therefore, we hypothesize the following:

Hypothesis 3.1.4: Weak aggregate economy increases the probability firms issue private debt relative to public debt.

Bank Loans vs. Non-bank Private Debt

Denis and Mihov (2003) discuss that firms with low credit quality are likely to borrow non-bank private debt since borrowing from banks involves a higher cost of debt for low credit quality firms. A firm's low credit quality attracts little attention among banks because the cost of monitoring and screening to firms with low credit quality is less efficient. Moreover, the ability of a bank to lend to low credit quality firms is restricted by regulations and capital requirements (Carey et al., 1998). It is also argued that banks maintain a reputation of holding healthy creditor-borrower relationships even when borrowers are in financial distress through lending to high credit quality firms. Banks prefer to lend to high credit quality firms so that they do not have to force borrowers into liquidation and can protect their reputation (Carey et al., 1998). Therefore, we hypothesize the following:

Hypothesis 3.2.1: Firms with a higher credit quality prefer bank loans to non-bank private debt.

Diamond (1984) and Fama (1985) argue that banks use effective and efficient monitoring and screening processes to mitigate the firm's information asymmetry problems. Conversely, unlike banks, non-bank creditors that cannot well monitor borrowers' activities require higher yields to compensate for the risk related to the moral hazard of asset substitution (Leland and Pyle, 1977). Since firms with low levels of information asymmetry have lower risk associated with asset substitution, non-bank suppliers demand lower payment, thus reducing firms' cost of debt issue. Hence, firms with higher levels of information asymmetry are likely to choose bank loans over non-bank private debt. Therefore, we hypothesize the following:

Hypothesis 3.2.2: Firms with higher levels of information asymmetry prefer bank loans to non-bank private debt.

According to Johnson (1997), the fixed assets ratio of the firm is positively related to the proportion of bank debt relative to non-bank private debt as banks tend to serve safer firms while non-bank financial institutions are likely to serve riskier firms. Risks associated with low fixed asset ratio include inefficient liquidation and asset substitution at the expense of bondholders (Leland and Pyle, 1977; Chemmanur and Fulghieri, 1994). Banks are often restricted by regulations and capital requirements on risk-taking ability. Conversely, banks are famous for lending to firms in financial distress so that they only serve firms with higher fixed assets ratio and protect their reputation by not often forcing borrowers into liquidation. Therefore, we hypothesize:

Hypothesis 3.2.3: Firms with high fixed assets ratios prefer bank loans to non-bank private debt.

Korajczyk and Levy (2003) and Julio et al. (2007) discuss that since the supply of capital in credit markets is in relation to the state of the economy, firms with financial constraints are more likely to be affected by the state of economy. When the economy is poor, the interest rate of bank loans increases and the firm's profitability becomes uncertain, thus leading to a decrease in bank borrowing. This implies that firms that hesitate to take out bank loans may turn to borrow non-bank private debt since non-bank financial institutions are likely to serve riskier firms and the cost of debt issue is lower (Johnson, 1997). Therefore, we hypothesize the following:

Hypothesis 3.2.4: Weak aggregate economy increases the probability firms issue non-bank private debt relative to bank loans.

144A Private Debt vs. Traditional Non-bank Private Debt

144A private debt was introduced as a substitute to traditional non-bank private debt (Arena, 2011). Without registering with SEC, 144A private debt provides borrowers with a beneficially simpler way to convert to public bonds (Fenn, 2000). Instead of targeting a small group of institutional debt issuers, 144A private debt holders expand the range of investors to cover speculative-grade borrowers. Unlike traditional non-bank private debt, 144A private debt is not associated with contractual obligations such as covenants or collateral (Arena, 2011). 144A private debt is also characterized by speed of issuance due to absence of initial registration (Denis and Mihov, 2003). The above features of 144A private debt make 144A private debt preferred to traditional non-bank private debt by low credit quality firms. Therefore, we hypothesize the following:

Hypothesis 3.3.1: Firms with a higher credit quality prefer traditional non-bank private debt to 144A private debt.

As 144A private debt is not constrained by monitoring process and contractual obligations, firms with high levels of information asymmetry save the cost of producing proprietary information (Arena, 2011). Firms with high levels of information asymmetry use 144A private debt as a way to build a reputation for future borrowings in the public market (Diamond, 1991). According to Fenn (2000), 144A private debt is designed to provide borrowers with flexibility to convert into public debt at a later date. This accommodates the need of firms with high levels of information asymmetry that use 144A private debt to build reputations. Therefore, we hypothesize the following:

Hypothesis 3.3.2: Firms with higher levels of information asymmetry prefer 144A private debt to traditional non-bank private debt.

Arena (2011) emphasizes that firms that issue traditional non-bank private debt are characterized with smaller portions of fixed assets relative to total assets since non-bank private debt holders have better risk-taking abilities. Conversely, firms that have higher proportion of fixed assets relative to total assets are more attractive to suppliers of 144A private debt since these firms are perceived being safer and their financial performance is less volatile. In addition, 144A private debt holders also use a fixed assets ratio to estimate credit ratings (Butera and Faff, 2006). Denis and Mihov (2003) and Arena (2011) find that higher proportions of fixed assets to total assets are associated with higher credit quality. This links the use of 144A private debt with high fixed assets ratios. Therefore, we hypothesize the following:

Hypothesis 3.3.3: Firms with higher fixed assets ratios prefer 144A private debt to traditional non-bank private debt.

Julio et al. (2007) argue that economic recession results in exacerbation of financial distress threat and restricts a firm's ability to issue high quality debt. This implies that firms are likely to issue traditional non-bank private debt over periods of economic recession due to relatively less restricted covenants associated with traditional non-bank private debt. Additionally, in the event of economic recession, diminishing growth opportunities and possibly higher agency costs may hinder a firm's access to the 144A private market (Lamont, 1995). Therefore, we hypothesize the following:

Hypothesis 3.3.4: Weak aggregate economy increases the probability firms issue traditional non-bank private debt relative to 144A private debt.

Syndicated Loans vs. Bilateral Loans

The syndicated loans market relative to the bilateral loans market is more transparent and attractive to independent rating agencies (Altunbaş et al., 2010). This suggests that firms with a higher credit quality have easier access to the syndicated loans market than firms with low credit quality. Moreover, there is a credit agreement between syndicated participants and the borrower and on-going activities from syndicated participants to monitor the creditworthiness (Wittenberg-Moerman, 2008). This suggests that syndicated loans require higher credit quality. Therefore, we hypothesize the following:

Hypothesis 3.4.1: Firms with higher credit quality prefer syndicated loans to bilateral loans.

As a syndicated loan is contributed by more than one lender, firm information will be shared by a group of lenders, increasing disclosure of sensitive corporate information (Altunbaş et al., 2010). Moreover, syndicated loans require a higher cost of debt for firms with high levels of information asymmetry since on-going disclosure of information to syndicated participants is relatively costly to these firms (Wittenberg-Moerman, 2008). Additionally, Wittenberg-Moerman (2008) also argues that uncertainty regarding future profitability, future creditworthiness, and future borrowings increases with proprietary information disclosed to syndicate participants by firms with high levels of information asymmetry. Therefore, we hypothesize the following:

Hypothesis 3.4.2: Firms with higher levels of information asymmetry prefer bilateral loans to syndicated loans.

Johnson (1997) argues that firms with higher fixed assets ratios have more potential collateral on borrowings, and these borrowers are more likely to recover debt in default. In the event where debt cannot be liquidated, members of syndicated creditors face less loss since the risk of not recovering debt has been split between syndication members. Gwatidzo and Ojah (2014) argue that collateral availability can attract more debt capital in a syndicated loan and reduce problems of moral hazard because collateral value associated with those fixed assets limit a borrower's ability to engage in ex-post opportunistic behaviour that leads to possible failure to pay off debt. In addition, firms with higher proportions of fixed assets to total assets are more visible to outside investors and have easier access to syndicated loans (Altunbaş et al., 2010). Therefore, we hypothesize:

Hypothesis 3.4.3: Firms with higher fixed assets ratios prefer syndicated loans to bilateral loans.

The monitoring ability of individual banks is limited by a poor economy because a poor economy leads to higher credit risk of lending (Altunbaş et al., 2010). In other words, syndicate participants of a syndicated loan serve better in managing the observable risk as the risk is spread over each participant. This emphasizes the benefit of syndicated loans over bilateral loans over periods of economic recession in order to mitigate adverse selection problems and probability of bankruptcy. Julio et al. (2007) discuss that syndicated loans provide more capital than bilateral loans. This indicates that syndicated loans should gain increasing popularity over periods of economic recession when the market is short of credit supply from bilateral loan lenders. Therefore, we hypothesize:

Hypothesis 3.4.4: Weak aggregate economy increases the probability firms issue syndicated loans relative to bilateral loans.

3.5 Data Overview

3.5.1 Sample Description

Our sample includes five sources of debt, i.e., public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt, across public and private debt issued by US firms in both US and non-US global markets over the period from 1995 to 2011.[64] Data on public debt, 144A and traditional private debt are collected from the SDC Global Issues database. We access DealScan of Loan Pricing Corporations for bank loans data, which includes both syndicated loans and bilateral loans. Corporate accounting information and stock return data are available from Compustat and CRSP respectively. Following Denis and Mihov (2003), financial data are matched for the year preceding the new debt issue. Financial firms (SIC 6000-6999) and utility firms (SIC 4900-4999) have been excluded from our research because these firms may issue loans to meet capital requirements or regulatory supervision, not for the economic reasons studied in this chapter. We also remove debt issues that are not merged with Compustat or CRSP because financial data are missing for non-merged debt issues. This selection process results in a sample of 23,939 new debt raised by 4,869 firms. Of those, 71.29% are private debt. Bank loans represent 12,933 (75.79%) in 17,065 private debt issues of which 11,466 (88.66%) are syndicated loans and 1,467 (11.34%) bilateral loans.

[64] 1995 is selected as the starting year of the sample period as rating agencies did not rate bank loans until 1995.

Given that firms may borrow several times from banks (public debt-holders) on the same day, the same month, or the same year and each borrowing contains the same characteristics, a special technique is required to manage different facilities (tranches) issued by the same firm in a given year.[65] Following Denis and Mihov (2003) and King et al. (2011), we aggregate the same type of debt issued within a calendar year as a single issue of the firm since analysis of this chapter is based on deals rather than tranches (facilities). A deal may occur with several tranches (facilities) within a year. Some researches aggregate on a monthly basis (e.g., Gomes and Phillips, 2012), on a quarterly basis (e.g., Arena and Howe, 2009; Arena, 2011), or on the basis of no aggregation (e.g., Arena, 2011). These works conclude that different treatments of multiple debt issues lead to consistent empirical results. Additionally, different treatments of multiple debt issues do not make any difference in empirical results in practice. The aggregation process on a yearly basis leads to a sample of 14,155 debt issues by 4,869 firms.

Principal of an aggregated issue is calculated by adding up all principals raised from different issues of the same category in a given year by the firm. Meanwhile, *years to maturity* and *yield to maturity* of the issues take the weighted average of years to maturity and yield to maturity of these different issues of the same debt in the given year.

3.5.2 Distribution of New Debt Issues

Figure 3-2 represents distributions of debt choices on three aspects: (1) choice between private debt and public bond; (2) choice between bank loans and non-bank private debt; (3) choice across debt sources, including syndicated loans, bilateral loans, traditional non-bank private debt, 144A, and public bond. Concerning the first aspect, total debt issuance moves along with private debt issuance, indicating the dominance of private debt relative to public bond among all debt issues. The second aspect asserts the superiority of bank loans over non-bank private debt and public bond, but weak difference between the other two counterparts. The last aspect illustrates issuances of

[65] A single bank loan (deal) may contain several facilities such as line of credit facility and term loan and one public debt may have different tranches within a year.

the five means after splitting bank loans into syndicated loans and bilateral loans and splitting non-bank private debt into 144A and traditional non-bank private debt.

Issues from traditional private debt and bilateral loans continued to decline from the end of 1990s until levelling out prior to the financial crisis. The decade prior to the 2007/08 financial crisis observes that borrowers cannot maintain the number of syndicated loans issues from drifting out of expectation. Economic recovery revives debt markets, leading to a sharp rebound of debt issues, particularly syndicate loans issues.

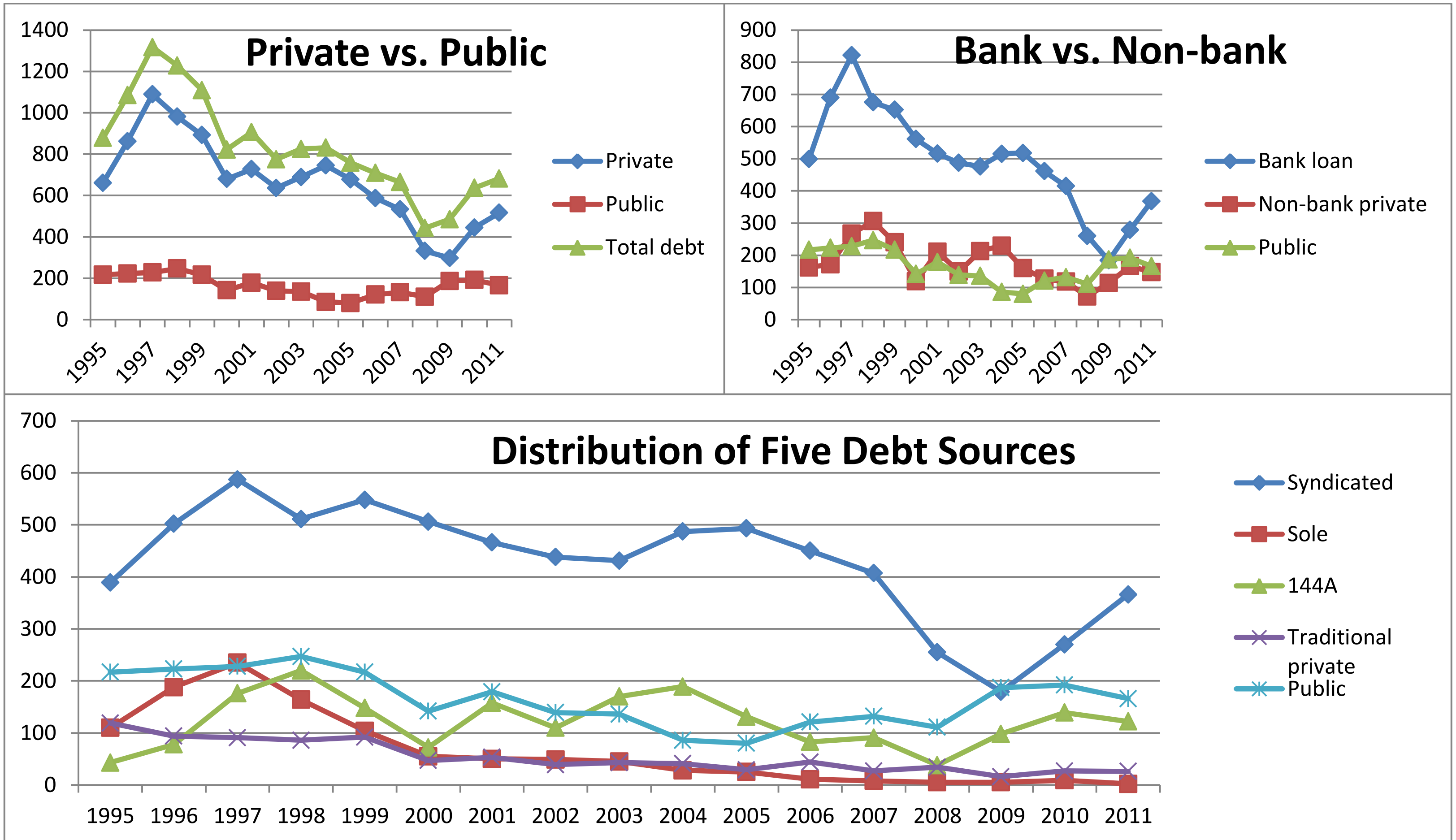
Table 3.1 shows the distribution of debt issues in our sample from 1995 to 2011. Our sample consists of 14,155 debt issues over the period 1995-2011 by 4,869 firms, representing 7.4% of the 168,541 non-financial firm-years reported in Compustat between 1994 to 2010, as financial data are matched one year prior to the year of debt issues. Among others, this sample size falls within the scope of previous studies, e.g., 6.9% in the work of James (1987) and 9.3% in the work of Arena and Howe (2009). Of debts issued, 8,378 (59.19%) are bank loans. Among bank loans, 7,285 (86.95%) are raised via syndication. The issue of bilateral loans loses popularity from 1995 to 2011, resulting in only 7.72% of total debt issues in the past 17 years. Traditional private debt issue decreases stably over time. In the sample, there are similar number of issues between traditional private debt and sole bank loans (908 vs. 1,093).[66] The other non-bank private debt category, 144A private debt, accounts for 69.47% (2,066) of the total volume of non-bank private debt (2,974). Interestingly, our selection process leads to 1,963 observations after yearly aggregation for the period between 1995 and 1996, which is larger than any other studies of its kind in the past, for example, 1,560 observations in the work of Denis and Mihov (2003) and 1,817 observations in the work of Arena (2011).

[66] Terms “sole bank loans” (or “sole loans”) and “bilateral bank loans” (or “bilateral loans”) are cross-used in this chapter.

Table 3.1 Distribution of Debt Issues

	Bank loans		Bank loans (total)	144A	Traditional private	Non-bank private (total)	Private (total)	Public	Total debt
	Syndicated	Sole							
1995	389	110	499	43	119	162	661	217	878
1996	502	188	690	78	94	172	862	223	1085
1997	587	235	822	176	91	267	1089	228	1317
1998	511	164	675	220	86	306	981	247	1228
1999	548	104	652	148	92	240	892	217	1109
2000	506	55	561	72	47	119	680	142	822
2001	466	50	516	158	53	211	727	179	906
2002	438	49	487	110	39	149	636	139	775
2003	431	45	476	170	43	213	689	136	825
2004	487	28	515	189	41	230	745	86	831
2005	493	25	518	131	29	160	678	80	758
2006	450	11	461	83	44	127	588	121	709
2007	407	8	415	91	27	118	533	132	665
2008	255	5	260	38	34	72	332	111	443
2009	179	5	184	98	16	114	298	187	485
2010	270	9	279	139	27	166	445	192	637
2011	366	2	368	122	26	148	516	166	682
1995-2011	7285	1093	8378	2066	908	2974	11352	2803	14155
percentage of total debt	51.47%	7.72%	59.19%	14.60%	6.41%	21.01%	80.20%	19.80%	100.00%
percentage of private debt	64.17%	9.63%	73.80%	18.20%	8.00%	26.20%	100.00%		
percentage of subdivision	86.95%	13.05%	100.00%	69.47%	30.53%	100.00%			

This table shows distribution of debt issues between 1995 and 2011. The number of issues is counted after merge with Compustat and CRSP databases, and aggregation of the same type of debt issues by a non-financial US firm within a year over the period of 1995-2011. New debt issue consists of both short-term and long-term debt. Syndicated is an abbreviation for syndicated loans. Sole is an abbreviation for sole loans or bilateral loans. 144A is abbreviated for 144A private debt. Traditional private is abbreviated for traditional private debt. Non-bank private is abbreviated for non-bank private debt. Private is abbreviated for private debt. Public is abbreviated for public debt.



Distributions of debt sources show different aspects: (1) public vs. private ; (2) bank loans vs. non-bank private; (3) choice across categories among syndicated loans, sole loans, 144A, traditional private, and public

Figure 3-2 Distribution of Debt Sources

Syndicated loans remain the most issued debt. Although syndicated loans are issued less often than public debt in 2009 they grow fastest compared to other sources at the beginning of the post-crisis era. 2009 also sees syndicated loans as the least issued compared to other years. This may be because of poor firm performance, poor market conditions, and poor economy during the most recent global financing crisis. 144A private debt remains the most issued debt among non-bank private debts since 1997. The year 1997 marks a record year of issuing most debt (1,317 issues). Syndicated loans and sole loans are also issued most in 1997 compared with other years.

3.5.3 Characteristics of New Debt Issues

Table 3.2 reports the characteristics of new debt issues from 1995 to 2011. Of 14,155 debt issues, 52.99% have credit ratings assigned by S&P or Moody's. *Panel A* of Table 3.2 shows 1,384 (66.99%) of 2,066 144A borrowers are rated with a median rating of B+ (converted from numerical rating 10, hereinafter referred to as a number) which is lower than investment grade rating (14). Numerical conversion of firms' credit ratings is defined in Appendix C. Traditional private debt issues, shown in *Panel B* of Table 3.2, are least rated (37.33%) compared to others although those rated indicate a quality of BBB (14). In *Panel C* of Table 3.2, public debt issuers see a percentage of 86.8 (2,433) are rated with BBB+ (15) which matches investment grade rating requirement and is the highest among the five debt sources. The number of rated firms with a median rating of BB+ (12) accounting for 45.27% of all 7,285 syndicated loans issue-years is reported in *Panel D* of Table 3.2, while this rated proportion accounts for only 4.3% of bilateral loans borrowers, with a B+ rating (9) in median value.

Table 3.2 Characteristics of Debt Issues

***Panel A* Characteristics of 144A Private Debt**

	Principal	Total volume	Years to maturity	Number of issues	Rated	Credit quality	Yield to maturity
1995	185.93 (125.00)	7,995	8.56 (10.00)	43	18	12.33 (10.5)	7.13 (9.33)
1996	213.48 (145.00)	16,652	9.98 (10.01)	78	40	10.40 (10)	8.66 (10.00)
1997	234.59 (150.00)	41,288	9.15 (10.00)	176	77	10.43 (10)	8.96 (9.52)
1998	286.41 (191.10)	63,011	9.59 (10.01)	220	105	10.47 (10)	8.52 (9.00)
1999	398.69 (200.00)	59,006	9.31 (10.00)	148	79	12.08 (11)	8.88 (9.75)
2000	666.13 (312.50)	47,961	7.92 (8.94)	72	48	13.10 (13)	8.59 (9.63)
2001	529.62 (300.00)	83,679	8.37 (8.12)	158	134	12.18 (11)	8.55 (9.01)
2002	374.80 (250.00)	41,228	8.76 (10.00)	110	89	11.70 (11)	8.64 (8.88)
2003	330.00 (225.00)	56,101	9.07 (9.97)	170	135	10.87 (10)	8.03 (8.00)
2004	419.45 (250.00)	79,277	8.61 (8.38)	189	142	10.64 (10)	6.61 (6.81)
2005	497.95 (250.00)	65,231	9.34 (9.18)	131	93	11.20 (10)	6.24 (6.83)
2006	805.20 (500.00)	66,831	9.70 (8.81)	83	55	10.85 (11)	6.98 (7.50)
2007	699.83 (400.00)	63,684	8.51 (8.05)	91	67	10.60 (10)	7.10 (7.63)
2008	504.19 (400.00)	19,159	8.23 (8.05)	38	33	11.70 (12)	8.88 (8.01)
2009	480.43 (350.00)	47,082	7.52 (7.26)	98	81	10.10 (10)	9.68 (9.75)
2010	626.00 (355.00)	87,014	8.12 (8.04)	139	103	9.05 (9)	8.62 (8.63)
2011	548.82 (382.50)	66,956	7.91 (8.03)	122	85	9.35 (9)	8.43 (8.13)
1995-2011	441.51 (250.00)	912,157	8.82 (8.89)	2066	1384	10.88 (10)	8.15 (8.56)

Summary table of characteristics of new 144A private debt issues over the period of 1995-2011. *Principal* (in $ million) is the amount of capital a firm has raised from the issue. *Total volume* (in $ million) is the total value of debt raised in a given year. *Years to maturity* is the number of years from issue date to final maturity. *Number of issues* is the total number of issues occurring in a given year. *Rated* is the number of firms with debt rating. *Credit quality* is the numerical conversion of firms' credit rating. Conversion matching is defined in Appendix C. *Yield to maturity* is the percentage of yield at maturity date. Median value is displayed in parenthesis.

Table 3.2 Characteristics of Debt Issues

Panel B Characteristics of Traditional Private Debt

	Principal	Total volume	Years to maturity	Number of issues	Rated	Credit quality	Yield to maturity
1995	57.33	6,822	8.34	119	52	13.77	0.72
	(30.00)		(7.01)			(14)	(0.00)
1996	110.31	10,369	6.58	94	33	14.52	1.69
	(45.52)		(6.95)			(15)	(0.00)
1997	69.33	6,309	9.09	91	36	14.78	3.00
	(40.00)		(9.01)			(16)	(0.00)
1998	71.41	6,141	9.07	86	22	14.05	2.20
	(50.00)		(9.85)			(15)	(0.00)
1999	134.30	12,355	8.68	92	33	14.21	2.18
	(70.00)		(9.15)			(15)	(0.00)
2000	113.16	5,319	8.72	47	16	14.81	2.67
	(80.00)		(8.01)			(16)	(0.00)
2001	129.36	6,856	7.65	53	26	15.46	3.43
	(76.00)		(7.01)			(15)	(1.39)
2002	104.17	4,062	8.04	39	16	14.44	2.98
	(60.75)		(7.03)			(14)	(0.00)
2003	128.74	5,536	8.52	43	17	14.53	1.98
	(100.00)		(8.02)			(14)	(0.00)
2004	151.75	6,222	10.60	41	18	14.44	3.87
	(55.00)		(8.31)			(14)	(4.96)
2005	142.99	4,147	10.27	29	10	14.60	2.74
	(100.00)		(10.01)			(15)	(4.29)
2006	135.60	5,967	9.22	44	16	14.00	3.88
	(100.00)		(9.80)			(14)	(5.40)
2007	324.02	8,749	8.94	27	13	15.38	3.86
	(200.00)		(9.30)			(15)	(5.33)
2008	184.99	6,290	7.93	34	8	13.13	5.38
	(137.50)		(7.58)			(14)	(6.23)
2009	112.11	1,794	9.06	16	8	15.00	5.73
	(77.87)		(7.06)			(15)	(6.34)
2010	217.42	5,870	6.99	27	7	15.14	3.26
	(123.44)		(8.05)			(15)	(4.00)
2011	196.85	5,118	10.18	26	8	14.88	3.35
	(140.50)		(10.01)			(14)	(4.01)
1995-2011	118.86	107,926	8.54	908	339	14.46	2.62
	(65.00)		(8.01)			(14)	(0.00)

Summary table of characteristics of new traditional private debt issues over the period of 1995-2011. *Principal* (in $ million) is the amount of capital a firm has raised from the issue. *Total volume* (in $ million) is the total value of debt raised in a given year. *Years to maturity* is the number of years from issue date to final maturity. *Number of issues* is the total number of issues occurred in a given year. *Rated* is the number of firms with debt rating. *Credit quality* is the numerical conversion of firms' credit rating. Conversion matching is defined in Appendix C. *Yield to maturity* is the percentage of yield at maturity date. Median value is displayed in parenthesis.

Table 3.2 Characteristics of Debt Issues

Panel C Characteristics of Public Debt

	Principal	Total volume	Years to maturity	Number of issues	Rated	Credit quality	Yield to maturity
1995	368.50		11.72	217	171	15.78	6.19
	(150.00)	79,964	(10.01)			(16)	(7.00)
1996	444.10		10.44	223	174	15.25	5.79
	(200.00)	99,034	(9.99)			(16)	(6.84)
1997	507.24		11.54	228	186	15.69	5.07
	(217.50)	115,652	(10.00)			(16)	(6.73)
1998	608.45		12.56	247	215	15.91	5.29
	(250.00)	150,287	(10.02)			(16)	(6.30)
1999	618.64		9.57	217	173	15.43	5.08
	(250.00)	134,246	(8.96)			(15)	(6.32)
2000	804.33		6.45	142	121	15.93	5.51
	(350.00)	114,215	(5.01)			(17)	(6.82)
2001	958.89		8.00	179	160	15.49	6.06
	(350.00)	171,641	(7.14)			(16)	(6.30)
2002	856.28		9.42	139	126	15.04	5.54
	(400.00)	119,023	(8.52)			(15)	(5.91)
2003	1,005.63		9.34	136	124	14.76	4.31
	(362.50)	136,766	(8.25)			(15)	(4.64)
2004	665.74		9.44	86	73	14.67	4.48
	(325.00)	57,254	(8.32)			(14)	(4.90)
2005	847.75		11.33	80	73	15.40	4.25
	(385.29)	67,820	(10.02)			(15)	(5.04)
2006	1,008.39		10.81	121	110	14.55	5.11
	(500.00)	122,016	(10.02)			(14)	(5.89)
2007	1,341.52		12.77	132	119	15.03	5.28
	(750.00)	177,080	(10.03)			(15)	(5.89)
2008	1,525.04		9.79	111	105	15.60	6.18
	(750.00)	169,280	(10.00)			(16)	(6.15)
2009	1,294.68		9.51	187	175	14.28	6.73
	(688.74)	242,105	(8.29)			(14)	(6.25)
2010	988.14		11.14	192	179	13.64	5.21
	(500.00)	189,724	(10.03)			(14)	(5.11)
2011	1,383.45		10.55	166	149	14.62	4.23
	(750.00)	229,653	(10.02)			(15)	(4.19)
1995-2011	847.58		10.37	2803	2433	15.14	5.39
	(384.00)	2,375,757	(9.99)			(15)	(5.96)

Summary table of characteristics of new public debt issues over the period of 1995-2011. *Principal* (in $ million) is the amount of capital a firm has raised from the issue. *Total volume* (in $ million) is the total value of debt raised in a given year. *Years to maturity* is the number of years from issue date to final maturity. *Number of issues* is the total number of issues occurred in a given year. *Rated* is the number of firms with debt rating. *Credit quality* is the numerical conversion of firms' credit rating. Conversion matching is defined in Appendix C. *Yield to maturity* is the percentage of yield at maturity date. Median value is displayed in parenthesis.

Table 3.2 Characteristics of Debt Issues

Panel D Characteristics of Bank Loans

	Principal		Total volume		Years to maturity		Number of issues		Rated		Credit quality	
	Syn	**Sole**	**Syn**	**Sole**	**Syn**	**Sole**	**Syn**	**Sole**	**Syn**	**Sole**	**Syn**	**Sole**
1995	375.12	14.25	145,923	1,567	3.23	2.28	389	110	169	3	13.27	10.33
	(142.26)	(10.00)			(3.08)	(2.28)					(13)	(9)
1996	410.11	10.27	205,874	1,930	3.33	2.21	502	188	180	6	13.46	8.67
	(130.00)	(7.13)			(3.13)	(1.92)					(14)	(8.5)
1997	435.01	12.70	255,353	2,984	3.43	2.47	587	235	224	3	13.19	10.67
	(150.00)	(8.00)			(3.64)	(2.00)					(13)	(11)
1998	422.49	11.37	215,891	1,864	3.17	2.00	511	164	176	1	12.60	8.00
	(150.00)	(8.50)			(3.00)	(1.35)					(12)	(8)
1999	387.85	12.34	212,544	1,283	2.63	2.11	548	104	220	5	13.02	10.40
	(152.59)	(7.10)			(2.34)	(1.75)					(13)	(9)
2000	452.72	17.92	229,075	986	2.74	1.94	506	55	216	1	12.91	17.00
	(150.00)	(10.00)			(2.57)	(1.65)					(13)	(17)
2001	412.76	19.30	192,345	965	2.54	2.12	466	50	223	5	13.02	8.80
	(150.00)	(9.15)			(2.33)	(2.00)					(13)	(9)
2002	335.51	19.81	146,952	971	2.69	2.22	438	49	202	4	13.09	8.00
	(125.00)	(10.00)			(2.92)	(2.00)					(14)	(8)
2003	330.23	15.28	142,327	688	3.06	1.91	431	45	226	3	11.97	7.33
	(170.00)	(7.50)			(3.00)	(1.79)					(11)	(8)
2004	494.81	17.14	240,971	480	3.94	2.43	487	28	235	3	11.85	10.00
	(200.00)	(12.65)			(4.58)	(1.88)					(11)	(9)
2005	582.89	39.50	287,366	987	4.27	3.53	493	25	265	2	12.20	8.00
	(260.00)	(25.00)			(5.00)	(3.11)					(12)	(8)
2006	738.70	69.45	332,413	764	4.33	3.22	450	11	223	3	11.80	11.00
	(262.50)	(30.00)			(5.00)	(3.00)					(11)	(9)
2007	966.18	287.69	393,237	2,301	4.49	3.38	407	8	220	2	11.50	12.50
	(400.00)	(87.50)			(5.00)	(4.25)					(11)	(12.5)
2008	666.21	144.12	169,883	721	3.36	1.93	255	5	101	2	12.15	13.00
	(216.49)	(39.30)			(3.17)	(2.00)					(12)	(13)
2009	829.59	1,441.50	148,496	7,207	2.93	2.28	179	5	82	2	11.40	5.50
	(190.00)	(30.00)			(3.00)	(2.25)					(10)	(5.5)
2010	775.01	28.47	209,253	256	3.71	3.12	270	9	132	1	11.74	8.00
	(341.25)	(20.00)			(4.00)	(3.00)					(11)	(8)
2011	955.28	44.13	349,633	88	4.52	7.50	366	2	204	1	12.03	15.00
	(500.00)	(44.13)			(5.00)	(7.50)					(12)	(15)
1995-2011	532.26	23.83	3,877,539	26,044	3.42	2.27	7,285	1,093	3,298	47	12.46	9.66
	(200.00)	(9.50)			(3.44)	(1.94)					(12)	(9)

Summary table of characteristics of new debt issues over the period of 1995-2011. *Principal* (in $ million) is the amount of capital a firm has raised from the issue. *Total volume* (in $ million) is the total value of debt raised in a given year. *Years to maturity* is the number of years from issue date to final maturity. *Number of issues* is the total number of issues occurred in a given year. *Rated* is the number of firms with debt rating. *Credit quality* is the numerical conversion of firms' credit rating. Conversion matching is defined in Appendix C. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. Median value is displayed in parenthesis.

Firms raise most capital from public issuance per issue on average (i.e., $ 847.58 million) and second most from syndicated loans (i.e., $532.26 million) but least from bilateral loans (i.e., $ 23.83 million). Over the sample period, firms' debt finances are mostly financed by syndicated loans and public debt ($ 3,877 billion vs. $ 2,375 billion), and least financed by bilateral loans ($ 26 billion). On average, public debt has the longest average years to maturity (10.37 years) and bilateral loans have the shortest years to maturity (2.27 years). Although syndicated loans represents the most number of issues over the period of 1995-2011, years to maturity is only 3.42 years on average, which is much shorter than that of public debt. 144A private debt shows a higher average yield to maturity than public bond (8.15% vs. 5.39%) and traditional private debt (2.62%). Consistent with Denis and Mihov (2003) and Arena (2011), there are differences in average yields across different debt sources. This is because years to maturity can be compensated with higher yields to offset risks of borrowing for firms. The average yield spread varies over time. This can be explained by differences in margins that change over time. It is also possible that yield spread is affected by market and macroeconomic conditions that may change over time. The state of economy is closely related to market liquidity. When aggregate economy is strong the market is liquid hence firms have better access to external capital and higher yields.

3.5.4 Descriptive Statistics

The descriptive statistics of explanatory variables and control variables is reported in Table 3.3. The mean (median) of these variables are represented in *Panel A*, and a summary of some proportions of firm categories are displayed in *Panel B*. Public debt issues and private debt issues have average book assets (market capitalization) of $15,650 ($17,604) million and $5,090 ($5,173) million respectively. Public debt issuers are older than private debt issuers (35 years against 13 years in median value). As a comparison with public bond issuers, private debt issuers have larger deviation from target leverage level (0.06 vs. 0.01). The mean (median) Tobin's Q of public debt borrowers and private debt borrowers are 1.83 (1.56) and 3.33 (1.45). Mean (median)

GDP growth also shows some difference between public and private debt: 2.69% (3.35%) vs. 3.01% (3.80%).

Bank loans borrowers are larger than non-bank private debt borrowers. Total assets of bank loans borrowers and non-bank private debt borrowers are \$ 4,896 (\$ 551.38) million and \$ 5,636 (\$ 1,139) million in mean (median). Market capitalization represents a mean (median) of \$ 5,089 (\$ 502.40) million and \$ 5,405 (\$ 829.40) million respectively. Similar firm age between bank loans borrowers and non-bank debt issuers is reported with a mean (median) of 18.95 (13.00) years and 20.80 (15.00) years. Deviation from target is, on average, (median) 0.05 (0.02) for bank loans and 0.08 (0.05) for non-bank private debt. Bank loans borrowers have less growth opportunities, on average, than non-bank private issuers (1.96 against 7.17). GDP growth is higher in mean (median) value for bank loans relative to non-bank private debt. This indicates that bank loans occurred in better economy.

Among borrowers of private debt sources, traditional debt borrowers have larger firm size than any other types: mean (median) total assets and market capitalization \$8,105 (\$ 873.67) million and \$ 7,077 (\$ 843.51) million respectively. Traditional private debt is issued by older firms that have a median age of 20 years. 144A private debt issuers see greatest deviation from market leverage on average (0.11). The highest average GDP growth (3.53%), smallest yield spread (1.34), and smallest recession dummy (0.06) on sole bank loans suggest that bilateral loans are borrowed when the economy is better.

For syndicated loans and bilateral loans or syndicated loans borrowers and bilateral loans borrowers, mean (median) total assets is \$ 5,561 (\$ 735.33) million and \$356.63 (\$ 37.02) million; mean (median) market capitalization is \$ 5,745 (\$ 666.11) and \$ 294.32 (\$ 41.15) million; mean (median) age is 20.15 (14.00) years and 10.93 (8.00) years; mean (median) Tobin's Q is 1.87 (1.46) and 2.61 (1.49); mean (median) deviation from target is 0.05 (0.02) and 0.04 (-0.00); mean (median) GDP growth is 3.00% (3.35%) and 3.53% (3.80%).

Table 3.3 Descriptive Statistics

Panel A Descriptive Statistics of Independent Variables

	Bank loans			Non-bank private				
1995-2011	**Syn**	**Sole**	**Bank loans**	**Non-bank private**	**144A**	**Traditional**	**Private**	**Public**
Principal	532.20	23.82	465.93	343.00	441.51	118.86	433.73	847.58
	(200.00)	(9.50)	(150.00)	(200.00)	(250.00)	(65.00)	(156.00)	(384.00)
Investment grade	0.72	0.96	0.76	0.58	0.45	0.89	0.71	0.77
	(1.00)	(1.00)	(1.00)	(1.00)	(0.00)	(1.00)	(1.00)	(1.00)
Not rated	0.55	0.96	0.60	0.42	0.33	0.63	0.55	0.13
	(1.00)	(1.00)	(1.00)	(0.00)	(0.00)	(1.00)	(1.00)	(0.00)
Assets	5,561.40	356.63	4,896.24	5,636.00	4,553.08	8,105.45	5,090.24	15,649.88
	(735.33)	(37.02)	(551.38)	(1,139.32)	(1,258.22)	(873.67)	(694.75)	(5,469.00)
Market capitalization	5,744.89	294.32	5,089.24	5,404.59	4,624.39	7,076.59	5,172.60	17,603.70
	(666.11)	(41.15)	(502.40)	(829.40)	(818.45)	(843.51)	(581.97)	(5,112.76)
Age	20.15	10.93	18.95	20.80	19.32	24.17	19.44	33.06
	(14.00)	(8.00)	(13.00)	(15.00)	(13.00)	(20.00)	(13.00)	(35.00)
Q	1.87	2.61	1.96	7.17	9.48	2.14	3.33	1.83
	(1.46)	(1.49)	(1.46)	(1.41)	(1.35)	(1.53)	(1.45)	(1.56)
Profitability	0.20	0.05	0.18	0.26	0.31	0.14	0.20	0.17
	(0.15)	(0.12)	(0.14)	(0.15)	(0.14)	(0.16)	(0.14)	(0.16)
Tangibility	0.33	0.27	0.32	0.38	0.38	0.38	0.34	0.40
	(0.26)	(0.18)	(0.25)	(0.33)	(0.34)	(0.32)	(0.27)	(0.35)
Z	0.52	0.46	0.52	0.60	0.67	0.43	0.54	0.53
	(1.00)	(0.00)	(1.00)	(1.00)	(1.00)	(0.00)	(1.00)	(1.00)
Book leverage	0.33	0.26	0.32	0.82	1.05	0.29	0.45	0.32
	(0.29)	(0.19)	(0.28)	(0.36)	(0.41)	(0.27)	(0.30)	(0.30)
NOLCF	0.39	0.96	0.46	0.62	0.32	1.27	0.51	0.08
	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)
Deviation from target	0.05	0.04	0.05	0.08	0.11	0.02	0.06	0.01
	(0.02)	(-0.00)	(0.02)	(0.05)	(0.08)	(0.00)	(0.03)	(-0.00)
Yield spread	1.54	1.34	1.51	1.64	1.70	1.48	1.54	1.55
	(1.15)	(1.15)	(1.15)	(1.29)	(1.29)	(1.15)	(1.29)	(1.29)
GDP growth	3.00	3.53	3.07	2.87	2.71	3.22	3.01	2.69
	(3.35)	(3.80)	(3.80)	(3.35)	(2.79)	(3.80)	(3.80)	(3.35)
Recession dummy	0.13	0.06	0.12	0.15	0.17	0.10	0.13	0.20
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Summary table of descriptive statistics of independent variables over the period of 1995-2011. *Principal* (in $ million) is the amount of capital a firm has raised from the issue. *Years to maturity* equals the number of years to maturity of debt issues. *Investment grade rating* equals 1 if the firm has an existing debt rating of BBB or higher, 0 otherwise. *Not rated* equals 1 if the firm has no credit rating, 0 otherwise. *Assets* (in $ million) is the book value of assets. *Market capitalization* (in $ million) is the number of shares outstanding multiplied by the closing stock price at the end of the fiscal year prior to issue year. *Q* is the sum of market value of equity minus book value of equity plus book value of debt divided by book value of assets. *Profitability* is the ratio of EBITDA to total assets. *Tangibility* is the ratio of net plants, property and equipment to total assets prior to issue date. *Z* equals 1 if the ratio of (3.3*earnings before interests and tax plus sales plus 1.4*retained earnings plus 1.2*current assets minus current liability) to total assets smaller than 1.81, 0 otherwise. *Book leverage* is the ratio of total debt to book assets. *Net operating loss carry forward (NOLCF)* is the ratio of net operating loss carry forward to total assets prior to issue date. *Deviation from target* is the difference between firm's market leverage and the average market leverage of the industry. *Yield spread* is the difference between yield of 10-year government bond and the yield of three-month T-bills. *GDP growth* is the annual growth rate of GDP. *Age* is the number of years from the year reported in Compustat to the issue year. *Recession dummy* is 1 if more than two months of a year is defined as recession by NERB, otherwise 0. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. Non-bank private is abbreviated for non-bank private debt. 144A is abbreviated for 144A private debt. Traditional is abbreviated for traditional non-bank private debt. Public is abbreviated for public debt. Private is abbreviated for private debt. Mean value is reported with median value in parenthesis.

Table 3.3 Descriptive Statistics

Panel B **Summary of Proportions**

	Bank loans			Non-bank private				
1995-2011	**Syn**	**Sole**	**Bank loans**	**Non-bank private**	**144A**	**Traditional**	**Private**	**Public**
Proportion of firms with investment grade	0.39	0.13	0.39	0.28	0.18	0.69	0.35	0.73
Proportion of rated firms	0.45	0.04	0.40	0.58	0.67	0.37	0.45	0.87
Proportion of firms with Z less than 1.81	0.52	0.46	0.52	0.60	0.67	0.43	0.54	0.53
Proportion of firms with recession year(s)	0.12	0.06	0.11	0.14	0.17	0.09	0.12	0.18

Summary table of proportions of firm categories over the period of 1995-2011. *Proportion of firms with investment grade among rated firms* represents the fraction of firms with investment rating in rated firms. *Proportion of rated firms* is the fraction of rated firms contributing to total sample issue-years. *Proportion of firms with Z less than 1.81* is the fraction of Z value less than 1.81 among issue-years. *Proportion of firms with recession year(s)* is the fraction of recession year among issue-years. Recession year is defined when there are more than two months in a year reported as recession by NERB. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. Non-bank private is abbreviated for non-bank private debt. 144A is abbreviated for 144A private debt. Traditional is abbreviated for traditional non-bank private debt. Public is abbreviated for public debt. Private is abbreviated for private debt.

For 144A private debt and traditional non-bank private debt or 144A private debt issuers and traditional non-bank private debt issuers, mean (median) total assets is $ 4,553 ($ 1,258) million and $8,105 ($ 873.67) million; mean (median) market capitalization is $ 4,624 ($ 818.45) and $ 7,077 ($ 843.51) million; mean (median) age ia 19.32 (13.00) years and 24.17 (20.00) years; mean (median) Tobin's Q is 9.48 (1.35) and 2.14 (1.53); mean (median) deviation from target is 0.11 (0.08) and 0.02 (0.00); mean (median) GDP growth is 2.71% (2.79%) and 3.22% (3.80%).

Panel B of Table 3.3 summarizes some proportions, including proportion of firms with investment grade among rated firms, proportion of rated firms, proportion of firms with Z less than 1.81, and proportion of firms with recession year(s). On the one hand, the majority of public bond issuers are rated by S&P or Moody's (87%); on the other hand, less than 5% of bilateral loans issuers have credit ratings. Among those that borrow private debt, 144A private debt borrowers have the highest percentage of rated firms, i.e., 0.67 (or 67%). The proportion of firms with investment grade among rated public bond issuers, which is the highest of all, doubles the proportion of those among private debt issuers (73% vs. 35%). Among rated firms that choose private debt, traditional non-bank private debt borrowers followed by syndicated loans borrowers have the highest percentage of firms with investment grade (69%), and sole bank loans borrowers see only 13% assigned with BBB or higher.

The weights of firms with financial distress between private debt issuers and public bond issuers are extremely close. Although the proportion of firms experiencing financial distress is mostly seen among 144A private debt financing (67%), the proportion of firms experiencing financial distress is least seen among the other alternative of non-bank private financing (traditional non-bank private debt) (43%).

In economic recession years, the greatest proportion of debt borrowers finance via public bond, namely 18% .[67] Between bank loans and non-bank private debt, the latter is

[67] Recession year is defined when there are more than two months in a year reported as recession by NBER. A recession is considered as a significant decline in economic activity spread across the economy, which is visible in real GDP, real income, employment, industrial production, and wholesale-retail sales.

preferred (14%). 144A private debt is preferred to traditional non-bank private debt (17% vs. 9%). This may be because 144A private debt requires no registration with SEC and its unique feature on speed of issuance.

3.6 Methodology

3.6.1 Univariate Analysis

Univariate analysis is conducted with two types of tests (Kruskal-Wallis test and Mann-Whitney test). Kruskal-Wallis test (Kruskal and Wallis, 1952) is conducted to test the difference in medians. Kruskal-Wallis test is used for comparing more than two random samples as this method mitigates problems caused by alternatives' (e.g., ANOVA) normality assumptions or by outliers. Mann-Whitney two-sample test (Mann and Whitney, 1947), which is identical to the Wilcoxon rank-sum test, is selected to estimate differences in appropriate variables where proportions of firms apply. By conducting this technique, we are able to compare the whole distributions of different debt sources, not the median(s) or mean(s) as an individual parameter.

Kruskal-Wallis Test

The Kruskal-Wallis test statistic H is defined as:

$$\mathrm{H} = \frac{1}{S^2}\left\{\sum_{j=1}^{m} \frac{R_j^2}{n_j} - \frac{n(n+1)^2}{4}\right\} \tag{3.1}$$

Where n is the total sample size, m is the number of groups, n_j is the size of the jth group, and R_j is the sum of the ranks for the jth group.

$$S^2 = \frac{1}{n-1}\left\{\sum_{all\ ranks} R(X_{ji})^2 - \frac{n(n+1)^2}{4}\right\} \tag{3.2}$$

$$\mathrm{n} = \sum_{j=1}^{k} n_j \tag{3.3}$$

If there are no ties, Equation (3.1) is simplified to the following equation:

$$\mathrm{H} = \frac{12}{n(n+1)}\sum_{j=1}^{m} \frac{R_j^2}{n_j} - 3(n+1) \tag{3.4}$$

The sampling distribution of H is approximately χ^2 with m-1 degrees of freedom. The expression is as follows:

$$\mathrm{H} \sim \chi^2(m-1) \tag{3.5}$$

The null hypothesis of Kruskal-Wallis test is that all m distribution functions are equal while the alternative hypothesis of the test is that at least one of the populations is likely to yield larger values than one of the other populations.

Mann-Whitney Test

The Mann-Whitney test is defined as:

$$\mathrm{U} = n_1 n_2 + \frac{n_2(n_2+1)}{2} - \sum_{i=n_1+1}^{n_2} R_i \tag{3.6}$$

Where n_1 is the size of sample one and n_2 is the size of sample two, samples of size n_1 and n_2 are pooled and R_i are the ranks.

U can be resolved to the following equations:

$$U_1 = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1 \tag{3.7}$$

$$U_1 = n_1 n_2 + \frac{n_2(n_2+1)}{2} - R_2 \tag{3.8}$$

$$\mathrm{U} = \min(U_1, U_2) \tag{3.9}$$

Where R_1 is the adjusted rank sum for sample one and R_2 is the adjusted rank sum of sample two.

The null hypothesis of Mann-Whitney test is that both samples are from the same population while an alternative hypothesis to the test is that one sample yields different value from the other.

3.6.2 Multivariate Analysis

Following Denis and Mihov (2003) and Arena (2011), we use the incremental technique for multivariate analysis (multinomial logistic regression) on debt choice of the sources of debt. Multinomial logistic regression is a more general version of logistic regression, with more than two possible discrete outcomes (Greene, 2011). In other words, the logistic model is a special case of the multinomial model in which the dependent variable is binary. Consistent with prior studies of debt mix (e.g., Arena, 2011), multinomial logistic models are used to predict the likelihood of a new choice of debt source. King et al. (2011) argue that multinomial logistic regression fits the analysis of debt mix according to the incremental issues of debt in practice. This approach facilitates determination of specific factors that drive the choice of a new debt issue over alternative sources at a given time. Denis and Mihov (2003) point out that the multinomial logistic regressions fit the analysis to distinguish and derive simultaneous comparisons among the determinants of the choice of debt sources.

Considering the influence of time-varying effect on firm characteristics, this approach allows a linkage of debt choice with explanatory variables measured immediately before the decision (Morellec et al., 2012). This methodology also considers the time required for the management team to assess the relevant factors that affect debt choice prior to making the financing decision, plus pre-issue work such as document preparation for debt issue in the market, process to have approval from related authorities, time allowed by external investors to subscribe or lend, and the effect to appear in the annual books of accounts (Antoniou et al. 2008b). Additionally, incremental approach does not require an optimal debt mix for the observation and provides useful results that also complement research in optimal debt mix (Arena, 2011).

Similar to Arena (2011) and King et al. (2011), the specification of multinomial logistic regression is shown as follows:

$$\Pr(Debt\ source = m|X) = \frac{\exp(X\beta_{m|b})}{\sum_{j=1}^{J}\exp(X\beta_{j|b})}\ for\ m = 1\ to\ J \tag{3.10}$$

where b is the comparison group. J represents the five sources of debt (public debt, syndicated loans, bilateral loans, 144A private debt, traditional non-bank private debt). *m* takes a value of 1 if the firm issues syndicated loans, 2 for bilateral loans, 5 for 144A private debt, 6 for traditional non-bank private debt, and 7 for public debt. X indicates a vector of explanatory variables.

As this chapter investigates firms' choice of more general debt sources, we link the choice of debt to issue with credit quality, information asymmetry, market factors, macroeconomic conditions, and all other control variables. Specifically, we conduct logistic analysis to predict the likelihood of a new debt issue. The model is defined as follows:

$$Choice\ of\ Debt_{i,t} = \beta_0 + \beta_1 Credit\ Quality + \beta_2 Information\ Asymmetry + \beta_3 Market\ Factors + \beta_4 Macroeconomic\ Conditions + \beta_5 c_5 + \beta_6 c_6 + \cdots + \beta_n c_n \qquad (3.11)$$

where choice of debt at year t is a binary variable that takes 1 if one category between two debt categories is issued by firm i and 0 if the other category is issued. Comparisons between categories include public debt vs. private debt, bank loans vs. non-bank private debt. Explanatory and control variables are taken one year prior to the debt issue to allow appropriate time for management of the firm to make a decision of debt financing. Consistent with Altunbaş et al. (2010), we estimate a logistic model with random effects in order to control for unobserved heterogeneity. $c_5, c_6, \ldots c_n$ account for control variables. These control variables are defined below.

3.6.3 Control Variables

Issue Characteristics: The likelihood of public debt issue increases with issue size due to flotation costs (Denis and Mihov, 2003; Arena, 2011). Firms that issue a large amount of public debt benefit from economies of scale. Denis and Mihov (2003) and Arena (2011) also find that firms with larger issue size show less credit risk and better reputation, which facilitate benefit from cost-efficient public debt issue. Public issue is the largest in absolute issue size but the lowest relative to total assets (Denis and Mihov, 2003). Their findings indicate that public debt issuers are larger. This is also consistent with flotation costs theory (Blackwell and Kidwell, 1988). The work of Denis and Mihov (2003) reports another interesting point that public bond issues have the greatest maturity against bank and non-bank private debt and that non-bank private debt issues have the highest yield to maturity compared to bank loans and public debt. We focus on three issue characteristics in this research: (1) *principal*; (2) *years to final maturity*; (3) *yield to maturity.*

Growth Opportunities: Growth opportunities capture expected value of future earnings relative to book assets, as this considers expected future profits from the investors' view as intangible assets which are not included in the book value of assets (Altunbaş et al., 2010). Growth opportunities entail the growth potential of the firm. Information asymmetry theory explains that investors of firms with information asymmetry between insiders and outsiders are less likely to be aware of the growth opportunities if firms issue debt privately (Antoniou et al., 2008b). The use of public debt will not be preferred by firms with growth opportunities for the concern of disclosing sensitive information (Yosha, 1995). Conversely, Antoniou et al. (2008b) assume that the issue of bank debt is negatively related to growth opportunities. They argue that banks are treated as a hold-up in the eyes of firms with single reliance on bank loans, which is a further argument of Hoshi et al. (1993) who find that firms that have favourable investment opportunities prefer to use public debt relative to private debt because foregoing profitable investments due to high cost of bank loans is costly. Borrowing from banks relative to public debt also involves higher probability of financial distress because lower-levered firms reply on public debt (highly-levered firms use private debt). We use Tobin's Q, which is calculated as ratio of market assets to total assets prior to issue date to measure investment opportunities. Our estimation models control for Tobin's Q. A negative sign on Tobin's Q means the market value of the firm drops as the market may have perceived negative information about value and risk of the firm, for example, firms may have foregone investments. The negative coefficient on Tobin's Q could also suggest that firms' capacity to raise external capital drops. Hence, the possibility of financial distress increases.

Firm Age: Firm age shows a close association with reputation and information asymmetry of the firm. Mature firms with a better reputation on credit quality show less unobservable credit risk and are, accordingly, less risky than younger firms (Johnson, 1997). Mature firms are also likely to be large firms. Such firms have built a long-term firm-client relationship, and are intuitively more transparent to the public. Firm age also entails the business cycle of the firm (Diamond, 1991). Other than reputation, firm age signalizes the credit quality of the firm to the public. We count firm age as the number of years from the date the firm was reported in CRSP to the issue date.

Financial Distress: Financial distress (the threat) pushes firms to look for lenders that can solve the renegotiation and liquidity problem. Private borrowings are more likely to be associated with flexibility of renegotiation and liquidity needs relative to public debt (Denis and Mihov, 2003; King et al., 2011). We use *Z-score* to measure a firm's financial distress (the threat).

Industry Conditions: King et al. (2011), among others, demonstrate the significant impact of industry conditions on debt choice. Firms with more specialized assets than counterparts in the same industry tend to have higher liquidity as the amount of specialized assets indicates the collateral value of a firm. Regulated firms tend to issue public debt relative to private instruments. Graham and Leary (2011) summarize that the majority of the cross-sectional variation is within industries rather than across industries. According to Leary and Roberts (2014), the industry leverage level leads to significant change to the leverage level of a firm. For example, when the industry leverage increases, the firm's leverage ratio is higher. Moreover, growth opportunities or the financial health of counterparts in the industry may be considered by managers to determine the choice of debt sources. We use two proxies to measure industry conditions: (1) *deviation from target leverage*; (2) *term spread.*

Leverage: Leverage measures the effect of total debt at the current level on the choice of new debt issue, which may deliver a signal to investors regarding the operations of the firm. On the one hand, firms that show a higher leverage ratio may have already obtained a higher reputation and, consequently, are likely to issue public debt (Denis and Mihov, 2003). Firms with high leverage may avoid borrowing from banks in order to reduce the liquidity problem (Diamond, 1991). On the other hand, private (especially bank) monitoring may improve a firm's pubic reputation, thus leading to lower cost of public debt issue (Antoniou et al., 2008b). This implies an increasing emphasis on private debt relative to public debt, particularly bank loans over public debt. We use total debt to total assets ratio to measure leverage.

Taxation: The interest of a debt has a shield effect on tax. Trade-off theory suggests that a high tax rate increases the tax benefit of interest on debt, thus leading to more debt issues in the market when tax rates are higher. In addition, tax has a significant effect on the firm's financing decision because of reputation accumulated from debt issues. Net operating losses carry forward (NOLCF) largely captures non-debt tax shields which is a substitute of the tax benefit. NOLCF is associated with losses in previous and consecutive periods, holding on the condition that the tax rules allow to carry forward losses. This feature fits the methodological design of the second empirical chapter that covers time-varying effect of debt choices. We use *net operating loss carry forward (NOLCF)* to measure tax effect.

Profitability: Profitability measures a firm's ability to generate profits. It reflects a firm's ability to repay or pay out debt obligations (Bhagat and Frost, 1986). Mizen and Tsoukas (2011) argue that the profitability of the firm reduces risk of debt in default and attracts positive NPV investment projects, thus affecting debt financing decisions positively. Moreover, firms can accumulate reputation and attract more public funds with developed reputation at a later date. We use the ratio of EBIT to total assets to measure profitability.

Risk: Firms with a volatile cash flow are likely to raise external capital for future investment and cash shortfalls. Mackie-Mason (1989) argues that firms with a volatile cash flow are likely to hold more sensitive information. This information asymmetry makes the issue of public debt more expensive than private debt as it increases the cost of debt. Conversely, Antoniou et al. (2008b) find that cash flow volatility characterizes credit risk and probability of bankruptcy. A positive relationship is reported between cash flow volatility and bank loans given that bank loans offer possibilities to renegotiate material terms to firms under financial distress. Antoniou and his colleagues add that firms with a volatile cash flow may also suffer increased deviation from expected value of EBIT and, consequently, experience increasing financial distress costs. We use *cash flow volatility (CFVOL)* to measure risk of the firm.

3.7 Results

3.7.1 Univariate Analysis

The univariate analysis in this sub-section is aimed to answer the research question "*Is the choice of debt source dependent on credit quality, information asymmetry, market conditions, or macroeconomic conditions?*" We test the differences of the four principal factors and control variables on the choice between the five debt sources and on the choice between one of the five debt sources and a different, more general, debt category.

We report p-values of the difference of the medians by way of an unbalanced mixed model (Kruskal-Wallis and Wilcoxon Rank-sum) of variance with random firm and year effects in parentheses. Kruskal-Wallis is used to test differences of selected explanatory variable medians, and Wilcoxon Rank-sum is used to test differences of variables in proportions. This is driven by the idea that the same firm may raise capital from different sources of debt at different times, and data analysis can be affected by dependency among different debt sources (Arena, 2011). Our tests are designed to control for the dependency. P-values represent the significance of the test of the difference of the medians.

Table 3.4 Univariate Analysis

Panel A Univariate Analysis on Differences in Medians for Basic Debt Sources

1995-2011	(1) Sole vs. Syn	(2) 144A vs. Syn	(3) Traditional vs. Syn	(4) Public vs. Syn	(5) 144A vs. Sole	(6) Traditional vs. Sole	(7) Public vs. Sole	(8) Traditional vs. 144A	(9) Public vs. 144A	(10) Public vs. Traditional
Principal	-190.50	50.00	-135.00	184.00	240.50	55.50	374.50	-185.00	134.00	319.00
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Proportion of firms with investment grade among rated firms	-0.26	-0.21	0.30	0.34	0.06	0.57	0.61	0.51	0.55	0.04
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Proportion of rated firms	-0.41	0.22	-0.08	0.42	0.63	0.33	0.82	-0.30	0.20	0.49
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Assets	-698.31	522.89	138.34	4,733.67	1,221.20	836.65	5,431.98	-384.55	4,210.78	4,595.33
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market capitalization	-624.96	152.34	177.40	4,446.65	777.30	802.37	5,071.61	25.06	4,294.31	4,269.24
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.557)	(0.000)	(0.000)
Age	-6.00	-1.00	6.00	21.00	5.00	12.00	27.00	7.00	22.00	15.00
	(0.000)	(0.230)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Q	0.03	-0.11	0.06	0.10	-0.14	0.04	0.07	0.18	0.21	0.03
	(0.869)	(0.000)	(0.001)	(0.000)	(0.001)	(0.040)	(0.001)	(0.000)	(0.000)	(0.308)
Profitability	-0.03	-0.01	0.02	0.01	0.02	0.04	0.04	0.02	0.02	0.00
	(0.000)	(0.171)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.971)
Tangibility	-0.08	0.07	0.06	0.09	0.15	0.14	0.17	-0.02	0.01	0.03
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.760)	(0.016)	(0.021)
Proportion of firms with Z less than 1.81	-0.06	0.15	-0.09	0.00	0.21	-0.03	0.06	-0.24	-0.14	0.09
	(0.000)	(0.000)	(0.000)	(0.781)	(0.000)	(0.180)	(0.000)	(0.000)	(0.000)	(0.000)
Book leverage	-0.10	0.12	-0.02	0.01	0.22	0.08	0.11	-0.14	-0.11	0.03
	(0.000)	(0.000)	(0.001)	(0.024)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
NOLCF	0.00	0.02	0.00	0.00	0.02	0.00	0.00	-0.02	-0.02	0.00
	(0.661)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.000)	(0.000)	(0.001)
Deviation from target	-0.02	0.06	-0.02	-0.02	0.09	0.00	0.00	-0.08	-0.08	-0.00
	(0.012)	(0.000)	(0.000)	(0.000)	(0.000)	(0.089)	(0.017)	(0.000)	(0.000)	(0.877)
Yield spread	0.00	0.14	0.00	0.14	0.14	0.00	0.14	-0.14	0.00	0.14
	(0.000)	(0.000)	(0.102)	(0.224)	(0.000)	(0.254)	(0.000)	(0.000)	(0.000)	(0.048)
GDP growth	0.44	-0.56	0.44	0.00	-1.00	0.00	-0.44	1.00	0.56	-0.44
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.961)	(0.000)
Proportion of firms with recession year(s)	-0.06	0.05	-0.03	0.06	0.11	0.03	0.13	-0.08	0.02	0.09
	(0.000)	(0.000)	(0.048)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.013)	(0.000)

Results from univariate analysis of differences in medians for the choice between syndicated loans, bilateral loans, traditional non-bank private debt, 144A private debt, and public debt over the period of 1995-2011. Differences of selected explanatory variable medians are estimated by Kruskal-Wallis test. Differences in proportions are estimated by Wilcoxon rank-sum test. *Principal* (in \$ million) is the amount of capital a firm has raised from the issue. *Years to maturity* equals the number of years to maturity of debt issues. *Assets* (in \$ million) is the book value of assets. *Market capitalization* (in \$ million) is the number of shares outstanding multiplied by the closing stock price at the end of the fiscal year prior to issue year. *Q* is the sum of market value of equity minus book value of equity plus book value of debt divided by book value of assets. *Profitability* is the ratio of EBITDA to total assets. *Tangibility* is the ratio of net plants, property and equipment to total assets prior to issue date. *Book leverage* is the ratio of total debt to book assets. *NOLCF* is the ratio of net operating loss carry forward to total assets prior to issue date. *Deviation from target* is the difference between the firm's market leverage and the average market leverage of the industry. *Yield spread* is the difference between yield of 10-year government bond and the yield of three-month T-bills. *GDP growth* is the annual growth rate of GDP. *Age* is the number of years from the year reported in Compustat to the issue year. Sole is abbreviated for sole loans or bilateral loans. 144A is abbreviated for 144A private debt. Traditional is abbreviated for traditional non-bank private debt. Public is abbreviated for public debt. P-values which represent the significance of the test of the difference of the medians are reported in parentheses.

Table 3.4 Univariate Analysis

Panel B Univariate Analysis on Differences in Medians for More General Debt Sources

1995-2011	(1) Bank vs. Traditional	(2) Bank vs. 144A	(3) Bank vs. Public	(4) Bank vs. Non-bank private	(5) Non-bank private vs. Syn	(6) Non-bank private vs. Sole	(7) Non-bank private vs. Public	(8) Private vs. Public
Principal	85.00	-100.00	-234.00	-50.00	0.00	190.50	-184.00	-228.00
	(0.000)	(0.000)	(0.000)	(0.000)	(0.108)	(0.000)	(0.000)	(0.000)
Proportion of firms with investment grade among rated firms	-0.31	0.20	-0.35	0.10	-0.11	0.16	-0.45	-0.38
	(0.000)	(0.000)	(0.144)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Proportion of rated firms	0.03	-0.27	-0.47	-0.18	0.13	0.54	-0.29	-0.42
	(0.130)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Assets	-322.29	-706.84	-4,917.62	-587.93	403.98	1,102.29	-4,329.69	-4,774.25
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market capitalization	-341.11	-316.05	-4,610.36	-327.00	163.29	788.25	-4,283.36	-4,530.79
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age	-7.00	0.00	-22.00	-2.00	1.00	7.00	-20.00	-22.00
	(0.000)	(0.024)	(0.000)	(0.000)	(0.013)	(0.000)	(0.000)	(0.000)
Q	-0.06	0.11	-0.09	0.06	-0.05	-0.08	-0.15	-0.11
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Profitability	-0.02	0.01	-0.02	0.00	0.00	0.03	-0.01	-0.01
	(0.000)	(0.773)	(0.000)	(0.008)	(0.138)	(0.000)	(0.000)	(0.000)
Tangibility	-0.06	-0.08	-0.10	-0.08	0.07	0.15	-0.02	-0.08
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.087)	(0.004)	(0.000)
Proportion of firms with Z less than 1.81	0.08	-0.16	-0.01	-0.08	0.07	0.14	0.07	0.01
	(0.000)	(0.000)	(0.311)	(0.000)	(0.000)	(0.000)	(0.000)	(0.315)
Book leverage	0.01	-0.13	-0.02	-0.08	0.06	0.17	0.05	0.00
	(0.096)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.980)
NOLCF	0.00	-0.02	0.00	0.00	0.00	0.01	0.01	0.00
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Deviation from target	0.02	-0.07	0.02	-0.04	0.03	0.05	0.05	0.03
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Yield spread	0.00	-0.14	-0.14	-0.14	0.14	0.14	0.00	0.00
	(0.214)	(0.000)	(0.057)	(0.000)	(0.000)	(0.031)	(0.002)	(0.650)
GDP growth	0.00	1.00	0.44	0.44	0.00	-0.44	0.00	0.44
	(0.001)	(0.000)	(0.000)	(0.005)	(0.333)	(0.000)	(0.006)	(0.000)
Proportion of firms with recession year(s)	0.02	-0.05	-0.07	-0.03	0.02	0.09	-0.04	-0.06
	(0.169)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)

Results from univariate analysis of differences in medians for the choice between one of the five debt sources (syndicated loans, bilateral loans, traditional non-bank private debt, 144A private debt, and public debt) and one of the more general categories (bank loans, non-bank private debt, and private debt) over the period of 1995-2011. Differences of selected explanatory variable medians are estimated by Kruskal-Wallis test. Differences in proportions are estimated by Wilcoxon rank-sum test. Principal (in $ million) is the amount of capital a firm has raised from the issue. Years to maturity equals the number of years to maturity of debt issues. Assets (in $ million) is the book value of assets. Market capitalization (in $ million) is the number of shares outstanding multiplied by the closing stock price at the end of the fiscal year prior to issue year. Q is the sum of market value of equity minus book value of equity plus book value of debt divided by book value of assets. Profitability is the ratio of EBITDA to total assets. Tangibility is the ratio of net plants, property and equipment to total assets prior to issue date. Z equals 1 if the ratio of (3.3*earnings before interests and tax plus sales plus 1.4*retained earnings plus 1.2*current assets minus current liability) to total assets smaller than 1.81, 0 otherwise. Book leverage is the ratio of total debt to book assets. Net operating loss carry forward (NOLCF) is the ratio of net operating loss carry forward to total assets prior to issue date. Deviation from target is the difference between firm's market leverage and the average market leverage of the industry. Yield spread is the difference between yield of 10-year government bond and the yield of three-month T-bills. GDP growth is the annual growth rate of GDP. Age is the number of years from the year reported in Compustat to the issue year. Bank is abbreviated for bank loans. Traditional is abbreviated for traditional non-bank private debt. 144A is abbreviated for 144A private debt. Public is abbreviated for public debt. Non-bank private is abbreviated for non-bank private debt. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. Private is abbreviated for private debt. P-values which represent the significance of the test of the difference of the medians are reported in parentheses.

Panel A of Table 3.4 reports the results from univariate analysis of the choice between the five debt categories (syndicated loans, bilateral loans, traditional non-bank private debt, 144A private debt, and public debt), including ten comparison groups. This set of comparisons considers all possibilities of comparisons between the five debt categories.

Panel B of Table 3.4 reports the results of univariate analysis of choice between one of the five debt sources and a more general category, including eight comparison groups. A more general category could be "bank loans", "non-bank private debt", or "private debt". We include both syndicated loans and bilateral loans into the category of "bank loans", include both 144A private debt and traditional non-bank private debt into the category of "non-bank private debt", and include bank loans and non-bank private debt into the category of "private debt". Our comparisons do not include the choice between a category and its more general categories as this incurs overlap between categories. For example, we do not consider the choice between syndicated loans (the category) and bank loans (the more general category).

Credit Quality

For all ten comparisons in *Panel A* of Table 3.4, significant coefficients on proportion of firms with credit rating and proportion of firms with investment grade if rated show that credit quality for issuers of different debt categories is significantly different. Our results show that public debt issues are related to higher credit quality. This is in comsistent with the findings of Denis and Mihov (2003) and Arena (2011); public bond issuers have significantly higher proportion of rated firms and higher proportion of firms with investment grade if rated than all private debt issuers. We also find that sole bank loans borrowers have significantly lower proportions of being rated and lower proportions with investment grade if rated than issuers of other debt sources. *Panel B* of Table 3.4 reports the results from univariate analysis of differences in variables for comparisons regarding more general categories (bank loans, non-bank private debt, and private debt);it shows consistent results with those reported in *Panel A* of Table 3.4, that public debt issuers are more likely to be rated than bank debt issuers and non-bank debt issuers. However, there is no significant difference between bank debt issuers and public debt issuers on proportion of firms with investment grade if rated. Our results enlighten that credit quality plays an important role in determining the decision-making among various categories of debt sources, and that the effect of investment grade rating on debt choices may be strengthened even further.

Information Asymmetry

Due to limited access to analyst information of private debt borrowers, we mainly focus on alternative information asymmetry measures, namely, total assets and market capitalization. Size is used as a measure of information asymmetry in the context. One limitation of this measure for private debt is that size could be limited to capture part of information asymmetry. It is explained that those relying on private debt for funding are mainly small firms that are not mature and have not raised strong reputation to issue public debt, not because of information asymmetry. Panel A of Table 3.4 shows that public debt issuers have much higher median values on total assets (market capitalization) than issuers of any other debt categories, meaning lower levels of information asymmetry. *Panel B* of Table 3.4 reports that public debt issuers' total assets (capitalization) in median value are $ 4,774 (4,531) million more than all private issuers. Total assets (capitalization) of public debt issuers outweigh that of bank loans borrowers by $ 4,918 (4,610) million and that of non-bank private debt borrowers by $ 4,330 (4,283) million. Our results are consistent with Denis and Mihov (2003) and Arena (2011). The firms with greater total assets and market capitalization should have lower levels of information asymmetry and are less likely to substitute assets at bondholders' expense. Moreover, as these firms face low levels of information asymmetry, they experience lower costs for producing information and less severe problems of moral hazard (Leland and Pyle, 1977). Creditors should experience lower cost of monitoring.

Market Conditions

Panel A of Table 3.4 shows that firms issuing bilateral loans have lower fixed assets ratios than their counterparts that issue other categories of debt. Firms issuing public bonds have higher fixed assets ratios than any other debt categories. The results from univariate analysis for more general categorized debt as reported in *Panel B* of Table 3.4 show consistency with those in *Panel A.* Firms borrowing bank loans have lower fixed asset ratios than those borrowing traditional non-bank private debt, 144A private debt, non-bank private debt, and public debt. Additionally, firms borrowing debt from public creditors also show higher fixed assets ratios than those borrowing from non-bank private creditors, and private creditors. This can be explained by private creditors' being better able to take observable risks (Kale and Meneghetti, 2011). According to Boot et al. (1991), public borrowings are also associated with higher collateral value.

Macroeconomic Conditions

We look, particularly, at GDP growth and proportion of firms with recession years as measures of macroeconomic conditions in the univariate analysis. *Panel A* of Table 3.4 shows no significant difference in median values of macroeconomic conditions between syndicated loans and public debt when the economy changes. We also observe that when the economy is good, firms prefer bilateral loans to syndicated loans, syndicated loans to 144A private debt, traditional non-bank private debt to syndicated loans, public debt to syndicated loans, sole loans to 144A private debt, bilateral loans to public debt, traditional non-bank private debt to 144A private debt, and traditional non-bank private debt to public debt. *Panel B* of Table 3.4 shows that firms prefer bank debt to 144A private debt, and non-bank private debt when the economy is good. In the event of a good economy, public debt is not a preferred option compared to bank loans, non-bank private debt, and private debt. This is consistent with the work of Julio et al. (2007). Julio and his colleagues argue that periods of poor economy see increasing market frictions and financial constraints. Financially constrained firms are more likely to be affected by the state of economy. When the economy is becoming better, financially constrained firms are likely to borrow debt that is associated with lower cost of debt. These firms also benefit from building reputation over periods of good economy (Diamond, 1991).

Control Variables

Syndicated Loans vs. Bilateral Loans

Apart from the above principal factors, control variables also affect the choice of debt sources. *Panel A* of Table 3.4 reports that firms that prefer syndicated loans to bilateral loans are characterized by larger issue size, older firm age, higher profitability, higher likelihood to have an Altman's Z below 1.81, larger deviation from target, lower yield spread, and higher leverage ratio. These results are in line with characteristics of lower information asymmetry and higher credit quality for syndicated loans borrowers. One explanation is that the syndicated loans market with a capacity to provide transparency and massive funding is recognized to be closer to the bond market and is superior to the bilateral loans market (Armstrong, 2003).

144A Private Debt vs. Traditional Non-bank Private Debt

With respect to the comparison between 144A private debt and traditional non-bank private debt, *Panel A* of Table 3.4 shows that 144A private debt issuers are characterized by larger issue size, younger firms' age, lower Tobin's Q, lower profitability, higher likelihood to have an Altman's Z below 1.81, higher leverage, higher net operating loss carry forward to total assets ratio, larger deviation from target, and higher yield spread. These results are consistent with Arena's (2011) results. In accordance with Carey et al. (1993), 144A private debt is preferred to traditional non-bank private debt due to speed of issuance and lower flotation cost associated with 144A private debt. According to Arena (2011), these results are consistent with the view that 144A private debt issuers are characterized by lower credit quality.

Bank Loans vs. Non-bank Private Debt

In *Panel B* of Table 3.4, we report results from the univariate analysis for comparisons between non-bank private debt and bank loans, and public debt and private debt. Non-bank private debt issuers relative to bank loan borrowers take on larger amounts of debt, are older, less profitable, have lower Tobin's Q, lower net operating loss carry forward to total assets ratio, are more likely to have an Altman's Z below 1.81, have higher leverage ratio, larger deviation from target, and higher yield spread. These results are consistent with the view that non-bank private debt lenders serve firms with higher observable risk while banks serve low-risk borrowers (Carey et al., 1998). There are two explanations associated with this view. One aspect is that debt lenders' ability in taking observable risk is limited by regulations and capital requirements. Another, from the view of banks, is that lending to high-risk borrowers may deteriorate reputation of not forcing borrowers in distress into liquidation.

Public Debt vs. Private Debt

As shown in Panel B of Table 3.4, public debt issuers are characterized by larger issue size, older firm age, higher Tobin's Q, larger profitability, lower net operating loss carry forward to total assets ratio, and smaller deviation from target. These results are in line with the work of Denis and Mihov (2003) and Arena (2011). Firms with lower levels of information asymmetry prefer to borrow debt publicly. These observations are consistent with the view that firms with high levels of information asymmetry prefer to borrow debt privately and could be explained by the three main theories. First, information asymmetry theory argues that firms with higher levels of information asymmetry have lower costs for producing information to creditors (Diamond, 1984). Second, the efficiency of renegotiation and liquidation argues that renegotiation of private debt is relatively more flexible and cheaper for firms in financial distress and are less likely to be forced into liquidation (Chemmanur and Fulghieri, 1994). Third, flotation cost theory argues that the issue of public debt to a substantial amount is associated with economies of scale (Blackwell and Kidwell, 1988).

3.7.2 Multivariate Analysis

Multivariate analysis is a more comprehensive and detailed process to test *Hypothesis 3.1.1 to Hypothesis 3.4.4* positing the effect of the four principal factors (i.e., credit quality, information asymmetry, market conditions, and macroeconomic conditions) on the choice between public debt and private debt, bank loans and non-bank private debt, 144A private debt and traditional non-bank private debt, and syndicated loans and bilateral loans. These hypotheses are tested by using *equation (3.11).* This section is also aimed to answer the main research question "*Is the choice of debt source dependent on credit quality, information asymmetry, market conditions, or macroeconomic conditions?*" Table 3.5 shows the results from the multivariate analysis. *Panel A* of Table 3.5 represents coefficients of multinomial logistic regressions for 10 different comparison groups across the five debt categories. *Panel B* reports the empirical results for comparisons between various debt categories given more general categories such as "bank loans", "non-bank private debt", and "private debt", including eight comparison groups. Consistent with univariate analysis, we include syndicated loans and bilateral loans into the category of "bank loans", include 144A private debt and traditional non-bank private debt into the category of "non-bank private debt", and include bank loans and non-bank private debt into the category of "private debt".

Credit Quality

Panel A of Table 3.5 shows that investment grade rating has a positive effect on the choice of traditional non-bank private debt relative to syndicated loans, the choice of public debt relative to syndicated loans, the choice of traditional non-bank private debt relative to bilateral loans, the choice of public debt relative to bilateral loans, the choice of traditional non-bank private debt relative to 144A private debt, and the choice of public debt relative to 144A private debt. The choice of 144A private debt relative to syndicated loans is negatively related to investment grade rating. We learn that firms with higher investment grade ratings are likely to issue public debt or traditional non-bank private debt first, syndicated loans second and 144A private debt last. The results provide evidence to support *Hypothesis 3.3.1 that firms with a higher credit quality* *prefer traditional non-bank private debt to 144A private debt*. This finding is consistent with that of Denis and Mihov (2003) and Arena (2011). According to Arena (2011), this can be explained that compared to traditional non-bank private debt, a) 144A private debt is not associated with contractual obligations such as covenants or collateral; b) 144A private debt is usually subordinated and monitoring activities are not practically undertaken by investors; c) risk of borrowing 144A private debt is relatively lower for firms with lower credit quality; d) 144A does not require an initial registration and is potentially convertible to public bond after issue. These features apparently reveal benefits to firms with lower credit quality. Moreover, firms with higher investment grade ratings prefer traditional non-bank private debt and public debt to bilateral loans. The evidence above does not support *Hypothesis 3.4.1 that firms with higher credit quality prefer syndicated loans to bilateral loans*.

As reported in *Panel B* of Table 3.5, investment grade rating has a positive impact on the probability of traditional non-bank private debt vs. bank loans, the probability of public debt vs. bank loans, the probability of bank loans vs. non-bank private debt, the probability of syndicated loans vs. non-bank private debt, the probability of public debt vs. non-bank private debt, and the probability of public debt vs. private debt. Investment grade rating has a negative effect on the probability of 144A private debt vs. bank loans. The findings are shown below. First, firms with investment grade prefer public debt to private debt, which supports *Hypothesis 3.1.1 that firms with higher credit quality prefer public debt to private debt.* This finding is consistent with Denis and Mihov (2003) and Arena (2011). Berger and Udell (1998) argue that firms with lower credit quality prefer private debt because private debt categories including bank loans and non-bank private debt offer monitoring and covenants with lower cost of debt. These firms also benefit from building reputation from private debt claims for public debt borrowings at a later date. Diamond (1991) finds that firms with low credit quality take advantage of a reputation built from private debt borrowings to access public debt markets later. Moreover, Chandra and Nayar (2008), among others, find that firms with high credit quality experience an increase on share price after issuing public debt. This is because public debt announcement signals positive NPV investment opportunities and creditworthiness. Second, firms with investment grade prefer bank loans to non-bank private debt, which supports *Hypothesis 3.2.1 that firms with higher credit quality prefer bank loans to non-bank private debt*. This finding is consistent with the work of Denis and Mihov (2003). According to Kwan and Carleton (1995), compared to bank loans, non-bank private debt is tightly held and illiquid due to regulatory restrictions. Firms with lower credit quality also benefit from lower flotation costs and custom-designed covenants (Denis and Mihov, 2003). Monitoring of banks runs on a daily basis, leading to tremendous costs that exceed relevant benefits to firms with low credit quality (Diamond, 1991). Given that 144A private debt is regarded as the majority of non-bank private debt (Denis and Mihov, 2003), a combined nature of both bank loans and public debt reflected on 144A private debt may match the need of firms with low credit quality perfectly. Moreover, firms with low credit quality have to face a large amount of loan loss reserve as required by banking regulations (Carey et al., 1998). In addition, non-bank private debt is associated with more concentrated ownership compared to syndicated loans which account for the majority of bank loans (Altunbaş et al., 2010), thus resulting in more flexibility of renegotiation in default. Finally, we also find that firms with investment grade follow a pecking order of traditional non-bank private debt, bank loans, and 144A private debt.[68]

Panel A of Table 3.5 also reports coefficients of not rated dummy. We observe that not rated dummy increases the probability of bilateral loans vs. syndicated loans, the probability of traditional non-bank private debt vs. syndicated loans, and the probability of traditional non-bank private debt vs. 144A private debt. However, not rated dummy decreases the probability of public debt vs. bilateral loans, the probability of 144A

[68] Following Denis and Mihov (2003) and Arena (2011), a pecking order of debt choices conditional on an explanatory variable is determined by the significant difference in the median of the explanatory variable (univariate analysis) and significance of the coefficient of the explanatory variable (multinomial logistic analysis). With regard to univariate analysis of the difference of the median of the variable, we calculate the p-values of the difference of the means by using unbalanced mixed model of variance and controlling for random firm and year effects. With respect to multinomial logistic analysis, the dependent variable of the multinomial logistic regression considers more than two possible discrete outcomes, thus distinguishing and deriving simultaneous comparisons among the determinants of the choice of debt sources.

private debt vs. bilateral loans, the probability of public debt vs. bilateral loans, the probability of public debt vs. 144A private debt, and the probability of public debt vs. traditional non-bank private debt. Hence, it is indicated that firms with credit ratings borrow debt capital by following an order of: 1) public debt; 2) syndicated loans or 144A private debt; 3) bilateral loans or traditional non-bank private debt. Explanations on this finding are consistent with interpretation of the effect of investment grade rating on the choice between 144A private debt and traditional non-bank private debt. According to Altunbaş et al. (2010), a rising number of syndicated loans rated by independent rating agencies call for presence of credit rating in the credit market. Firms with credit ratings have easier access to the syndicated loans market. Moreover, as there are required activities to monitor the creditworthiness of borrowers after initial agreement between syndicate members and the borrower (Wittenberg-Moerman, 2008), firms with credit ratings are less restricted by these requirements.

Panel B of Table 3.5 also provides information that not rated dummy relates positively to the probability of traditional non-bank private debt vs. bank loans, while it relates negatively to the probability of public debt vs. bank loans, the probability of bank loans vs. non-bank private debt, the probability of syndicated loans vs. non-bank private debt, the probability of public debt vs. non-bank private debt, and the probability of public debt vs. private debt. We learn that: 1) firms with credit ratings prefer public debt to private debt; 2) firms with credit ratings prefer bank loans to non-bank private debt. Our results are consistent with Denis and Mihov (2003) and Arena (2011). These results are consistent with the view that firms with higher credit quality prefer public debt to private debt, and bank loans to non-bank private debt.

Therefore, we find that:

- Firms with higher credit quality follow a pecking order on the choice of debt sources: 1) public debt or traditional non-bank private debt; 2) syndicated loans; 3)144A private debt.
- Firms with higher credit quality prefer public debt to private debt.

- Firms with higher credit quality prefer bank loans to non-bank private debt.

Our results support *Hypotheses 3.1.1, 3.2.1, and 3.3.1*, and reject *Hypothesis 3.4.1*. We also find that firms with credit ratings relative to those without credit ratings borrow debt in the following pecking order: 1) public debt; 2) syndicated loans or 144A private debt; 3) bilateral loans or traditional non-bank private debt.

Information Asymmetry

Panel A of Table 3.5 shows that the level of information asymmetry is negatively accountable to the probability of 144A private debt over syndicated loans, the probability of traditional non-bank private debt over syndicated loans, the probability of public debt over syndicated loans, the probability of traditional non-bank private debt over bilateral loans, the probability of public debt over bilateral loans, the probability of traditional non-bank private debt over 144A private debt, and the probability of public debt over 144A. Information asymmetry is positively accountable to the probability of public debt over traditional non-bank private debt. Hence, we learn that firms with higher levels of information asymmetry tend to borrow syndicated loans first, 144A private debt second, public debt third and traditional non-bank private debt as a last resort. Additionally, bilateral loans are preferred by firms with higher levels of information asymmetry to traditional non-bank private debt or public debt. This favours *Hypothesis 3.3.2 that firms with higher levels of information asymmetry prefer 144A private debt to traditional non-bank private debt*. However, the results provide no evidence to accept *Hypothesis 3.4.2 that firms with higher levels of information asymmetry prefer bilateral loans to syndicated loans*. Our findings are in line with the work of Arena (2011) and Kaya (2013). The first interpretation of our findings is that, relative to traditional non-bank private debt, 144A is subordinated and monitoring by 144A debt holders is less strict so that firms with high levels of information asymmetry benefit from providing less sensitive information and experience a lower cost of debt. Moreover, unlike traditional non-bank private debt, 144A private debt does not require an initial registration, thus leading to a lower cost of producing information for firms with high levels of information asymmetry. 144A private debt, which is associated with the possibility to convert into a public debt at a later date, provides firms with high levels of information asymmetry with higher liquidity for future investment opportunities (Denis and Mihov, 2003).

Panel B of Table 3.5 reports that assets play a positive role on the probability of traditional non-bank private debt over bank loans, the probability of 144A private debt over bank loans, the probability of public debt over bank loans, the probability of public debt over non-bank private debt, and the probability of public debt over private debt. Negative roles of assets are observed on the following comparisons: bank loans vs. non-bank private debt, syndicated loans vs. non-bank private debt, and bilateral loans vs. non-bank private debt. We find that firms with higher levels of information asymmetry prefer private debt to public debt, which supports *Hypothesis 3.1.2 that firms with higher levels of information asymmetry prefer private debt to public debt*. One explanation is that firms with higher levels of information asymmetry have to face expensive costs regarding information disclosure such as certified financial statements for SEC registration (Blackwell and Kidwell, 1988), while these firms benefit from private borrowings and can gather the same information at lower cost (Krishnaswami et al., 1999). Another explanation is that, given that private creditors can price the firm's financing claim more accurately than public debt holders and can protect firms' sensitive information from dissemination (Campbell, 1979; Hadlock and James, 2002), those with higher levels of information asymmetry tend to raise capital from private debt holders to keep sensitive information confidential. Third, moral hazard theory (Diamond, 1984) argues that the efficiency of one intermediary, which is usually seen among private creditors, outweighs that of public creditors since individuals of public creditors may have an incentive to free-ride on others' monitoring efforts. Finally, firms with higher levels of information asymmetry that cannot be fully monitored by public creditors need to pay higher expenses to compensate for the risks associated with the moral hazard of asset substitution (Leland and Pyle, 1977; Krishnaswami et al., 1999).

Table 3.5 Multivariate Analysis

Panel A Multivariate Analysis on the Choice of Basic Debt Sources

1995-2011	(1) Sole vs. Syn	(2) 144A vs. Syn	(3) Traditional vs. Syn	(4) Public vs. Syn	(5) 144A vs. Sole	(6) Traditional vs. Sole	(7) Public vs. Sole	(8) Traditional vs. 144A	(9) Public vs. 144A	(10) Public vs. Traditional
Ln(principal)	-1.79	0.06	-1.30	-0.27	1.85	0.49	1.51	-1.36	-0.33	1.03
	(0.000)	(0.173)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Investment grade rating	-0.81	-0.92	0.50	0.59	-0.11	1.31	1.39	1.42	1.51	0.09
	(0.151)	(0.000)	(0.009)	(0.000)	(0.840)	(0.024)	(0.013)	(0.000)	(0.000)	(0.661)
Not rated	1.03	0.10	1.25	-1.55	-0.93	0.22	-2.58	1.15	-1.64	-2.80
	(0.061)	(0.484)	(0.000)	(0.000)	(0.098)	(0.696)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(assets)	0.06	0.18	0.94	0.67	0.13	0.89	0.61	0.76	0.48	-0.28
	(0.435)	(0.000)	(0.000)	(0.000)	(0.109)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(age)	-0.19	-0.23	0.27	0.12	-0.04	0.46	0.31	0.50	0.34	-0.15
	(0.086)	(0.000)	(0.001)	(0.040)	(0.768)	(0.000)	(0.012)	(0.000)	(0.000)	(0.101)
q	0.03	-0.09	-0.06	-0.04	-0.12	-0.09	-0.06	0.03	0.05	0.03
	(0.506)	(0.039)	(0.205)	(0.366)	(0.044)	(0.132)	(0.259)	(0.639)	(0.314)	(0.662)
Profitability	0.15	0.22	0.72	0.95	0.07	0.56	0.80	0.50	0.73	0.23
	(0.330)	(0.310)	(0.013)	(0.003)	(0.798)	(0.066)	(0.022)	(0.148)	(0.039)	(0.566)
Tangibility	0.76	0.14	0.76	0.59	-0.62	0.01	-0.17	0.62	0.45	-0.18
	(0.014)	(0.334)	(0.001)	(0.000)	(0.064)	(0.983)	(0.616)	(0.013)	(0.013)	(0.478)
Volatility	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.000)	(0.004)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.594)	(0.223)	(0.690)
Z	-0.57	0.23	-0.42	-0.11	0.80	0.15	0.46	-0.65	-0.34	0.31
	(0.000)	(0.004)	(0.000)	(0.138)	(0.000)	(0.376)	(0.006)	(0.000)	(0.000)	(0.013)
Book leverage	0.51	1.35	1.35	1.84	0.84	0.84	1.33	0.01	0.50	0.49
	(0.227)	(0.000)	(0.000)	(0.000)	(0.068)	(0.099)	(0.005)	(0.989)	(0.085)	(0.239)
Deviation from	-1.24	-0.47	-2.20	-2.81	0.78	-0.96	-1.57	-1.74	-2.35	-0.61
	(0.039)	(0.142)	(0.000)	(0.000)	(0.238)	(0.179)	(0.021)	(0.002)	(0.000)	(0.286)
NOLCF	-0.03	-0.00	0.01	-0.01	0.02	0.03	0.02	0.01	-0.01	-0.02
	(0.050)	(0.494)	(0.336)	(0.799)	(0.133)	(0.018)	(0.735)	(0.217)	(0.877)	(0.686)
GDP growth	0.19	-0.06	0.09	-0.12	-0.24	-0.10	-0.30	0.14	-0.06	-0.20
	(0.001)	(0.003)	(0.013)	(0.000)	(0.000)	(0.111)	(0.000)	(0.000)	(0.012)	(0.000)
constant	3.78	-2.06	-4.75	-5.26	-5.83	-8.53	-9.04	-2.69	-3.21	-0.51
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.346)
Obs	7,369									
LR chi2	5,039.37									
Prob>chi 2	0.000									
Pseudo R-square	0.26									

Multinomial logistic regression analysis on financing choice between the five public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt over the period of 1995-2011. The dependent variables are the log-odds ratio of the probability of issuing one type of debt relative another. *Ln(principal)* is the log of the amount of capital a firm has raised from the issue. *Ln(assets)* is the log of book value of assets. *Q* is the sum of market value of equity minus book value of equity plus book value of debt divided by book value of assets. *Profitability* is the ratio of EBITDA to total assets. *Tangibility* is the ratio of net plants, property and equipment to total assets prior to issue date. *Book leverage* is the ratio of total debt to book assets. *NOLCF* is the ratio of net operating loss carry forward to total assets prior to issue date. *Deviation from target* is the difference between a firm's market leverage and the average market leverage of the industry. *GDP growth* is the annual growth rate of GDP. *Ln(age)* is the log of the number of years from the year reported in Compustat to the issue year. *Volatility* is the standard deviation of annual operating income before depreciation over the past five years, it requires at least three consecutive years. *Z* equals 1 if Altman's Z-score is less than 1.81, otherwise 0. *Investment grade rating* takes 1 if the firm is assigned BBB or higher by S&P, otherwise 0. *Not rated* takes 1 if the firm has no existing credit rating, otherwise 0. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. 144A is abbreviated for 144A private debt. Traditional is abbreviated for traditional non-bank private debt. Public is abbreviated for public debt. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered P-values are reported in parentheses.

Table 3.5 Multivariate Analysis

Panel B Multivariate Analysis on the Choice of More General Debt Sources

1995-2011	(1) Traditional vs. Bank	(2) 144A vs. Bank	(3) Public vs. Bank	(4) Bank vs. Non-bank private	(5) Syn. Vs. Non-bank private	(6) Sole vs. Non-bank private	(7) Public vs. Non-bank private	(8) Public vs. Private
Ln(principal)	-0.98	0.17	-0.18	0.30	0.46	-1.13	0.23	-0.05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.187)
Investment grade rating	0.42	-0.95	0.57	0.75	0.71	-0.30	1.26	0.80
	(0.026)	(0.000)	(0.000)	(0.000)	(0.000)	(0.590)	(0.000)	(0.000)
Not rated	1.41	0.13	-1.55	-0.55	-0.48	0.37	-2.05	-1.76
	(0.000)	(0.367)	(0.000)	(0.000)	(0.000)	(0.510)	(0.000)	(0.000)
Ln(assets)	0.97	0.19	0.66	-0.49	-0.47	-0.56	0.16	0.48
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(age)	0.32	-0.22	0.13	0.07	0.09	-0.17	0.21	0.16
	(0.000)	(0.000)	(0.025)	(0.162)	(0.059)	(0.138)	(0.001)	(0.004)
Q	-0.08	-0.10	-0.04	0.07	0.06	0.09	0.02	-0.03
	(0.102)	(0.015)	(0.281)	(0.019)	(0.068)	(0.077)	(0.677)	(0.457)
Profitability	0.79	0.26	0.96	-0.49	-0.42	-0.31	0.52	0.80
	(0.007)	(0.226)	(0.002)	(0.007)	(0.023)	(0.172)	(0.118)	(0.010)
Tangibility	0.74	0.13	0.59	-0.34	-0.36	0.27	0.22	0.47
	(0.001)	(0.380)	(0.000)	(0.006)	(0.005)	(0.389)	(0.185)	(0.001)
Volatility	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.129)	(0.000)
Z	-0.36	0.24	-0.11	-0.02	-0.02	-0.49	-0.13	-0.11
	(0.001)	(0.003)	(0.162)	(0.724)	(0.808)	(0.002)	(0.146)	(0.136)
Book leverage	1.33	1.35	1.83	-1.44	-1.43	-1.10	0.37	1.29
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.012)	(0.170)	(0.000)
Deviation from target	-2.16	-0.42	-2.78	0.88	0.92	0.08	-1.88	-2.47
	(0.000)	(0.180)	(0.000)	(0.001)	(0.001)	(0.903)	(0.000)	(0.000)
NOLCF	0.01	-0.00	-0.01	0.00	0.00	-0.03	-0.01	-0.01
	(0.115)	(0.555)	(0.807)	(0.967)	(0.833)	(0.051)	(0.823)	(0.810)
GDP growth	0.08	-0.06	-0.12	0.03	0.03	0.19	-0.09	-0.11
	(0.016)	(0.002)	(0.000)	(0.129)	(0.135)	(0.001)	(0.000)	(0.000)
constant	-6.77	-2.72	-5.78	2.73	1.66	6.03	-3.56	-5.52
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs	7,369			7,369	7,369			7,369
LR chi2	3,292.37			2,355.28	4,020.49			1,907.43
Prob>chi2	0.000			0.000	0.000			0.000
Pseudo R-square	0.25			0.16	0.23			0.25

Summary of results from multinomial logistic regression analysis on financing choice of more general debt sources over the period of 1995-2011. The dependent variables of multinomial regressions are the log-odds ratio of the probability of issuing one type of debt relative to another. The dependent variable of logistic regression is the probability of issuing one type of debt relative to another (column (4),(8)). *Ln(principal)* is the log of the amount of capital a firm has raised from the issue. *Ln(assets)* is the log of book value of assets. *Q* is the sum of market value of equity minus book value of equity plus book value of debt divided by book value of assets. *Profitability* is the ratio of EBITDA to total assets. Tangibility is the ratio of net plants, property and equipment to total assets prior to issue date. *Book leverage* is the ratio of total debt to book assets. *NOLCF* is the ratio of net operating loss carry forward to total assets prior to issue date. *Deviation from target* is the difference between a firm's market leverage and the average market leverage of the industry. *GDP growth* is the annual growth rate of GDP. *Ln(age)* is the log of the number of years from the year reported in Compustat to the issue year. *Volatility* is the standard deviation of annual operating income before depreciation over the past five years, it requires at least three consecutive years. *Z* equals 1 if Altman's Z-score is less than 1.81, otherwise 0. *Investment grade rating* takes 1 if the firm is assigned BBB or higher by S&P, otherwise 0. *Not rated* takes 1 if the firm has no existing credit rating, otherwise 0. Bank is abbreviated for bank loans. Traditional is abbreviated for traditional non-bank private debt. 144A is abbreviated for 144A private debt. Public is abbreviated for public debt. Non-bank private is abbreviated for non-bank private debt. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. Private is abbreviated for private debt. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. P-values are reported in parentheses.

We also find that firms with higher levels of information asymmetry prefer bank loans to non-bank private debt, which supports *Hypothesis 3.2.2 that firms with higher levels of information asymmetry prefer bank loans to non-bank private debt*. This finding is consistent with Carey et al. (1998). It explains that banks are particularly specialized in lending to firms with high levels of information asymmetry (Fama, 1985; Nakamura, 1989). Firstly, this is a result of trade-off between cost of monitoring and cost of providing the required information. Firms with high levels of information asymmetry experience higher cost of monitoring and producing information. Hence they prefer bank loans that are associated with better monitoring efficiency. Secondly, according to Diamond (1991), firms taking bank loans may have the purpose of building a reputation in the debt market. One implication is that firms with high levels of information asymmetry that is caused by insufficient communication with the market may need bank borrowings to build reputation. Additionally, we find that firms with higher levels of information asymmetry prefer bank loans to traditional non-bank private debt or 144A private debt and firms with higher levels of information asymmetry prefer syndicated loans or bilateral loans to non-bank private debt. This can be consistently explained by the views as discussed above.

Therefore, we find that:

- Firms with higher levels of information asymmetry tend to borrow debt in the following order: 1) syndicated loans; 2) 144A private debt; 3) public debt; 4) traditional non-bank private debt.
- Bilateral loans are preferred by firms with higher levels of information asymmetry to traditional non-bank private debt or public debt.
- Firms with higher levels of information asymmetry prefer private debt to public debt.
- Firms with higher levels of information asymmetry prefer bank loans to non-bank private debt.

Our results support *Hypotheses 3.1.2, 3.2.2, and 3.3.2,* and reject *Hypothesis 3.4.2*.

Market Conditions

Panel A of Table 3.5 shows that positive coefficients of tangibility (fixed assets ratio) are on comparisons as follows: probability of bilateral loans vs. syndicated loans, probability of traditional non-bank private debt vs. syndicated loans, probability of public debt vs. syndicated loans, probability of traditional non-bank private debt vs. 144A private debt, and probability of public debt vs. 144A private debt. A negative sign of tangibility appears on the comparison of 144A private debt vs. bilateral loans. The results suggest that firms with higher fixed assets ratios prefer bilateral loans, traditional non-bank private debt, or public debt to syndicated loans or 144A private debt. This can be interpreted by one argument of Bhagat and Frost (1986) that fixed assets are treated as a source of funding in the event of financial distress. Hence, individual banks that have concentrated ownership of bilateral loans require higher fixed assets to offset the likelihood of debt in default. As traditional non-bank debt requires initial registration and processing information through SEC, firms with higher fixed assets ratios find it less difficult to produce information and quickly access the traditional non-bank debt market (Arena, 2011). This does not support *Hypothesis 3.4.3 that firms with higher fixed assets ratios prefer syndicated loans to bilateral loans* or *Hypothesis 3.3.3 that firms with higher fixed assets ratios prefer 144A private debt to traditional non-bank private debt*.

We report in *Panel B* of Table 3.5 on comparisons of debt choices regarding more general categories. Tangibility is shown with positive signs on the following comparisons: traditional non-bank private debt vs. bank loans, public debt vs. bank loans, and public debt vs. private debt. Tangibility is shown with negative signs on the following comparisons: bank loans vs. non-bank private debt, and syndicated loans vs. non-bank private debt. Hence, the report suggests that 1) firms with higher fixed assets ratios prefer public debt to private debt, which does not support *Hypothesis 3.1.3 that firms with higher fixed assets ratios prefer private debt to public debt*. This explains that firms use public debt to build a stronger reputation (Luengnaruemitchai and Ong, 2005), hence they are creating opportunities to acquire more fixed assets for public debt; 2) firms with higher fixed assets ratios prefer non-bank private debt to bank loans, which does not support *Hypothesis 3.2.3 that firms with higher fixed assets ratios prefer bank loans to non-bank private debt*. This can be interpreted as firms with lower fixed assets ratios have higher risks of being financially distressed and are keen to look for efficiency and flexibility of renegotiation and liquidation, thus leading to their preference for bank loans (Chemmanur and Fulghieri, 1994).

Therefore, we find that:

- Firms with higher fixed assets ratios issue debt in the following order: 1) bilateral loans, traditional non-bank private debt, or public debt; 2) syndicated loans or 144A private debt.
- Firms with higher fixed assets ratios prefer public debt to private debt.
- Firms with higher fixed assets ratios prefer non-bank private debt to bank loans.

Our results reject *Hypotheses 1.3, 2.3, 3.3, and 4.3*.

Macroeconomic Conditions

With respect to GDP growth, *Panel A* of Table 3.5 reports that *GDP growth* has positive effects on the probability of bilateral loans over syndicated loans, the probability of traditional non-bank private debt, the probability of traditional non-bank private debt over 144A private debt. Negative coefficients of GDP growth are on the following comparisons: 144A private debt vs. syndicated loans, public debt vs. syndicated loans, 144A private debt vs. bilateral loans, public debt vs. bilateral loans, public debt vs. 144A private debt, and public debt vs. traditional non-bank private debt. Our results indicate that when the economy is better, firms are likely to borrow debt with the following pecking order: 1) traditional non-bank private debt or bilateral loans, 2) syndicated loans, 3) 144A private debt, 4) public debt. The evidence supports *Hypothesis 3.4.4 that weak aggregate economy increases the probability firms issue syndicated loans relative to bilateral loans* but rejects *Hypothesis 3.3.4 that weak aggregate economy increases the probability firms issue traditional non-bank private debt relative to 144A private debt*.

Diamond (1991) argues that a poorer economy brings financial constraints to a firm and worsens financial dilemma such as uncertainty of profitability. This implies that when the economy is poorer, firms are likely to borrow syndicated loans since regulation and standardization in the secondary market provide the syndicated loans market with greater liquidity (Altunbaş et al., 2010). On the other hand, the risks of leading a syndicated loan are spread over members as each member of a syndicated loan is responsible for their particular share of the loan. Additionally, recent years have seen an increasing number of syndicated loans being rated by independent rating agencies so that financial institutions recognize syndicated loans as an alternative to public debt (Armstrong, 2003; Altunbaş et al., 2010). Hence, syndicated loans are likely to suit the need of firms in terms of capital volume and informational transparency.

The relationships between GDP growth and choice of debt for more general categories are reported in *Panel B* of Table 3.5. Positive coefficients are with probability of traditional non-bank private debt over bank loans, and probability of bilateral loans over non-bank private debt. While negative coefficients are with probability of 144A private debt over bank loans, probability of public debt over bank loans, probability of public debt over non-bank private debt, and probability of public debt over private debt. Hence, the results suggest that: 1) when the economy is better firms are likely to borrow traditional non-bank private debt first, bank loans second, and 144A private debt last, this is consistent with the view that traditional non-bank private debt issuers are characterized by higher credit quality; 2) when the economy is better, firms are likely to first borrow bilateral loans, second non-bank private debt, and last public debt, this is consistent with the view that public debt issuers are characterized by lower level of information asymmetry. Hence, we reject *Hypothesis 3.1.4 that weak aggregate economy increases the probability firms issue private debt relative to public debt and Hypothesis 3.2.4 that weak aggregate economy increases the probability firms issue non-bank private debt relative to bank loans.*

Therefore, we find that:

- When the economy is better, firms are likely to borrow debt in the following order: 1) traditional non-bank private debt or bilateral loans, 2) syndicated loans, 3) 144A private debt, 4) public debt.

Our results reject *Hypotheses 3.1.4*, *3.2.4*, *and 3.3.4*, and support *Hypothesis 3.4.4*. We also find that when the economy is better, firms are likely to borrow in the following pecking order: 1) traditional non-bank private debt; 2) bank loans; 3) 144A private debt. When the economy is better, firms are likely to borrow in the following order: 1) bilateral loans; 2) non-bank private debt; 3) public debt.

Control Variables

Syndicated loans vs. Bilateral loans

For control variables, *Panel A* of Table 3.5 shows that syndicated loan borrowers are older, have larger issue size, have a lower likelihood of financial distress, have lower risk, have greater deviation from the industry, and have higher taxation. These results are consistent with the view that firms with higher credit quality prefer syndicated loans to bilateral loans. Armstrong (2003) argues that an increasing number of syndicated loans are rated by independent agencies. This implies that older firms that have a better reputation are likely to rely on better quality borrowings. Syndicate members are capable of providing larger volumes of funds to the borrower than a stand-alone bank. Syndicated loans, accordingly, provide greater liquidity to the firm. Although syndicate members share the risk of lending (Esty and Megginson, 2003), they prefer borrowers with lower risks of repaying as lower risk is associated with lower likelihood of debt in default.

144A private debt vs. Traditional non-bank private debt

Panel A of Table 3.5 reports that 144A private debt issuers are characterized by larger issue size, younger firm age, larger deviation from the industry, and lower likelihood of financial distress compared to traditional non-bank debt issuers. Our results are consistent with the view that 144A private debt borrowers have higher levels of information asymmetry and lower credit quality. 144A private debt is not restricted by SEC in terms of accessing and processing information (Arena, 2011). 144A private debt issuers benefit from flexibility and efficiency of renegotiation in default (Denis and Mihov, 2003). Due to no initial registration associated with 144A private debt, speed of issuance is advantageous relative to traditional non-bank debt.

Bank loans vs. Non-bank private debt

Panel B of Table 3.5 presents coefficients of control variables for the comparison between bank loans and non-bank private debt. Banks loans borrowers have larger issue size, lower profitability, higher risk, lower leverage, and higher deviation from the industry. These results are consistent with the view that firms with a higher credit quality prefer bank loans to non-bank private debt. Altunbaş et al. (2010) discuss that the volume that bank loans borrowers can raise from banks are significantly higher due to the special syndicate ownership in relation to syndicated bank loans.

Bank loans borrowers are also characterized by higher Q (market-to-book ratio). This is consistent with Arena (2011). As firms with low growth opportunities have limited numbers of positive NPV projects, bank loans are relatively costly as the cost to forego these investment projects is much lower than the cost of debt in relation to bank loans (Hoshi et al., 1993). Houston and James (1996) also argue that non-bank private debt issue is negatively related to growth opportunities due to lower hold-up problems and higher financing cost of producing sensitive information to banks and public creditors.

Public debt vs. Private debt

Coefficients of control variables for the comparison between public debt and private debt are reported in *Panel B* of Table 3.5. Public debt issuers are older, more profitable, lower risk, have higher leverage and lower deviation from the industry. These results are in line with the view that higher credit quality firms prefer public debt to private debt. Highly levered firms are observed with a higher reputation and are likely to attract investment in the public credit market (Johnson, 1997, Cantillo and Wright, 2000; Denis and Mihov, 2003). These public debt borrowers have shown strong credibility to satisfy public creditors and have lower potential to experience financial distress (Altunbaş et al., 2010).

3.7.3 Debt Choice under Time-varying Macroeconomic Conditions

According to Julio et al., (2007), the principal effect of macroeconomic conditions on debt financing decisions is in relation to financial constraints. One aspect is that economic recession affects the supply of credit in the debt market as increasing financial frictions in the market over periods of poor economy hinder firms from achieving financing needs. Another aspect is that a poorer economy is associated with diminishing positive NPV investment opportunities and higher agency costs, thus restricting the firm's ability to achieve the desired debt level. Moreover, Schmukler and Vesperoni (2001) argue that information held by banks allows them to lend to sound firms. Conversely, financially constrained firms experience more severe financial constraints over periods of economic recession (Korajczyk and Levy, 2003). Global shocks may also hit the domestic economy, and lead to a short of supply of credit in the market (i.e., illiquidity).

To further understand the role of the four factors (namely credit quality, information asymmetry, market conditions, and macroeconomic conditions) under time-varying macroeconomic conditions on debt choice among the five sources, we classify the sample into three sub-samples based on the measure of macroeconomic condition. GDP growth is designed into three levels as in Julio et al. (2007). 'Low GDP growth' years are defined as years in which the GDP growth rate is less than 2%; 'medium GDP growth' years are those with GDP growth between 2% and 3.5%; 'high GDP growth' years are those with growth larger than 3.5%. Consistent with the previous section, analysis of this section is conducted with multinomial logistic regressions. We aim to test *Hypothesis 3.1.1* to *Hypothesis 3.4.4* with *equation (3.11)* concerning the effect of the four principal factors (i.e., credit quality, information asymmetry, market conditions, and macroeconomic conditions) on the choice between public debt and private debt, bank loans and non-bank private debt, 144A private debt and traditional non-bank private debt, and syndicated loans and bilateral loans.

This section of analysis focuses on the choice of debt sources under time-varying macroeconomic conditions. Empirical results in relation to choices across the five debt categories are reported in Table 3.6. Table 3.7 reports the empirical results for comparisons between one of the five debt sources and a more general debt category. Consistently, more general categories include "bank loans", "non-bank private debt", and "private debt". As a result, we have a total of eight comparison groups. Consistent with the earlier explanations, we do not distinguish syndicated loans with bilateral loans under the category of "bank loans", nor distinguish 144A private debt with traditional non-bank private debt under the category of "non-bank private debt", nor bank loans with non-bank private debt under the category of "private debt". For both Tables 3.6 and 3.7, *Panel A* presents debt choices during low GDP growth years, *Panel B* presents debt choices during medium GDP growth years, and *Panel C* presents debt choices during high GDP growth years.

3.7.3.1 Debt Choice during Low GDP Growth Years

Credit Quality

Panel A of Tables 3.6 and 3.7 show debt choices during low GDP growth years. In *Panel A* of Table 3.6, we observe a negative sign on investment grade rating for the probability of 144A private debt against syndicated loans, and positive signs for the probability of traditional non-bank private debt against 144A private debt and the probability of public debt against 144A private debt. This suggests that during low GDP growth years, public debt, tradfitional private debt, and syndicated loans are followed by 144A for firms with investment grade. Therefore, *Hypothesis 3.3.1 that firms with higher credit quality prefer traditional non-bank private debt to 144A private debt* is supported, but *Hypothesis 3.4.1 that firms with higher credit quality prefer syndicated loans to bilateral loans* is not accepted. Over periods of economic recessions, the distinction between 144A private debt and traditional non-bank private debt are supposed to be amplified, thus leading to consistent outstanding benefit of 144A private debt over traditional non-bank private debt. Features of 144A private debt against traditional non-bank private debt are recapped as follows: a) 144A private debt is not associated with contractual obligations such as covenants or collateral; b) 144A private debt is usually subordinated and monitoring activities are not practically undertaken by investors; c) risk of borrowing 144A private debt is relatively lower for firms with lower credit quality; d) 144A does not require an initial registration and is potentially convertible to public bond after issue. These features apparently reveal benefits to firms with lower credit quality. Due to the increased financial constraints faced by firms with low credit quality at poor states of the economy, the speed of issuance on 144A private debt suits the financing needs of firms with low credit quality. Huang et al. (2010) also argue that "*speed of issuance is perhaps especially valuable for low credit quality firms as they are likely to have urgent financing needs*" (p. 643).

Panel A of Table 3.7 reports the results from multivariate analysis on the choice of debt sources for more general categories during low GDP growth years. Investment grade rating negatively affects probability of traditional non-bank private debt vs. bank loans, and positively affects probability of bank loans vs. non-bank private debt, probability of syndicated loans vs. non-bank private debt, and probability of public debt vs. non-bank private debt. These results mean that firms with investment grade prefer public debt to private debt, and bank loans to non-bank private debt during low GDP growth years. Therefore, we find evidence to support *Hypothesis 3.1.1 that firms with higher credit quality prefer public debt to private debt*. Since private debt incurs lower cost of debt relative to public debt due to cheaper monitoring and covenants (Berger and Udell, 1998), private debt such as bank loans and non-bank private debt are invaluable to low credit quality firms over the period of economic recession when there are more financial frictions and limited supply of credit in the debt market. Furthermore, private borrowings may still be regarded as a way to building reputation over the periods of economic recession by firms with low credit quality (Diamond, 1991). Additionally, firms with low credit quality expect uncertain future financial performance (Altunbaş et al., 2010; Arena, 2011). Hence, these firms are likely to borrow debt privately due to flexibility of renegotiation in order to change the debt structure.

Our findings also support *Hypothesis 3.2.1 that firms with higher credit quality prefer bank loans to non-bank private debt*. This can be interpreted from a number of aspects. First, non-bank private debt remains restricted by regulations in terms of illiquidity in the event of economic recession (Kwan and Carleton, 1995). Second, low flotation costs and custom-designed covenants of non-bank private debt are outstanding features relative to bank loans for low credit quality firms experiencing financial constraints during economic recession (Denis and Mihov, 2003). Third, loan loss reserve associated with bank loans hinder low credit quality firms over periods of poor economy.

Negative signs of not rated dummy during low GDP growth years are observed in *Panel A* of Table 3.6 from regressions on the following choices: 144A private debt vs. syndicated loans, public debt vs. syndicated loans, 144A private debt vs. bilateral loans, public debt vs. bilateral loans, and public debt vs. traditional non-bank private debt. Positive coefficients are shown on not rated dummy for the following comparison groups: traditional non-bank private debt vs. syndicated loans, traditional non-bank private debt vs. bilateral loans, and traditional non-bank private debt vs. 144A private debt. Our results suggest that firms with credit ratings prefer public debt and 144A private debt to syndicated loans and bilateral loans, and choose traditional private debt as a last issue choice over periods of GDP growth. These results are consistent with the view that 144A private debt issuers are characterized by high levels of information asymmetry.

In *Panel A* of Table 3.7, during low GDP growth years not rated dummy shows positive effects on probability of traditional non-bank private debt over bank loans, probability of bank loans over non-bank private debt, and probability of syndicated loans over non-bank private debt, and negative effects on probability of 144A private debt over bank loans, probability of public debt over bank loans, probability of public debt over non-bank private debt, and probability of public debt over private debt. Our results suggest that firms with credit ratings tend to borrow debt publicly during low GDP growth years.

Table 3.6 Multivariate Analysis on the Choice of Basic Debt Sources (Time-varying)

Panel A Multivariate Analysis on the Choice of Basic Debt Sources during Low GDP Growth Years

1995-2011	(1) Sole vs. Syn	(2) 144A vs. Syn	(3) Traditional vs. Syn	(4) Public vs. Syn	(5) 144A vs. Sole	(6) Traditional vs. Sole	(7) Public vs. Sole	(8) Traditional vs. 144A	(9) Public vs. 144A	(10) Public vs. Traditional
Ln(principal)	-1.56	0.33	-1.04	0.07	1.89	0.52	1.63	-1.37	-0.26	1.11
	(0.000)	(0.001)	(0.000)	(0.412)	(0.000)	(0.011)	(0.000)	(0.000)	(0.019)	(0.000)
Investment grade rating	-19.09	-1.06	0.10	-0.02	18.03	19.19	19.07	1.16	1.04	-0.12
	(0.982)	(0.000)	(0.824)	(0.929)	(0.983)	(0.982)	(0.982)	(0.020)	(0.000)	(0.800)
Not rated	0.00	-1.37	2.03	-1.72	-1.38	2.03	-1.72	3.40	-0.35	-3.75
	(0.998)	(0.000)	(0.000)	(0.000)	(0.042)	(0.008)	(0.015)	(0.000)	(0.273)	(0.000)
Ln(assets)	0.29	0.12	1.00	0.76	-0.17	0.71	0.48	0.88	0.64	-0.24
	(0.109)	(0.197)	(0.000)	(0.000)	(0.396)	(0.000)	(0.016)	(0.000)	(0.000)	(0.128)
Ln(age)	-0.17	-0.30	0.49	0.14	-0.13	0.66	0.31	0.80	0.45	-0.35
	(0.606)	(0.007)	(0.012)	(0.207)	(0.695)	(0.070)	(0.361)	(0.000)	(0.001)	(0.105)
Q	-0.06	-0.43	0.11	0.04	-0.37	0.17	0.09	0.54	0.46	-0.07
	(0.710)	(0.004)	(0.337)	(0.700)	(0.080)	(0.345)	(0.595)	(0.003)	(0.004)	(0.584)
Profitability	0.33	0.25	0.46	2.23	-0.08	0.12	1.90	0.21	1.98	1.77
	(0.750)	(0.698)	(0.614)	(0.002)	(0.946)	(0.923)	(0.126)	(0.848)	(0.019)	(0.106)
Tangibility	0.41	-0.15	0.98	0.20	-0.57	0.57	-0.22	1.14	0.35	-0.79
	(0.606)	(0.586)	(0.042)	(0.500)	(0.498)	(0.515)	(0.796)	(0.034)	(0.296)	(0.136)
Volatility	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	-0.00
	(0.001)	(0.007)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.682)	(0.750)	(0.835)
Z	-1.05	0.15	-0.21	-0.02	1.21	0.84	1.04	-0.36	-0.17	0.19
	(0.017)	(0.343)	(0.420)	(0.920)	(0.009)	(0.085)	(0.025)	(0.211)	(0.364)	(0.493)
Book leverage	1.81	1.28	1.40	1.26	-0.53	-0.41	-0.55	0.12	-0.02	-0.14
	(0.150)	(0.016)	(0.122)	(0.023)	(0.693)	(0.774)	(0.684)	(0.907)	(0.973)	(0.890)
Deviation from target	-1.80	-0.59	-1.68	-2.01	1.22	0.12	-0.21	-1.09	-1.42	-0.33
	(0.262)	(0.379)	(0.159)	(0.005)	(0.476)	(0.949)	(0.904)	(0.402)	(0.080)	(0.801)
NOLCF	-1.44	0.08	-1.60	-0.76	1.52	-0.15	0.69	-1.67	-0.83	0.84
	(0.030)	(0.354)	(0.034)	(0.036)	(0.024)	(0.877)	(0.362)	(0.027)	(0.021)	(0.308)
GDP growth	-0.04	-0.08	-0.01	-0.25	-0.04	0.04	-0.20	0.08	-0.17	-0.24
	(0.771)	(0.048)	(0.945)	(0.000)	(0.804)	(0.816)	(0.194)	(0.366)	(0.001)	(0.004)
constant	2.19	-1.92	-7.57	-7.80	-4.11	-9.76	-9.99	-5.65	-5.87	-0.23
	(0.126)	(0.006)	(0.000)	(0.000)	(0.009)	(0.000)	(0.000)	(0.000)	(0.000)	(0.862)
Obs	1,781									
LR chi2	1,237.22									
Prob>chi2	0.000									
Pseudo R-square	0.28									

Multinomial logistic regression analysis on financing choice between the five public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt at low GDP growth over the period of 1995-2011. The dependent variables are the log-odds ratio of the probability of issuing one type of debt relative another. Low GDP growth years are defined as years in which the GDP growth rate was less than 2%. *Ln(principal)* is the log of the amount of capital a firm has raised from the issue. *Ln(assets)* is the log of book value of assets. *Q* is the sum of market value of equity minus book value of equity plus book value of debt divided by book value of assets. *Profitability* is the ratio of EBITDA to total assets. Tangibility is the ratio of net plants, property and equipment to total assets prior to issue date. *Book leverage* is the ratio of total debt to book assets. *NOLCF* is the ratio of net operating loss carry forward to total assets prior to issue date. *Deviation from target* is the difference between firm's market leverage and the average market leverage of the industry. *GDP growth* is the annual growth rate of GDP. *Ln(age)* is the log of the number of years from the year reported in Compustat to the issue year. *Volatility* is the standard deviation of annual operating income before depreciation over the past five years, it requires at least three consecutive years. *Z* equals 1 if Altman's Z-score is less than 1.81, otherwise 0. *Investment grade rating* takes 1 if the firm is assigned BBB or higher by S&P, otherwise 0. *Not rated* takes 1 if the firm has no existing credit rating, otherwise 0. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. 144A is abbreviated for 144A private debt. Traditional is abbreviated for traditional non-bank private debt. Public is abbreviated for public debt. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. P-values are reported in parentheses.

Table 3.6 Multivariate Analysis on the Choice of Basic Debt Sources (Time-varying)

Panel B **Multivariate Analysis on the Choice of Basic Debt Sources during Medium GDP Growth Years**

1995-2011	(1) Sole vs. Syn	(2) 144A vs. Syn	(3) Traditional vs. Syn	(4) Public vs. Syn	(5) 144A vs. Sole	(6) Traditional vs. Sole	(7) Public vs. Sole	(8) Traditional vs. 144A	(9) Public vs. 144A	(10) Public vs. Traditional
Ln(principal)	-2.37	-0.04	-1.62	-0.54	2.33	0.75	1.83	-1.58	-0.50	1.08
	(0.000)	(0.631)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Investment grade rating	0.48	-1.24	0.64	0.56	-1.72	0.16	0.08	1.88	1.80	-0.08
	(0.568)	(0.000)	(0.064)	(0.001)	(0.046)	(0.853)	(0.921)	(0.000)	(0.000)	(0.825)
Not rated	0.62	-0.69	1.44	-0.59	-1.32	0.81	-1.21	2.13	0.11	-2.02
	(0.287)	(0.000)	(0.000)	(0.013)	(0.029)	(0.202)	(0.050)	(0.000)	(0.698)	(0.000)
Ln(assets)	0.60	0.29	1.14	0.88	-0.31	0.54	0.28	0.85	0.59	-0.26
	(0.000)	(0.001)	(0.000)	(0.000)	(0.078)	(0.001)	(0.096)	(0.000)	(0.000)	(0.036)
Ln(age)	-0.35	-0.26	0.32	0.10	0.09	0.66	0.45	0.57	0.36	-0.22
	(0.152)	(0.022)	(0.061)	(0.370)	(0.732)	(0.013)	(0.085)	(0.003)	(0.011)	(0.245)
Q	-0.02	-0.14	-0.06	0.05	-0.12	-0.04	0.07	0.08	0.19	0.11
	(0.833)	(0.177)	(0.575)	(0.593)	(0.436)	(0.782)	(0.609)	(0.588)	(0.133)	(0.401)
Profitability	-0.28	0.20	0.70	0.53	0.48	0.98	0.81	0.50	0.33	-0.17
	(0.579)	(0.636)	(0.228)	(0.368)	(0.443)	(0.152)	(0.276)	(0.461)	(0.611)	(0.824)
Tangibility	0.40	0.00	0.71	0.74	-0.41	0.30	0.33	0.71	0.74	0.03
	(0.540)	(0.995)	(0.114)	(0.008)	(0.560)	(0.677)	(0.633)	(0.155)	(0.032)	(0.950)
Volatility	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	0.00	-0.00	-0.00	0.00
	(0.799)	(0.231)	(0.035)	(0.000)	(0.879)	(0.963)	(0.989)	(0.215)	(0.139)	(0.676)
Z	-0.14	0.30	-0.68	-0.04	0.43	-0.54	0.10	-0.97	-0.33	0.64
	(0.682)	(0.061)	(0.003)	(0.805)	(0.228)	(0.136)	(0.774)	(0.000)	(0.082)	(0.008)
Book leverage	-0.28	1.10	-0.10	1.34	1.37	0.17	1.62	-1.20	0.25	1.44
	(0.786)	(0.009)	(0.905)	(0.005)	(0.198)	(0.884)	(0.135)	(0.187)	(0.653)	(0.112)
Deviation from target	0.37	-0.01	0.15	-2.27	-0.38	-0.22	-2.64	0.16	-2.25	-2.41
	(0.798)	(0.984)	(0.895)	(0.001)	(0.804)	(0.893)	(0.091)	(0.896)	(0.007)	(0.045)
NOLCF	0.03	0.08	0.08	0.08	0.04	0.04	0.05	-0.00	0.01	0.01
	(0.548)	(0.172)	(0.184)	(0.168)	(0.149)	(0.041)	(0.125)	(0.921)	(0.876)	(0.771)
GDP growth	-1.46	-0.59	0.23	-0.53	0.87	1.69	0.93	0.82	0.06	-0.75
	(0.052)	(0.020)	(0.529)	(0.025)	(0.265)	(0.031)	(0.228)	(0.052)	(0.837)	(0.056)
Constant	8.07	-0.75	-4.38	-4.36	-8.82	-12.45	-12.43	-3.63	-3.61	0.02
	(0.001)	(0.436)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.022)	(0.003)	(0.990)
Obs	2,084									
LR chi2	1,384.75									
Prob > chi2	0.000									
Pseudo R-square	0.26									

Multinomial logistic regression analysis on financing choice between the five public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt at medium GDP growth over the period of 1995-2011. The dependent variable is the log-odds ratio of the probability of issuing one type of debt relative another. Medium GDP growth years are defined as years in which the GDP growth rate was between 2% and 3.5%. *Ln(principal)* is the log of the amount of capital a firm has raised from the issue. *Ln(assets)* is the log of book value of assets. *Q* is the sum of market value of equity minus book value of equity plus book value of debt divided by book value of assets. *Profitability* is the ratio of EBITDA to total assets. Tangibility is the ratio of net plants, property and equipment to total assets prior to issue date. *Book leverage* is the ratio of total debt to book assets. *NOLCF* is the ratio of net operating loss carry forward to total assets prior to issue date. *Deviation from target* is the difference between firm's market leverage and the average market leverage of the industry. *GDP growth* is the annual growth rate of GDP. *Ln(age)* is the log of the number of years from the year reported in Compustat to the issue year. *Volatility* is the standard deviation of annual operating income before depreciation over the past five years, it requires at least three consecutive years. *Z* equals 1 if Altman's Z-score is less than 1.81, otherwise 0. *Investment grade rating* takes 1 if the firm is assigned BBB or higher by S&P, otherwise 0. *Not rated* takes 1 if the firm has no existing credit rating, otherwise 0. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. 144A is abbreviated for 144A private debt. Traditional is abbreviated for traditional non-bank private debt. Public is abbreviated for public debt. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. P-values are reported in parentheses.

Table 3.6 Multivariate Analysis on the Choice of Basic Debt Sources (Time-varying)

Panel C **Multivariate Analysis on the Choice of Basic Debt Sources during High GDP Growth Years**

1995-2011	(1) Sole vs. Syn	(2) 144A vs. Syn	(3) Traditional vs. Syn	(4) Public vs. Syn	(5) 144A vs. Sole	(6) Traditional vs. Sole	(7) Public vs. Sole	(8) Traditional vs. 144A	(9) Public vs. 144A	(10) Public vs. Traditional
Ln(principal)	-2.00	0.02	-1.39	-0.33	2.02	0.61	1.67	-1.41	-0.35	1.06
	(0.000)	(0.771)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Investment grade rating	-0.37	-0.71	0.66	0.85	-0.34	1.03	1.22	1.37	1.56	0.19
	(0.663)	(0.000)	(0.018)	(0.000)	(0.690)	(0.235)	(0.154)	(0.000)	(0.000)	(0.510)
Not rated	0.48	-0.56	1.93	-0.85	-1.04	1.45	-1.33	2.49	-0.29	-2.78
	(0.268)	(0.000)	(0.000)	(0.000)	(0.021)	(0.002)	(0.004)	(0.000)	(0.195)	(0.000)
Ln(assets)	-0.09	0.18	0.92	0.59	0.26	1.00	0.68	0.74	0.41	-0.33
	(0.380)	(0.007)	(0.000)	(0.000)	(0.021)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(age)	-0.21	-0.16	0.18	0.11	0.05	0.39	0.32	0.34	0.27	-0.07
	(0.158)	(0.046)	(0.106)	(0.182)	(0.756)	(0.020)	(0.054)	(0.008)	(0.007)	(0.598)
Q	0.07	-0.02	-0.08	-0.07	-0.09	-0.15	-0.13	-0.06	-0.04	0.02
	(0.231)	(0.628)	(0.222)	(0.220)	(0.190)	(0.064)	(0.078)	(0.462)	(0.540)	(0.824)
Profitability	0.23	0.30	0.46	0.38	0.07	0.23	0.15	0.17	0.08	-0.09
	(0.199)	(0.297)	(0.249)	(0.452)	(0.838)	(0.576)	(0.782)	(0.723)	(0.884)	(0.886)
Tangibility	0.93	0.30	0.84	0.79	-0.62	-0.08	-0.14	0.54	0.49	-0.05
	(0.031)	(0.186)	(0.008)	(0.001)	(0.181)	(0.860)	(0.774)	(0.136)	(0.088)	(0.883)
Volatility	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.893)	(0.436)	(0.177)	(0.001)	(0.842)	(0.772)	(0.708)	(0.494)	(0.073)	(0.486)
Z	-0.51	0.27	-0.31	-0.24	0.78	0.19	0.27	-0.59	-0.51	0.07
	(0.013)	(0.025)	(0.044)	(0.038)	(0.001)	(0.404)	(0.242)	(0.001)	(0.001)	(0.674)
Book leverage	0.57	1.55	1.97	2.35	0.97	1.40	1.78	0.42	0.80	0.38
	(0.345)	(0.000)	(0.000)	(0.000)	(0.134)	(0.050)	(0.010)	(0.448)	(0.057)	(0.508)
Deviation from target	-1.21	-0.87	-3.03	-3.36	0.33	-1.83	-2.16	-2.16	-2.49	-0.33
	(0.140)	(0.056)	(0.000)	(0.000)	(0.710)	(0.053)	(0.022)	(0.005)	(0.000)	(0.677)
NOLCF	-0.03	-0.01	-0.26	-0.14	0.02	-0.23	-0.11	-0.25	-0.13	0.12
	(0.287)	(0.371)	(0.175)	(0.399)	(0.511)	(0.242)	(0.529)	(0.195)	(0.440)	(0.628)
GDP growth	-0.74	-0.22	-0.04	0.06	0.51	0.69	0.79	0.18	0.28	0.10
	(0.006)	(0.148)	(0.832)	(0.694)	(0.087)	(0.022)	(0.008)	(0.454)	(0.139)	(0.658)
Constant	8.65	-1.59	-3.58	-5.04	-10.24	-12.24	-13.69	-1.99	-3.45	-1.46
	(0.000)	(0.040)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.101)	(0.001)	(0.227)
Obs	3,504									
LR chi2	2,635.12									
Prob>chi2	0.000									
Pseudo R-square	0.28									

Multinomial logistic regression analysis on financing choice between the five public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt at high GDP growth over the period of 1995-2011. The dependent variables are the log-odds ratio of the probability of issuing one type of debt relative another. High GDP growth years are defined as years in which the GDP growth rate was greater than 3.5%. *Ln(principal)* is the log of the amount of capital a firm has raised from the issue. *Ln(assets)* is the log of book value of assets. *Q* is the sum of market value of equity minus book value of equity plus book value of debt divided by book value of assets. *Profitability* is the ratio of EBITDA to total assets. Tangibility is the ratio of net plants, property and equipment to total assets prior to issue date. *Book leverage* is the ratio of total debt to book assets. *NOLCF* is the ratio of net operating loss carry forward to total assets prior to issue date. *Deviation from target* is the difference between firm's market leverage and the average market leverage of the industry. *GDP growth* is the annual growth rate of GDP. *Ln(age)* is the log of the number of years from the year reported in Compustat to the issue year. *Volatility* is the standard deviation of annual operating income before depreciation over the past five years, it requires at least three consecutive years. *Z* equals 1 if Altman's Z-score is less than 1.81, otherwise 0. *Investment grade rating* takes 1 if the firm is assigned BBB or higher by S&P, otherwise 0. *Not rated* takes 1 if the firm has no existing credit rating, otherwise 0. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. 144A is abbreviated for 144A private debt. Traditional is abbreviated for traditional non-bank private debt. Public is abbreviated for public debt. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered . P-values are reported in parenthesis.

Table 3.7 Multivariate Analysis on the Choice of More General Debt Sources (Time-varying)

Panel A **Multivariate Analysis on the Choice of More General Debt Sources during Low GDP Growth Years**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1995-2011	Traditional vs. Bank	144A vs. Bank	Public vs. Bank	Bank vs. Non-bank private	Syn. Vs. Non-bank private	Sole vs. Non-bank private	Public vs. Non-bank private	Public vs. Private
Ln(principal)	-0.86	0.38	0.11	0.08	0.16	-1.24	0.24	0.15
	(0.000)	(0.000)	(0.188)	(0.258)	(0.034)	(0.000)	(0.011)	(0.055)
Investment grade rating	0.20	-1.05	0.00	1.06	1.07	-17.27	0.99	0.36
	(0.671)	(0.000)	(0.995)	(0.000)	(0.000)	(0.981)	(0.000)	(0.043)
Not rated	2.10	-1.38	-1.73	0.71	0.70	0.44	-1.04	-1.47
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.504)	(0.000)	(0.000)
Ln(assets)	0.97	0.11	0.75	-0.39	-0.40	-0.26	0.37	0.63
	(0.000)	(0.233)	(0.000)	(0.000)	(0.000)	(0.154)	(0.000)	(0.000)
Ln(age)	0.54	-0.30	0.15	0.10	0.11	-0.14	0.29	0.23
	(0.006)	(0.008)	(0.184)	(0.309)	(0.250)	(0.677)	(0.018)	(0.036)
Q	0.10	-0.43	0.04	0.11	0.11	0.03	0.13	0.05
	(0.372)	(0.004)	(0.710)	(0.223)	(0.234)	(0.879)	(0.248)	(0.551)
Profitability	0.68	0.24	2.22	-0.70	-0.69	-0.29	1.63	2.03
	(0.433)	(0.712)	(0.002)	(0.179)	(0.187)	(0.797)	(0.035)	(0.004)
Tangibility	0.93	-0.16	0.19	-0.09	-0.11	0.20	0.10	0.18
	(0.052)	(0.572)	(0.501)	(0.706)	(0.664)	(0.805)	(0.739)	(0.497)
Volatility	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00
	(0.003)	(0.006)	(0.000)	(0.002)	(0.003)	(0.000)	(0.432)	(0.000)
Z	-0.13	0.18	0.00	0.01	0.04	-0.95	0.00	-0.01
	(0.603)	(0.274)	(0.989)	(0.968)	(0.776)	(0.035)	(0.999)	(0.932)
Book leverage	1.21	1.24	1.22	-1.20	-1.29	0.39	-0.03	0.72
	(0.139)	(0.019)	(0.027)	(0.006)	(0.004)	(0.764)	(0.963)	(0.157)
Deviation from target	-1.62	-0.55	-1.98	0.47	0.52	-1.12	-1.56	-1.85
	(0.164)	(0.405)	(0.006)	(0.414)	(0.370)	(0.498)	(0.038)	(0.006)
NOLCF	-1.38	0.08	-0.74	0.01	0.03	-1.27	-0.70	-0.74
	(0.062)	(0.306)	(0.039)	(0.892)	(0.730)	(0.038)	(0.048)	(0.035)
GDP growth	-0.01	-0.08	-0.25	0.08	0.08	0.03	-0.16	-0.21
	(0.914)	(0.050)	(0.000)	(0.033)	(0.029)	(0.826)	(0.000)	(0.000)
Constant	-8.52	-2.16	-7.97	2.58	2.20	5.08	-5.75	-7.94
	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Obs	1,781			1,781	1,781			1,781
LR chi2	1,046.45			787.55	970.18			631.36
Prob>chi2	0.000			0.000	0.000			0.000
Pseudo R-square	0.31			0.21	0.24			0.31

Results from multinomial logistic regression analysis on financing choice of more general debt sources during low GDP growth years over the period of 1995-2011. The dependent variables of multinomial regressions are the log-odds ratio of the probability of issuing one type of debt relative to another. The dependent variable of logistic regression is the probability of issuing one type of debt relative to another (column (4),(8)). Low GDP growth years are defined as years in which the GDP growth rate is lower than 2%. *Ln(principal)* is the log of the amount of capital a firm has raised from the issue. *Ln(assets)* is the log of book value of assets. *Q* is the sum of market value of equity minus book value of equity plus book value of debt divided by book value of assets. *Profitability* is the ratio of EBITDA to total assets. Tangibility is the ratio of net plants, property and equipment to total assets prior to issue date. *Book leverage* is the ratio of total debt to book assets. *NOLCF* is the ratio of net operating loss carry forward to total assets prior to issue date. *Deviation from target* is the difference between firm's market leverage and the average market leverage of the industry. *GDP growth* is the annual growth rate of GDP. *Ln(age)* is the log of the number of years from the year reported in Compustat to the issue year. *Volatility* is the standard deviation of annual operating income before depreciation over the past five years, it requires at least three consecutive years. *Z* equals 1 if Altman's Z-score is less than 1.81, otherwise 0. *Investment grade rating* takes 1 if the firm is assigned BBB or higher by S&P, otherwise 0. *Not rated* takes 1 if the firm has no existing credit rating, otherwise 0. Bank is abbreviated for bank loans. Traditional is abbreviated for traditional non-bank private debt. 144A is abbreviated for 144A private debt. Public is abbreviated for public debt. Non-bank private is abbreviated for non-bank private debt. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. Private is abbreviated for private debt. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. P-values are reported in parentheses.

Table 3.7 Multivariate Analysis on the Choice of More General Debt Sources (Time-varying)

Panel B **Multivariate Analysis on the Choice of More General Debt Sources during Medium GDP Growth Years**

1995-2011	(1) Traditional vs. Bank	(2) 144A vs. Bank	(3) Public vs. Bank	(4) Bank vs. Non-bank private	(5) Syn. Vs. Non-bank private	(6) Sole vs. Non-bank private	(7) Public vs. Non-bank	(8) Public vs. Private
Ln(principal)	-1.12	0.09	-0.37	0.40	0.62	-1.43	0.18	-0.18
	(0.000)	(0.257)	(0.000)	(0.000)	(0.000)	(0.000)	(0.020)	(0.007)
Investment grade rating	0.50	-1.29	0.51	0.81	0.76	1.04	1.27	0.74
	(0.133)	(0.000)	(0.003)	(0.000)	(0.000)	(0.220)	(0.000)	(0.000)
Not rated	1.44	-0.70	-0.63	0.18	0.20	0.41	-0.47	-0.64
	(0.000)	(0.000)	(0.007)	(0.266)	(0.233)	(0.475)	(0.065)	(0.005)
Ln(assets)	1.06	0.26	0.81	-0.57	-0.61	-0.22	0.18	0.57
	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.150)	(0.043)	(0.000)
Ln(age)	0.39	-0.24	0.13	0.06	0.10	-0.35	0.21	0.15
	(0.018)	(0.034)	(0.245)	(0.525)	(0.316)	(0.151)	(0.099)	(0.149)
Q	-0.08	-0.15	0.04	0.07	0.05	0.03	0.09	0.05
	(0.466)	(0.140)	(0.675)	(0.305)	(0.475)	(0.800)	(0.376)	(0.582)
Profitability	0.74	0.19	0.53	-0.45	-0.42	-0.69	0.14	0.38
	(0.220)	(0.646)	(0.355)	(0.251)	(0.288)	(0.201)	(0.824)	(0.489)
Tangibility	0.73	-0.01	0.73	-0.23	-0.25	0.07	0.45	0.61
	(0.093)	(0.967)	(0.008)	(0.337)	(0.313)	(0.915)	(0.150)	(0.020)
Volatility	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00	-0.00
	(0.011)	(0.182)	(0.000)	(0.008)	(0.021)	(0.872)	(0.452)	(0.001)
Z	-0.56	0.31	-0.02	0.01	0.03	0.08	0.03	0.02
	(0.011)	(0.046)	(0.906)	(0.961)	(0.844)	(0.813)	(0.875)	(0.894)
Book leverage	-0.10	1.11	1.33	-1.04	-1.02	-1.31	0.30	0.98
	(0.905)	(0.007)	(0.005)	(0.005)	(0.007)	(0.197)	(0.559)	(0.028)
Deviation from target	-0.16	-0.03	-2.27	0.06	-0.01	0.45	-2.26	-2.25
	(0.884)	(0.964)	(0.001)	(0.918)	(0.979)	(0.758)	(0.003)	(0.001)
NOLCF	0.03	0.03	0.03	-0.03	-0.07	-0.05	0.00	0.02
	(0.104)	(0.285)	(0.297)	(0.068)	(0.186)	(0.015)	(0.945)	(0.546)
GDP growth	0.43	-0.55	-0.46	0.28	0.38	-1.14	-0.12	-0.37
	(0.213)	(0.031)	(0.050)	(0.184)	(0.074)	(0.130)	(0.655)	(0.100)
constant	-7.26	-1.47	-5.12	2.06	0.70	9.46	-3.62	-5.03
	(0.000)	(0.121)	(0.000)	(0.008)	(0.385)	(0.000)	(0.001)	(0.000)
Obs	2,084			2,084	2,084			2,084
LR chi2	877.69			600.86	1,068.62			468.72
Prob>chi2	0.000			0.000	0.000			0.000
Pseudo R-square	0.22			0.15	0.23			0.22

Results from multinomial logistic regression analysis on financing choice of more general debt sources during medium GDP growth years over the period of 1995-2011. The dependent variables of multinomial regressions are the log-odds ratio of the probability of issuing one type of debt relative to another. The dependent variable of logistic regression is the probability of issuing one type of debt relative to another (column (4),(8)). Medium GDP growth years are defined as years in which the GDP growth rate is between 2% and 3.5%. *Ln(principal)* is the log of the amount of capital a firm has raised from the issue. *Ln(assets)* is the log of book value of assets. *Q* is the sum of market value of equity minus book value of equity plus book value of debt divided by book value of assets. *Profitability* is the ratio of EBITDA to total assets. Tangibility is the ratio of net plants, property and equipment to total assets prior to issue date. *Book leverage* is the ratio of total debt to book assets. *NOLCF* is the ratio of net operating loss carry forward to total assets prior to issue date. *Deviation from target* is the difference between firm's market leverage and the average market leverage of the industry. *GDP growth* is the annual growth rate of GDP. *Ln(age)* is the log of the number of years from the year reported in Compustat to the issue year. *Volatility* is the standard deviation of annual operating income before depreciation over the past five years, it requires at least three consecutive years. *Z* equals 1 if Altman's Z-score is less than 1.81, otherwise 0. *Investment grade rating* takes 1 if the firm is assigned BBB or higher by S&P, otherwise 0. *Not rated* takes 1 if the firm has no existing credit rating, otherwise 0. Bank is abbreviated for bank loans. Traditional is abbreviated for traditional non-bank private debt. 144A is abbreviated for 144A private debt. Public is abbreviated for public debt. Non-bank private is abbreviated for non-bank private debt. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. Private is abbreviated for private debt. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. P-values are reported in parentheses.

Table 3.7 Multivariate Analysis on the Choice of More General Debt Sources (Time-varying)

Panel C **Multivariate Analysis on the Choice of More General Debt Sources during High GDP Growth Years**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1995-2011	Traditional vs. Bank	144A vs. Bank	Public vs. Bank	Bank vs. Non-bank private	Syn. Vs. Non-bank private	Sole vs. Non-bank private	Public vs. Non-bank private	Public vs. Private
Ln(principal)	-0.99	0.17	-0.20	0.33	0.54	-1.24	0.25	-0.06
	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.224)
Investment grade rating	0.46	-0.78	0.80	0.58	0.50	-0.20	1.30	0.96
	(0.086)	(0.000)	(0.000)	(0.000)	(0.001)	(0.818)	(0.000)	(0.000)
Not rated	1.95	-0.55	-0.89	-0.10	-0.05	-0.05	-0.98	-0.99
	(0.000)	(0.000)	(0.000)	(0.453)	(0.675)	(0.906)	(0.000)	(0.000)
Ln(assets)	0.98	0.20	0.60	-0.51	-0.48	-0.71	0.08	0.40
	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.241)	(0.000)
Ln(age)	0.23	-0.16	0.12	0.03	0.06	-0.20	0.17	0.13
	(0.030)	(0.051)	(0.158)	(0.626)	(0.416)	(0.191)	(0.063)	(0.097)
Q	-0.12	-0.06	-0.08	0.07	0.04	0.12	-0.02	-0.07
	(0.072)	(0.169)	(0.115)	(0.056)	(0.301)	(0.075)	(0.704)	(0.198)
Profitability	0.62	0.43	0.46	-0.51	-0.37	-0.17	0.00	0.32
	(0.148)	(0.126)	(0.346)	(0.029)	(0.117)	(0.524)	(0.996)	(0.499)
Tangibility	0.80	0.28	0.78	-0.50	-0.52	0.25	0.26	0.60
	(0.009)	(0.212)	(0.001)	(0.009)	(0.008)	(0.568)	(0.319)	(0.008)
Volatility	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00
	(0.013)	(0.190)	(0.000)	(0.018)	(0.181)	(0.754)	(0.087)	(0.001)
Z	-0.30	0.26	-0.25	-0.05	-0.08	-0.48	-0.32	-0.27
	(0.046)	(0.033)	(0.030)	(0.578)	(0.433)	(0.022)	(0.014)	(0.015)
Book leverage	1.92	1.54	2.32	-1.79	-1.77	-1.44	0.55	1.67
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.022)	(0.164)	(0.000)
Deviation from target	-2.96	-0.79	-3.28	1.56	1.64	0.90	-1.69	-2.72
	(0.000)	(0.081)	(0.000)	(0.000)	(0.000)	(0.280)	(0.003)	(0.000)
NOLCF	-0.25	-0.01	-0.15	0.01	0.01	-0.01	-0.11	-0.14
	(0.209)	(0.437)	(0.377)	(0.484)	(0.334)	(0.676)	(0.494)	(0.425)
GDP growth	0.13	-0.17	0.11	0.07	0.15	-0.58	0.22	0.14
	(0.511)	(0.269)	(0.484)	(0.572)	(0.230)	(0.035)	(0.184)	(0.340)
Constant	-6.76	-2.75	-5.99	2.94	1.14	10.29	-3.90	-5.69
	(0.000)	(0.000)	(0.000)	(0.000)	(0.080)	(0.000)	(0.000)	(0.000)
Obs	3,504			3,504	3,504			3,504
LR chi2	1,495.96			1,077.82	2,167.71			859.55
Prob>chi2	0.000			0.000	0.000			0.000
Pseudo R-square	0.26			0.16	0.26			0.25

Results from multinomial logistic regression analysis on financing choice of more general debt sources during high GDP growth years over the period of 1995-2011. The dependent variables of multinomial regressions are the log-odds ratio of the probability of issuing one type of debt relative to another. The dependent variable of logistic regression is the probability of issuing one type of debt relative to another (column (4),(8)). High GDP growth years are defined as years in which the GDP growth rate is higher than 3.5%. *Ln(principal)* is the log of the amount of capital a firm has raised from the issue. *Ln(assets)* is the log of book value of assets. *Q* is the sum of market value of equity minus book value of equity plus book value of debt divided by book value of assets. *Profitability* is the ratio of EBITDA to total assets. Tangibility is the ratio of net plants, property and equipment to total assets prior to issue date. *Book leverage* is the ratio of total debt to book assets. *NOLCF* is the ratio of net operating loss carry forward to total assets prior to issue date. *Deviation from target* is the difference between firm's market leverage and the average market leverage of the industry. *GDP growth* is the annual growth rate of GDP. *Ln(age)* is the log of the number of years from the year reported in Compustat to the issue year. *Volatility* is the standard deviation of annual operating income before depreciation over the past five years, it requires at least three consecutive years. *Z* equals 1 if Altman's Z-score is less than 1.81, otherwise 0. *Investment grade rating* takes 1 if the firm is assigned BBB or higher by S&P, otherwise 0. *Not rated* takes 1 if the firm has no existing credit rating, otherwise 0. Bank is abbreviated for bank loans. Traditional is abbreviated for traditional non-bank private debt. 144A is abbreviated for 144A private debt. Public is abbreviated for public debt. Non-bank private is abbreviated for non-bank private debt. Syn is abbreviated for syndicated loans. Sole is abbreviated for sole loans or bilateral loans. Private is abbreviated for private debt. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. P-values are reported in parentheses.

This finding is consistent with the view that firms with higher credit quality prefer public debt to private debt. Non-bank private debt is preferred to bank loans by firms with credit ratings. This result is consistent with the view that non-bank private debt issuers are characterized by low levels of information asymmetry.

Therefore, we find that over periods of low GDP growth:

- Firms with higher credit quality prefer public debt, traditional private debt, and syndicated loan to 144A private debt.
- Firms with higher credit quality prefer public debt to private debt.
- Firms with higher credit quality prefer bank loans to non-bank private debt.

Our results support *Hypotheses 3.1.1, 3.2.1, and 3.3.1*, and reject *Hypothesis 3.4.1*. We also find that over years of low GDP growth, firms with credit ratings issue debt in the following order: 1) public debt or 144A private debt; 2) syndicated loans or bilateral loans; 3) traditional private debt, and that rated firms prefer public debt to private debt, and non-bank private debt to bank loans.

Information Asymmetry

In *Panel A* of Table 3.6, during low GDP growth years we observe that assets relates positively to probability of traditional non-bank private debt vs. syndicated loans, probability of public debt vs. syndicated loans, probability of traditional non-bank private debt vs. bilateral loans, probability of public debt vs. bilateral loans, probability of traditional non-bank private debt vs. 144A private debt, and probability of public debt vs. 144A private debt. Our results indicate that firms with lower levels of information asymmetry are likely to issue traditional non-bank private debt and public debt relative to syndicated loans, bilateral loans, and 144A private debt during low GDP growth years. Therefore, we accept *Hypothesis 3.3.2 that firms with higher levels of information asymmetry prefer 144A private debt to traditional non-bank private debt* but reject *Hypothesis 3.4.2 that firms with higher levels of information asymmetry prefer bilateral loans to syndicated loans*. The findings are consistent with Arena (2011) and Kaya (2013), as well as the previous section on the full sample. First, high asymmetric information firms produce relatively less sensitive information and experience a cheaper cost of debt regarding 144A private debt borrowings over periods of economic recession. Moreover, unlike traditional non-bank private debt, 144A private debt does not require an initial registration, thus leading to lower cost of producing information for firms with high levels of information asymmetry in the state of poor economy. In addition, 144A private debt that is associated with the possibility of being converted into a public debt at a later date, after recession, provides firms that have high levels of information asymmetry with higher liquidity for future investment opportunities.

Panel A of Table 3.7 shows that during low GDP growth years the positive effects of assets are on the following comparisons: traditional non-bank private debt vs. bank loans, public debt vs. bank loans, public debt vs. non-bank private debt, and public debt vs. private debt, and that the negative effects of assets are on the following comparisons: bank loans vs. non-bank private debt, and syndicated loans vs. non-bank private debt. Our results indicate that firms with lower levels of information asymmetry prefer public debt to private debt, non-bank private debt to bank loans, and traditional non-bank private debt to bank loans. Therefore, we accept *Hypothesis 3.1.2 that firms with higher levels of information asymmetry prefer private debt to public debt*.

Explanations are summarized as follows. First, firms with higher levels of information asymmetry have to face high costs regarding information disclosure such as certified financial statements for SEC registration (Blackwell and Kidwell, 1988), plus, the condition that financial constraints worsen information production over periods of economic recession. However, these firms could benefit from private borrowings which produce the same information with lower costs (Krishnaswami et al., 1999). Second, given that private creditors can price the firm's financing claim more accurately than public debt holders and can protect firms' sensitive information from dissemination which is crucial during economic recession when financial constraints occur (Campbell, 1979; Hadlock and James, 2002), those with higher levels of information asymmetry should raise capital from private debt holders to keep sensitive information confidential. Third, moral hazard theory (Diamond, 1984) argues that the efficiency of one intermediary which is usually seen among private creditors outweighs that of public creditors since individuals of public creditors may have an incentive to free-ride on others' monitoring effort plus a poor economy may distort the intention and interests of individual creditors. Finally, firms with higher levels of information asymmetry that cannot be fully monitored by public creditors need to pay higher expenses to compensate for the risk associated with the moral hazard of asset substitution (Leland and Pyle, 1977; Krishnaswami et al., 1999). Consequently, the related costs increase when there is increasing financial friction in the credit market at the state of low economy.

We also accept *Hypothesis 3.2.2 that firms with higher levels of information asymmetry prefer bank loans to non-bank private debt*. This finding is consistent with Carey et al. (1998). It explains that banks are particularly specialized in lending to firms with high levels of information asymmetry (Fama, 1985; Nakamura, 1989), including periods of economic recession as existing information held by banks allows them to do so (Schmukler and Vesperoni, 2001). One aspect is that this is a result of trade-off between cost of monitoring and cost of providing required information. Banks are capable of offering efficient monitoring, thus lowering the cost of producing information for firms with high levels of information asymmetry. Another aspect is that reputation building is still an important concern to firms over periods of economic recession (Diamond, 1991). One implication is that firms with high levels of information asymmetry that are caused by insufficient communication with the market may need bank borrowings to build or develop reputation urgently in the economic recession.

Therefore, we find that over periods of low GDP growth:

- Firms with lower levels of information asymmetry are likely to issue traditional non-bank private debt and public debt over syndicated loans, bilateral loans, and 144A private debt.
- Firms with lower levels of information asymmetry prefer public debt to private debt.

- Firms with lower levels of information asymmetry prefer non-bank private debt to bank loans.

Our results support *Hypotheses 3.1.2, 3.2.2, and3. 3.2*, and reject *Hypothesis 3.4.2*.

Market Conditions

Panel A of Table 3.6 shows that tangibility positively affects probability of traditional non-bank private debt vs. syndicated loans, and probability of traditional non-bank private debt vs. 144A private debt. This means that firms with higher fixed assets ratios are likely to issue traditional non-bank private debt relative to syndicated loans and 144A private debt. These results are consistent with those in the full sample. Firms with higher fixed assets ratios have easier access to traditional non-bank private debt due to the associated ability to register and process through SEC (Arena, 2011). Therefore, we reject *Hypothesis 3.3.3 that firms with fixed assets ratios prefer 144A private debt to traditional non-bank private debt* and *Hypothesis 3.4.3 that firms with higher fixed assets ratios prefer syndicated loans to bilateral loans*.

Tangibility, as shown in *Panel A* of Table 3.7, relates to the probability of traditional non-bank private debt over bank loans positively, which means firms with higher fixed assets ratios prefer traditional non-bank private debt to bank loans. This result is in line with the view that traditional non-bank private debt issuers are characterized by higher fixed assets. Therefore, we have no evidence to accept *Hypothesis 3.1.3 that firms with fixed assets ratios prefer private debt to public debt* and *Hypothesis 3.2.3 that firms with high fixed assets ratios prefer bank loans to non-bank private debt*.

Therefore, we find that over periods of low GDP growth:

- Firms with higher fixed assets ratios are likely to issue traditional non-bank private debt relative to syndicated loans and 144A private debt.
- Firms with higher fixed assets ratios prefer traditional non-bank private debt to bank loans.

Our results provide no evidence to accept *Hypotheses 3.1.3, 3.2.3, 3.3.3, and 3.4.3.*

Macroeconomic Conditions

In Table 3.6, *Panel A* reports the coefficients of GDP growth for comparison across the five debt categories during low GDP growth years. The adverse effects of GDP growth are seen in the following comparisons: 144A private debt vs. syndicated loans, public debt vs. syndicated loans, public debt vs. 144A private debt, and public debt vs. traditional non-bank private debt. Our results indicate that during low GDP growth years, firms prefer syndicated loans to 144A private debt, and 144A private debt to public debt when the economy is better. Additionally, traditional non-bank private debt is preferred to public debt when the economy is better. Therefore, we reject *Hypothesis 3.3.4 weak aggregate economy increases the probability firms issue traditional non-bank private debt relative to 144A private debt* and *Hypothesis 3.4.4 that weak aggregate economy increases the probability firms issue syndicated loans relative to bilateral loans*.

Panel A of Table 3.7 reports the coefficients of GDP growth for the comparison of the choice of more general debt categories during low GDP growth years. We observe that negative relationships with GDP growth appear on the choice of 144A private debt relative to bank loans, the choice of public debt relative to bank loans, the choice of public debt relative to non-bank private debt, and the choice of public debt relative to private debt. The positive effects of GDP growth are in the choice of bank loans relative to non-bank private debt, and the choice of syndicated loans relative to non-bank private debt. These coefficients indicate that: 1) firms during low GDP growth years prefer private debt to public debt when the economy is better; 2) firms during low GDP growth years prefer bank loans to non-bank private debt when the economy is better. These results are consistent with the view argued in the work of Armstrong (2003) that syndicate members of a syndicated loan provide large volumes of capital, thus increasing the liquidity of the firm largely. The view that syndicated loan borrowers are characterized by higher credit quality also supports the above results. Therefore, we reject *Hypothesis 3.1.4 that weak aggregate economy increases the probability firms issue private debt relative to public debt* but accept *Hypothesis 3.2.4 that weak aggregate economy increases the probability firms issue non-bank private debt relative to bank loans* .

Prior studies discuss that financially constrained firms are more sensitive to the state of the economy than unconstrained counterparts (Korajczyk and Levy, 2003), and that firms' debt claims are mainly dependent on bank borrowings as banks have held certain information and require less sensitive information on new borrowing (Schmukler and Vesperoni, 2001). One implication is that firms over periods of economic recession experience financial constraints and are likely to borrow from banks due to the lower cost of debt and less sensitive information required. Harrison and Widjaja (2013) argue that economic recession causes firms to face difficulties in opening or renewing a debt claim. Consequently, existing information held by banks mitigates difficulties in opening or renewing a debt claim.

Therefore, we find that over periods of low GDP growth:

- When the economy is better, firms issue debt in the following order: 1) syndicated loans; 2) 144A private debt; 3) public debt.
- When the economy is better, firms prefer private debt to public debt.
- When the economy is better, firms prefer bank loans to non-bank private debt.

Our results provide no evidence to accept *Hypotheses 3.1.4, 3.3.4, and 3.4.4*, but our results support *Hypothesis 3.2.4*.

Control Variables

Syndicated loans vs. Bilateral loans

Panel A of Table 3.6 shows that during low GDP growth years syndicated loans borrowers are characterized by larger issue size, lower likelihood of financial distress, lower risk, and higher tax. These results are consistent with those of the full sample and the view that higher credit quality firms tend to borrow syndicated loans relative to bilateral loans.[69]

144A private debt vs. traditional non-bank private debt

Panel A of Table 3.6 shows that in years of low GDP growth 144A private debt issuers relative to traditional non-bank debt issuers are younger, have larger issue size and higher tax. These results are in line with the view that 144A private debt borrowers are characterized by lower credit quality. 144A private debt issuers are also characterized by lower growth opportunities. One explanation is that firms borrowing 144A private debt appear to suffer financial distress (Arena, 2011). The market value of equity and the book value of equity are close, thus making Tobin's Q close to 1. Another explanation is related to agency problems of free-cash flow (Jensen, 1986). Firms with low growth opportunities are less likely to be affected by agency problems that are associated with free-cash flow and are less dependent on the disciplinary requirement of traditional non-bank private debt.

Bank loans vs. non-bank private debt

Panel A of Table 3.7 presents information during low GDP growth years coefficients of control variables for the comparison between bank loans and non-bank private debt. Banks loans borrowers are characterized by higher risk and lower leverage. These results are consistent with those of the full sample and associated with the point that bank loans borrowers are characterized by higher credit quality. Esho et al. (2001) demonstrate that higher leverage signals a higher likelihood of financial distress while low leverage signals a low likelihood of debt in default. Hence, the use of bank loans is related to low leverage.

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[69] According to Armstrong (2003) and Altunbaş et al. (2010), syndicated loans largely increase the liquidity of the firm and require higher credit quality.

Public debt vs. private debt

The coefficients of control variables for the comparison between public debt and private debt during low GDP growth years are reported in *Panel A* of Table 3.7. Public debt issuers are characterized by larger issue size, greater profitability, lower risk, and older firm age. These results are consistent with the view that public debt issuers are characterized by higher credit quality. These public debt borrowers have strong credibility to satisfy public creditors and hence have lower potential to experience financial distress (Altunbaş et al., 2010).

3.7.3.2 Debt Choice during Medium GDP Growth Years

Credit Quality

In *Panel B* of Table 3.6, we observe the negative coefficients on investment grade rating in years of medium GDP growth for comparisons of 144A private debt vs. syndicated loans and 144A private debt vs. bilateral loans, while there are positive coefficients for comparisons of traditional non-bank private debt vs. syndicated loans, public debt vs. syndicated loans, traditional non-bank private debt vs. 144A private debt, and public debt vs. 144A private debt. Thus, our results present that firms with investment grade ratings prefer traditional non-bank private debt and public debt to syndicated loans in medium GDP growth years. Additionally, firms with high investment grade ratings are least likely to issue 144A private debt. Therefore, we accept *Hypothesis 3.3.1 that firms with higher credit quality prefer traditional non-bank to 144A private debt* and reject *Hypothesis 3.4.1 that firms with higher credit quality prefer syndicated loans to bilateral loans*.

Consistent with Denis and Mihov (200a3) and Arena (2011), as well as previous sections, our findings reflect the superiority of 144A private debt over non-bank private debt for low credit quality firms as discussed in the above section in terms of contractual obligations, monitoring, risks, and speed of issuance. In other words, the effect of credit quality on the choice between 144A private debt and traditional non-bank private debt is neutral in medium states of the economy.

Panel B of Table 3.7 reports the choice of debt sources considering more general categories in years of medium GDP growth. We observe a positive effect of investment grade rating on the choice of public debt against bank loans, the choice of bank loans against non-bank private debt, the choice of syndicated loans against non-bank private debt, the choice of public debt against non-bank private debt, and the choice of public debt against private debt. The choice of 144A private debt against bank loans is negatively dependent on investment grade rating indicating that firms with investment grade are likely to issue public debt relative to private debt, and to issue bank debt relative to non-bank private debt during medium GDP growth years. Therefore, we accept *Hypothesis 3.1.1 that firms with higher credit quality prefer public debt to private debt*. The findings are also in accordance with that of the full sample. Since private debt incurs lower cost of debt relative to public debt due to cheaper monitoring and covenants (Berger and Udell, 1998), private debt such as bank loans and non-bank private debt are invaluable to low credit quality firms over periods of medium economic growth. Furthermore, private borrowings are regarded as a way to building reputation (Diamond, 1991). Additionally, given that firms with low credit quality expect uncertain future financial performance (Altunbaş et al., 2010; Arena, 2011) they need flexibility of renegotiation in order to adjust debt structure in medium economic growth years.

Our findings also support *Hypothesis 3.2.1 that firms with higher credit quality prefer bank loans to non-bank private debt*. This is explained in three ways. Firstly, non-bank private debt is tightly held and illiquid due to regulatory restrictions (Kwan and Carleton, 1995). Secondly, low flotation costs and custom-designed covenants of non-bank private debt are outstanding features relative to bank loans for low credit quality firms over periods of medium economy (Denis and Mihov, 2003). Thirdly, loan loss reserve associated with bank loans hinders low credit quality firms during medium economy states.

With respect to the not rated dummy variable in years of medium GDP growth, in *Panel B* of Table 3.6 probability of 144A private debt against syndicated loans, probability of public debt against syndicated loans, probability of 144A private debt against bilateral loans, probability of public debt against bilateral loans, and probability of public debt against traditional non-bank private debt are observed with negative signs. The probability of traditional non-bank private debt to syndicated loans and the probability of traditional non-bank private debt to 144A private debt have positive relations with the not rated dummy. Hence, we find that firms with credit ratings tend to issue 144A private debt and public debt relative to syndicated loans and traditional non-bank private debt in years of medium GDP growth. Among 144A private debt, public debt, syndicated loans, and traditional non-bank private debt, traditional non-bank private debt is preferred to the other three debt categories by firms without credit ratings. These results are in accordance with the view that 144A private debt issuers are characterized by high levels of information asymmetry.

The not rated dummy positively influences probability of traditional non-bank private debt relative to 144A private debt in years of medium GDP growth as reported in *Panel B* of Table 3.7. Not rated dummy a has negative influence on the choice of 144A private debt relative to bank loans, the choice of public debt relative to bank loans, the choice of public debt relative to non-bank private debt, and the choice of public debt relative to private debt. Our results suggest that firms with credit ratings prefer public debt to private debt and 144A private debt to bank loans over period of medium GDP growth. These results are consistent with the view that public debt issuers are characterized by high credit quality.

Therefore, we find that over periods of medium GDP growth:

- Firms with higher credit quality prefer traditional non-bank private debt and public debt to syndicated loans.
- Firms with higher credit quality are least likely to issue 144A private debt.

Our results support *Hypotheses 3.1.1, 3.2.1, and 3.3.1*, and reject *Hypothesis 3.4.1*. We also find that firms with credit ratings prefer 144A private debt and public debt relative to syndicated loans and traditional non-bank private debt. Public debt is preferred to private debt by firms with credit ratings.

Information Asymmetry

Assets, in years of medium GDP growth as reported in Panel B of Table 3.6, have positive roles on the bilateral loans borrowings relative to syndicated loans borrowings, on 144A private debt issue relative to syndicated loan borrowings, on traditional non-bank private debt issue relative to syndicated loans borrowings, public debt issue relative to syndicated loans borrowings, on traditional non-bank private debt issue relative to bilateral loan borrowings, on public debt issue relative to bilateral loan borrowings, on traditional non-bank private debt issue relative to 144A private debt issue, on and public debt issue relative to 144A private debt issue. We also observe negative signs on this information asymmetry proxy for comparisons including 144A private debt vs. bilateral loans, and public debt vs. traditional non-bank private debt. Hence, we find that in years of medium GDP growth firms with higher levels of information asymmetry issue categories of debts in the following pecking order: 1) syndicated loans; 2) 144A private debt; 3) bilateral loans; 4) public debt; 5) traditional non-bank private debt. In line with earlier discussions, 144A private debt is preferred to traditional non-bank private debt by firms with high levels of information asymmetry for several reasons. One explanation is that 144A is subordinated and monitoring of 144A debt holders is less strict so that firms with high levels of information asymmetry benefit from producing less sensitive information and experience lower cost of debt in medium economic growth years. Second, unlike traditional non-bank private debt, 144A private debt does not require an initial registration, thus leading to lower cost of producing information and speed of issuance for firms with high levels of information asymmetry. Furthermore, 144A private debt that is associated with the possibility to be converted into a public debt at a later date provides firms with high levels of information asymmetry with higher liquidity for future investment opportunities. Therefore, we accept *Hypothesis 3.3.2 that firms with higher levels of information asymmetry prefer 144A private debt to traditional non-*

bank private debt and reject *Hypothesis 3.4.2 that firms with higher levels of information asymmetry prefer bilateral loans to syndicated loans*.

Panel B of Table 3.7 reports the results for the choice of more general debt categories in years of medium GDP growth. Assets positively affect probability of traditional non-bank private debt vs. bank loans, probability of 144A private debt vs. bank loans, probability of public debt vs. bank loans, probability of public debt vs. non-bank private debt, and probability of public debt vs. private debt. We observe negative relationships between probability of bank loans vs. non-bank private debt and assets, and between probability of bilateral loans vs. non-bank private debt and assets. Our results suggest that: 1) firms with lower levels of information asymmetry prefer public debt to private debt in years of medium GDP growth; 2) firms with lower levels of information asymmetry prefer non-bank private debt to bank loans in years of medium GDP growth. Therefore, we accept *hypothesis 3.1.2 that firms with higher levels of information asymmetry prefer private debt to public debt.* Similar to discussions presented earlier, this is supported in a number of ways. First, producing information for SEC registration involves expensive costs, while disclosing information to private creditors incurs lower costs (Krishnaswami et al., 1999). During periods of medium economic growth, the effect of information asymmetry on the choice between public debt and private debt remains constant. Secondly, given that private creditors can price the firm's financing claim more accurately than public debt holders and can keep a firm's sensitive information confidentially (Campbell, 1979; Hadlock and James, 2002), firms with high levels of information asymmetry continue borrowing privately in medium economic years. Thirdly, moral hazard theory (Diamond, 1984) suggests that private borrowings are associated with cost-efficient monitoring of creditors and are free from free-ride problems caused by issuing public debt.

Our findings are also supportive to *Hypothesis 3.2.2 that firms with higher levels of information asymmetry prefer bank loans to non-bank private debt*. This finding is consistent with Carey et al. (1998) and earlier sections. On the one hand, this is a result of trade-off between cost of monitoring and cost of providing required information.

Firms with high levels of information asymmetry experience a higher cost of monitoring and cost of producing sensitive information, hence they prefer bank loans that are associated with better monitoring efficiency. On the other hand, according to Diamond (1991), firms borrowing bank loans may have the purpose of building reputation in the debt market. This implies that firms with high levels of information asymmetry may use bank borrowings to build reputation and protect sensitive information.

Therefore, we find that over periods of medium GDP growth:

- Firms with higher levels of information asymmetry issue debt in the following order: 1) syndicated loans; 2) 144A private debt; 3) bilateral loans; 4) public debt; 5) traditional non-bank private debt.
- Firms with higher levels of information asymmetry prefer private debt to public debt.
- Firms with higher levels of information asymmetry prefer bank loans to non-bank private debt.

Our results support *Hypotheses 3.1.2,3. 2.2, and 3.3.2*, and reject *Hypothesis 3.4.2.*

Market Conditions

The results in Panel B of Table 3.6 report that in years of medium GDP growth fixed assets ratio has a positive effect on probability of public debt over syndicated loans, and probability of public debt over 144A private debt. It is suggested that firms with higher fixed assets ratios tend to issue public debt against syndicated loans and 144A private debt over periods of medium GDP growth. These results are consistent with the view that public debt issuers are characterized by high credit quality. Moreover, Luengnaruemitchai and Ong (2005) argue that firms use reputation built from public credit markets to acquire more fixed assets. Therefore, we reject *Hypothesis 3.3.3 that firms with higher fixed assets ratios prefer 144A private debt to traditional non-bank private debt* and *Hypothesis 3.4.3 that firms with higher fixed assets ratios prefer syndicated loans to bilateral loans*.

Panel B of Table 3.7 further shows the choice of more general categories in years of medium GDP growth. The choice of traditional non-bank private debt over bank loans, the choice of public debt over bank loans, and the choice of public debt over private debt are positively related to tangibility. Hence, firms with higher fixed assets ratios prefer public debt to private debt, and prefer traditional non-bank private debt to bank loans. These results are consistent with the view that firms with a higher credit quality prefer public debt to private debt. We accordingly reject *Hypothesis 3.1.3 that firms with higher fixed assets ratios prefer private debt to public debt* and *Hypothesis 3.2.3 that firms with higher fixed assets ratios prefer bank loans to non-bank private debt*.

Therefore, we find that over periods of medium GDP growth:

- Firms with higher fixed assets ratios prefer public debt to syndicated loans and 144A private debt.
- Firms with higher fixed assets ratios prefer public debt to private debt.

Our results do not support *Hypotheses 3.1.3, 3.2.3, 3.3.3, and 3.4.3*.

Macroeconomic Conditions

Panel B of Table 3.6 reports the coefficients of GDP growth in medium GDP growth years. Probability of bilateral loans vs. syndicated loans, probability of 144A private debt vs. syndicated loans, probability of public debt vs. syndicated loans, and probability of public debt vs. traditional non-bank private debt are inversely related to GDP growth. Meanwhile, probability of traditional non-bank private debt vs. bilateral loans and probability of traditional non-bank private debt vs. 144A private debt are positively related to GDP growth. The results indicate that in medium GDP growth years, firms are likely to borrow syndicated loans or traditional non-bank private debt relative to bilateral loans, 144A private debt, and public debt when the economy is better. Therefore, we reject *Hypothesis 3.3.4 that weak aggregate economy increases the probability firms issue traditional non-bank private debt relative to 144A private debt* and *Hypothesis 3.4.4 that weak aggregate economy increases the probability firms issue syndicated loans relative to bilateral loans*.

Panel B of Table 3.7 also shows the coefficients of GDP growth in medium GDP growth years. We observe a positive sign of GDP growth on the comparison between syndicated loans and non-bank private debt. Negative signs are observed on the following comparisons: 144A private debt vs. bank loans, and public debt vs. bank loans. The results indicate that bank loans are preferred to 144A private debt and public debt when the economy is better in medium GDP growth years. Additionally, syndicated loans are preferred to non-bank private debt when the economy is better in medium GDP growth years. Therefore, we reject *Hypothesis 3.1.4 that weak aggregate economy increases the probability firms issue private debt relative to public debt and Hypothesis 3.2.4 that weak aggregate economy increases the probability firms issue non-bank private debt relative to bank loans* .

Therefore, we find that over periods of medium GDP growth:

- When the economy is better, firms are likely to borrow syndicated loans or traditional non-bank private debt relative to bilateral loans, 144A private debt, and public debt.
- When the economy is better, firms are likely to borrow bank loans over public debt.

Our results are not supportive to *Hypotheses 3.1.4, 3.2.4, 3.3.4, or 3.4.4*.

Control Variables

Syndicated loans vs. bilateral loans

Panel B of Table 3.6 shows that syndicated loans borrowers have larger issue size in medium GDP growth years. These results are consistent with those of the full sample and the view that syndicated loan borrowers are characterized by higher credit quality. Issue size plays a relatively more important role on the choice between syndicated loans and bilateral loans than other control variables in medium GDP growth years as other control variables are not significant in explaining the choice of debt sources.

144A private debt vs. traditional non-bank private debt

Panel B of Table 3.6 shows that 144A private debt issuers relative to traditional non-bank debt issuers are younger, have larger issue size and lower likelihood of financial distress in medium GDP years. These results are in line with the full sample and the view that 144A private debt borrowers are characterized by lower credit quality.

Bank loans vs. non-bank private debt

Panel B of Table 3.7 presents the coefficients of control variables for the comparison between bank loans and non-bank private debt in medium GDP growth years. Bank loans borrowers are characterized by higher risk, lower leverage, larger issue size and lower tax. These results are consistent with the view that bank loan borrowers are characterized by high credit quality.

Public debt vs. private debt

The coefficients of control variables for the comparison between public debt and private debt in medium GDP years are reported in *Panel B* of Table 3.7. Public debts issuers are characterized by lower risk, lower deviation from the industry, and higher leverage. These results are consistent with the view that public debt issuers are characterized by higher credit quality. Public debt is issued with smaller issue size relative to private debt in medium GDP growth years. This can be interpreted as a result of relatively more expensive information-monitoring cost on public debt. This is consistent with the view that firms with higher levels of information asymmetry prefer private debt to public debt.

3.7.3.3 Debt Choice during High GDP Growth Years

Credit Quality

The empirical results for debt choices across the five sources in high GDP growth years are reported in *Panel C* of Table 3.6. Our results show that investment grade rating has a negative relation with the choice of 144A private debt over syndicated loans. Positive effects of investment grade rating are observed on probability of traditional non-bank private debt over syndicated loans, probability of public debt over syndicated loans, probability of traditional non-bank private debt over 144A private debt, and probability of public debt over 144A private debt. The above results illustrate that firms with high investment grade ratings issue public debt and traditional non-bank private debt first, then syndicated loans, and 144A private debt as a last resort in high GDP growth years. Therefore, we accept *Hypothesis 3.3.1 that firms with higher credit quality prefer non-bank private debt to bank loans* and reject *Hypothesis 3.4.1 that firms with higher credit quality prefer syndicated loans to bilateral loans*.

This finding is consistent with that of Denis and Mihov (2003) and Arena (2011), which suggests that characteristics of 144A do not change over economic expansion. Namely, a) 144A private debt is not associated with contractual obligations such as covenants or collateral; b) 144A private debt is usually subordinated and monitoring activities are not practically undertaken by investors; c) risk of borrowing 144A private debt is relatively lower for firms with lower credit quality; d) 144A does not require an initial registration and is potentially convertible to public bond after issue. 144A private debt is still preferred to firms with low credit quality over periods of economic expansion when there is enough credit supply and less market friction.

Moreover, *Panel C* of Table 3.7 reports choices among debt sources including more general categories in high GDP growth years. The panel shows that investment grade rating has a positive effect on the choice of the following debt source: traditional non-bank private debt relative to bank loans, public debt relative bank loans, bank loans relative to non-bank private debt, syndicated loans relative to non-bank private debt, public debt relative to non-bank private debt, and public debt relative to private debt. Meanwhile, investment grade rating has negative effects on probability of 144A private debt over bank loans, and probability of bilateral loans over non-bank private debt. Hence, our results suggest that: 1) firms with high investment grade prefer public debt to private debt in high GDP growth years; 2) firms with high investment grade prefer bank loans to non-bank private debt in high GDP growth years; 3) firms with high investment grade prefer traditional non-bank private debt to bank loans in high GDP growth years; 4) firms with high investment grade prefer non-bank private debt to bilateral loans in high GDP growth years. Therefore, we accept *Hypothesis 3.1.1 that firms with higher credit quality prefer public debt to private debt* and *Hypothesis 3.2.1 that firms with higher credit quality prefer bank loans to non-bank private debt*.

Over periods of economic expansion, there are less financial frictions in the market and more positive NPV investment projects to the firm. Hence, compared to periods of economic recession, firms with lower credit quality have easier access to credit markets during economic expansion, especially private debt markets. Monitoring and covenants associated with private creditors lead to lower cost of debt for low credit quality firms (Berger and Udell, 1998). Another explanation is that firms with lower credit quality take advantage of private borrowings in terms of reputation building for future public debt due to lower cost (Diamond, 1991; Chandra and Nayar, 2008).

Firms with higher credit quality are less likely to borrow non-bank private debt as these claims are tightly held and illiquid (Kwan and Carleton, 1995). Lower flotation costs and custom-designed covenants on non-bank private debt suit low credit quality firms (Denis and Mihov, 2003). Borrowing from non-bank private creditors could lower monitoring cost caused by banks' frequent monitoring for firms with low credit quality (Diamond, 1991). Denis and Mihov (2003) argue that 144A private debt presents characteristics of both bank loans and public debt. This, hence, provides low credit quality firms with efficiency of public claim at a later date and flexibility of renegotiation.

In *Panel C* of Table 3.6, not rated dummy is negatively related to probability of 144A vs. syndicated loans, probability of public debt vs. syndicated loans, probability of 144A private debt vs. bilateral loans, the probability of public debt vs. bilateral loans, and probability of public debt vs. traditional non-bank private debt in high GDP growth years. Not rated dummy, meanwhile, has positive relations to probability of traditional non-bank private debt vs. syndicated loans, to probability of traditional non-bank private debt vs. bilateral loans, and to probability of traditional non-bank private debt vs. 144A private debt. We find that firms with credit ratings are likely to issue public debt and 144A private debt as first choice, to issue syndicated loans and bilateral loans as second choice, and to issue traditional non-bank private debt last in high GDP growth years. These results are consistent with the view that traditional non-bank private debt issuers are characterized by low levels of information asymmetry.

The effect of not rated dummy on the choice of debt sources including more general categories in high GDP growth years is reported in *Panel C* of Table 3.7. Negative signs on not rated dummy are shown in the following comparisons: 144A private debt vs. bank loans, public debt vs. bank loans, public debt vs. non-bank private debt, and public debt vs. private debt. Probability of traditional non-bank private debt over bank loans is positively related to not rated dummy. The results indicate that firms with credit ratings are likely to issue public debt relative to private debt in high GDP growth years. This is consistent with the view that firms issuing public debt are characterized by higher credit quality. Additionally, 144A private debt is preferred to bank loans by firms with credit ratings.

Therefore, we find that over periods of high GDP growth:

- Firms with higher credit quality issue debt in the following order: 1) public debt or traditional non-bank private debt; 2) syndicated loans; 3) 144A private debt.
- Firms with higher credit quality prefer public debt to private debt.
- Firms with higher credit quality prefer bank loans to non-bank private debt.

We accept *Hypotheses 3.1.1, 3.2.1, and 3.3.1*, and reject *Hypothesis 3.4.1*. We also find that in years of economic expansion firms with credit ratings issue debt in the following order: 1) public debt and 144A private debt; 2) syndicated loans and bilateral loans; 3) traditional non-bank private debt. Additionally, firms with credit ratings are likely to issue public debt relative to private debt.

Information Asymmetry

Panel C of Table 3.6 shows that in years of economic expansion assets has a positive influence on the following probabilities: probability of 144A private debt vs. syndicated loans, probability of traditional non-bank private debt vs. syndicated loans, probability of public loans vs. syndicated loans, probability of 144A private debt vs. bilateral loans, probability of traditional non-bank private debt vs. bilateral loans, probability of public debt vs. bilateral loans, probability of traditional non-bank private debt vs. 144A private debt, and probability of public debt vs. 144A private debt. Asset has a negative influence on probability of public debt vs. traditional non-bank private debt. The results tell a story that firms with higher levels of information asymmetry are likely to borrow syndicated loans or bilateral loans relative to 144A private debt, and to issue traditional non-bank private debt and public debt last in high GDP growth years. Therefore, we accept *Hypothesis 3.3.2 that firms with higher levels of information asymmetry prefer 144A private debt to traditional non-bank private debt* and reject *Hypothesis 3.4.2 that firms with higher levels of information asymmetry prefer bilateral loans to syndicated loans*.

Over periods of economic expansion, there is sufficient supply of credit in the market. Firms borrowing in the credit market also face less financial friction. Positive macroeconomic conditions imply that firms with high levels of information asymmetry experience less sensitive information being disseminated. Firms with high levels of information asymmetry continue benefiting from 144A private debt as 144A private debt is subordinated and monitoring of 144A debt holders is less strict. This requires these firms to produce less sensitive information. Moreover, unlike traditional non-bank private debt, 144A private debt does not require an initial registration. As a result, firms with high levels of information asymmetry benefit from a lower cost of producing information and faster speed of issuance over issue of 144A private debt. In addition, 144A private debt that is characterized by flexibility to be transferred to public debt remains the choice relative to traditional non-bank private debt for firms with high levels of information asymmetry during economic expansion.

Panel C of Table 3.7 reports that in years of high GDP growth assets has a positive effect on probability of traditional non-bank private debt relative to bank loans, on probability of 144A private debt relative to bank loans, on probability of public debt relative to bank loans, and on probability of public debt vs. private debt. Probability of bank loans relative to non-bank private debt, probability of syndicated loans relative to non-bank private debt, and probability of bilateral loans relative to non-bank private debt are negatively related to assets. Our results suggest that: 1) firms with higher levels of information asymmetry prefer private debt to public debt in years of economic expansion; 2) firms with higher levels of information asymmetry prefer bank loans to non-bank private debt in years of economic expansion; 3) firms with higher levels of information asymmetry prefer bank loans to traditional non-bank private debt and 144A private debt in years of economic expansion; 4) firms with higher levels of information asymmetry prefer syndicated loans and bilateral loans to non-bank private debt in years of economic expansion. Therefore, we accept *Hypothesis 3.1.2 that firms with higher levels of information asymmetry prefer private debt to public debt* and *Hypothesis 3.2.2 that firms with higher levels of information asymmetry prefer bank loans to non-bank private debt*.

Over periods of economic expansion, the credit market is fully capable of supplying credit and firms suffer less financial constraint, including those with high levels of information asymmetry. The reasons why private debt is preferred are based on the following points. At first, although the economy is good, firms with higher levels of information asymmetry have to face tremendous expenses regarding information disclosure such as certified financial statements for SEC registration (Blackwell and Kidwell, 1988). Conversely, these firms experience lower costs for producing the same information on private borrowings (Krishnaswami et al., 1999). Secondly, high asymmetric information firms produce less sensitive information to borrow privately over periods of economic expansion as private creditors price the debt claims of the firm more accurately (Campbell, 1979; Hadlock and James, 2002). Thirdly, free-ride problems, as suggested by moral hazard theory (Diamond, 1984) between multiintermediaries may be more serious over periods of economic expansion as such intermediaries have strong supplies of credit and increased conflict on individual interests. Hence, firms with high levels of information asymmetry choose private debt because of the efficiency of one intermediary during an economic boom. Finally, firms with higher levels of information asymmetry that cannot be fully monitored by public creditors need to pay higher expenses to compensate for the risks associated with the moral hazard of asset substitution although the economy is good (Leland and Pyle, 1977; Krishnaswami et al., 1999).

Borrowing from banks for firms with high levels of information asymmetry is resulted from a trade-off between cost of monitoring and cost of providing the required information. Firms with high levels of information asymmetry are likely to face a higher cost of monitoring and cost of producing information compared to firms with low levels of information asymmetry. Choosing bank loans for efficiency of monitoring could lower relevant costs for firms with higher levels of information asymmetry even over periods of economic expansion. Moreover, according to Diamond (1991), firms borrowing bank loans may have the purpose of building reputation in the debt market. It is intuitively a good time to raise debt capital when the economy is good as firms with high levels of information asymmetry face less financial constraint and can build reputation at a lower cost compared to periods of economic contraction.

Therefore, we find that over periods of high GDP growth:

- Firms with higher levels of information asymmetry are likely to borrow debt in the following order: 1) syndicated loans and bilateral loans relative; 2) 144A private debt; 3) traditional non-bank private debt and public debt.
- Firms with higher levels of information asymmetry prefer private debt to public debt.
- Firms with higher levels of information asymmetry prefer bank loans to non-bank private debt.

Our results favour *Hypotheses 3.1.2, 3.2.2, and 3.3.2*, and reject *Hypothesis 3.4.2*.

Market Conditions

As shown in *Panel C* of Table 3.6 for the choice of debt sources in years of high GDP growth, tangibility positively affects probability of bilateral loans vs. syndicated loans, probability of traditional non-bank private debt vs. syndicated loans, probability of public debt vs. syndicated loans, and probability of public debt vs. 144A non-bank private debt meaning that firms with higher fixed assets ratios prefer bilateral loans, traditional non-bank private debt, and public debt to syndicated loans in years of economic expansion. Interpretations are presented as follows: first, as positive macroeconomic conditions reduce financial constraints and market frictions, firms with high fixed assets ratios can utilize collateral value and liquidation value of fixed assets on debt issues. Second, firms with higher fixed assets ratios have easier access to syndicated loans markets relative to bilateral loan markets in terms of collateral values. Third, firms with higher fixed assets ratios receive more stringent monitoring from lenders of syndicated loans that lower the inefficient liquidation process because syndicated loans members hold more accurate firm information than bilateral loans lenders do (Johnson, 1997; Altunbaş et al., 2010). We accordingly reject *Hypothesis 3.3.3 that firms with higher fixed assets ratios prefer 144A private debt to traditional non-bank private debt* and accept *Hypothesis 3.4.3 that firms with higher fixed assets ratios prefer syndicated loans to bilateral loans.*

Panel C of Table 3.7 reports that in high GDP growth years, tangibility has a positive effect on the following comparisons: traditional non-bank private debt vs. bank loans, public debt vs. bank loans, and public loans vs. private debt. Tangibility has a negative effect on the following comparisons: bank loans vs. non-bank private debt, and syndicated loans vs. non-bank private debt. The results suggest that: 1) firms with higher fixed assets ratios prefer public debt to private debt in years of economic expansion, this can be explained as public debt being used to build reputation and to acquire further fixed assets (Luengnaruemitchai and Ong, 2005); 2) firms with higher fixed assets ratios prefer non-bank private debt to bank debt in years of economic expansion. This can be interpreted as low fixed assets ratio signalling a high likelihood of financial distress (Chemmanur and Fulghieri, 1994), thus leading to preference of efficiency of renegotiation and liquidation for firms with lower fixed assets ratios. We accordingly reject *Hypothesis 3.1.3 that firms with higher fixed assets ratios prefer private debt to public debt* and *Hypothesis 3.2.3 that firms with higher fixed assets ratios prefer bank loans to non-bank private debt*.

Therefore, we find that over periods of high GDP growth:

- Firms with higher fixed assets ratios prefer bilateral loans, traditional non-bank private debt, and public debt to syndicated loans.
- Firms with higher fixed assets ratios prefer public debt to private debt.
- Firms with higher fixed assets ratios prefer non-bank private debt to bank debt.

Our results reject *Hypotheses 3.1.3, 3.2.3, and 3.3.3*, and accept *Hypothesis 3.4.3*.

Macroeconomic Conditions

We observe that in high GDP growth years, GDP growth, as the measure of macroeconomic conditions as shown in *Panel C* of Table 3.6 affects, positively, the choice of 144A private debt over bilateral loans, the choice of traditional non-bank private debt over bilateral loans, and the choice of public debt over bilateral loans, while negatively affecting the choice of bilateral loans over syndicated loans. The lesson we learn from this panel regarding macroeconomic conditions is that firms are less likely to take bilateral loans compared to syndicated loans, 144A private debt, traditional non-bank private debt, and public debt when the economy is better in high GDP growth years. These results are consistent with the view that bilateral loans borrowers are characterized by lower fixed assets ratios. According to Armstrong (2003), individual banks have limited capacity to provide sufficient capital to firms with constrained collateral value although over periods of good economy when there are frictionless supplies of capital in the credit market. Low fixed assets ratios also signal the likelihood of debt in default (Esho et al., 2001), thus restricting such firms' ability to satisfy creditors. We accordingly reject *Hypothesis 3.3.4 weak aggregate economy increases* *the probability firms issue traditional non-bank private debt relative to 144A private debt* and *Hypothesis 3.4.4 that weak aggregate economy increases the probability firms issue syndicated loans relative to bilateral loans*.

In *Panel C* of Table 3.7, the only significant comparison is the borrowings of bilateral loans against non-bank private debt in years of high GDP growth. This means that a firm's debt choice is rarely dependent on the state of economy, except that firms prefer non-bank private debt to bilateral loans when the economy is good. These results are also consistent with the view that bilateral loans borrowers are characterized by low fixed assets ratios. We accordingly reject *Hypothesis 3.1.4 that weak aggregate economy increases the probability firms issue private debt relative to public debt* and *Hypothesis 3.2.4 that weak aggregate economy increases the probability firms issue non-bank private debt relative to bank loans.*

Therefore, we find that over periods of high GDP growth:

- When the economy is better, firms are less likely to borrow bilateral loans than syndicated loans, 144A private debt, traditional non-bank private debt, and public debt.

Our results reject *Hypotheses 3.1.4, 3.2.4, 3.3.4, and 3.4.4*.

Control Variables

Syndicated loans vs. bilateral loans

Panel C of Table 3.6 shows that in years of high GDP growth syndicated loans borrowers are characterized by larger issue size and lower likelihood of financial distress. These results are consistent with those of the full sample and the view that higher credit quality firms tend to borrow syndicated loans relative to bilateral loans.

144A private debt vs. traditional non-bank private debt

Panel C of Table 3.6 indicates that in years of high growth GDP, 144A private debt issuers are younger, have larger issue size, have lower likelihood of financial distress, and have larger deviation from the industry. These results are in line with those of the full sample and the view that 144A private debt borrowers are characterized by low credit quality.

Bank loans vs. non-bank private debt

Panel C of Table 3.7 presents the coefficients of control variables for the comparison between bank loans and non-bank private debt in high GDP growth years. Bank loans borrowers are characterized by larger issue size, higher growth opportunities, lower profitability, higher risk, lower leverage, and larger deviation from the industry. These results are consistent with those of the full sample and the view that bank loan borrowers are characterized by higher credit quality.

Public debt vs. private debt

Coefficients of control variables for the comparison between public debt and private debt in years of high GDP growth are reported in *Panel C* of Table 3.7. Public debt issuers are characterized by older firm age, higher risk, higher leverage, and smaller deviation from the industry. These results are consistent with the view that public debt issuers are characterized by higher credit quality. Higher likelihood of financial distress is associated with public debt issue over periods of high GDP growth. Firms with a high likelihood of financial distress may have difficulty in accessing the private debt market (especially bank loans) quickly (Altunbaş et al., 2010). These firms are able to claim in the public debt market due to their satisfactory credibility to meet conditions and requirements associated with public debt.

3.8 Conclusion

By investigating the effect of four major factors (i.e., credit quality, information asymmetry, market factors, and macroeconomic conditions) on debt choice between public and private debt, non-bank and bank loans, 144A and traditional non-bank private debt, and bilateral loans and syndicated loans, this chapter illustrates a comprehensive picture on stories and strategies behind debt financing behaviours. This chapter addresses the main research question *"is the choice of debt source dependent on credit quality, information asymmetry, market factors, or macroeconomic conditions?"* The hypotheses of this chapter relate to the roles of the four principal factors on the choice between public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt. This chapter considered the simultaneous issue of debt and used an incremental logistic model to examine influences of determinants on specially designed comparisons. As motivated by Julio et al., (2007) and Rauh and Sufi (2010), we also focused on the roles of the four principal factors under time-varying macroeconomic conditions by splitting our sample into three sub-samples in terms of GDP growth.

Findings

Syndicated Loans vs. Bilateral Loans

Market conditions play an adverse role on the choice of syndicated loans over bilateral loans for the full sample and the sample of high GDP growth years. For the full sample, macroeconomic conditions are negatively related to the choice of syndicated loans against bilateral loans, while over periods of medium and high GDP growth, this relationship turns positive. We find that credit quality does not significantly affect the choice between syndicated loans and bilateral loans for the full or sub-samples. Information asymmetry is mostly insignificant in determining the choice between syndicated loans and bilateral loans. Our results support *Hypothesis 3.4.4*, and provide no evidence to favour *Hypotheses 3.4.1, 3.4.2, or 3.4.3.*

144A Private Debt vs. Traditional Non-bank Private Debt

Our results show that credit quality has a significantly negative effect on the choice of 144A private debt over traditional non-bank private debt for the full and three sub-samples. Information asymmetry is consistently in a positive relation to the choice of 144A private debt against traditional non-bank private debt for the full and sub-samples ranging from years of low GDP growth to years of high GDP growth. Market conditions and the probability of 144A private debt over traditional non-bank private debt are negatively related for the full sample and sub-sample of low GDP growth years. The effect of market conditions on the choice of 144A private debt to traditional non-bank private debt becomes insignificant when the economy is better. Macroeconomic conditions and the probability of 144A private debt over traditional non-bank private debt are negatively related for the full sample. Our results support *Hypotheses 3.3.1 and 3.3.2*, and reject *Hypotheses 3.3.3 and 3.3.4*.

Bank Loans vs. Non-bank Private Debt

We find that both credit quality and information asymmetry influence the choice of bank loans to non-bank private debt positively for the full and three sub-samples. The probability of bank loans over non-bank private debt is negatively affected by market conditions for the full sample. This only appears for the sub-sample of high GDP growth years. The probability of bank loans to non-bank private debt for the sub-sample of medium GDP growth years is an increasing function of macroeconomic conditions. Our results are supportive of *Hypotheses 3.2.1, 3.2.2, and 3.2.4*, and are not supportive of *Hypothesis 3.2.3*.

Public Debt vs. Private Debt

The probability of public debt issue to private debt issue for the full and three sub-samples has an increasing function of credit quality. Information asymmetry affects the choice of public debt to private debt inversely for the full sample and three sub-samples. Market conditions influence the issue of public debt over private debt favourably for the full sample. This consistency is only observed in the sample of medium GDP growth years and the sample of high GDP growth years. We also find that macroeconomic conditions negatively drive the choice of public debt relative to private debt for the full sample and sub-sample of low GDP growth years. Our results provide evidence to accept *Hypotheses 3.1.1 and 3.1.2*, but not *Hypotheses 3.1.3 and 3.1.4*.

Contributions

The contributions of this chapter are twofold. First, we contribute to the literature in distinguishing between syndicate loans and bilateral loans and in conducting comprehensive comparable analysis on the choice of debt sources. To our knowledge, this chapter is the first to include both syndicated loans and bilateral loans into financing choices across a wide range of choices of debt sources of US firms. In our study, we include a comprehensive set of debt sources, namely, public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt. We directly compared the choice between syndicated loans and bilateral loans. Like no other, this chapter not only examined comparisons between syndicated loans/bilateral loans and another three debt categories (i.e., public debt, 144A private debt, and traditional non-bank private debt), but also conducted comparable analysis for the choice between syndicated loans/bilateral loans and more general debt categories (non-bank private debt and private debt). Moreover, this chapter also includes comparisons between 144A private debt/traditional non-bank private debt and the more general debt category, namely, bank loans which include both syndicated and bilateral loans.

Second, this chapter adds knowledge to existing studies in terms of width of determinants of debt choice. We study not only the most important determinant (i.e., credit quality) of debt choice in the literature (e.g., Denis and Mihov, 2003; Rauh and Sufi, 2010; Arena, 2011) but also three other influential and popular factors (information asymmetry, market factors, and macroeconomic conditions). We provide novel evidence that the other three influential factors are as important as credit quality in determining debt financing decisions and the choice of debt sources changes with time-varying macroeconomic conditions. Influences of other major factors also change with time-varying macroeconomic conditions. We conclude that this chapter demonstrates the importance of the four principal factors in determining the choice of debt sources.

Research Implications

From the perspective of managers, this chapter shapes corporate financial policy with the consideration of firm-specific characteristics, market factors, and macroeconomic conditions. Managers should be aware that short term variations in the state of the economy play an important role in the choice of debt sources. Short term variation in the state of economy could also affect the finance of both current and future investments. We also suggest managers to pay attention not only to current investment but also to possible future opportunities. Managers should not ignore any comparisons between different debt categories, including basic and more general debt categories. The wider managers emphasize the possible comparisons, the more cost efficient a decision to borrow will become. Moreover, we also suggest managers not only focus on building company reputation on borrowings, but also develop and maintain a strong creditor-borrower relationship.

From the perspective of investors, this chapter provides suggestions on investment. This piece of work extends investors' understanding of what matters to the determinants of a firm's choice of debt sources, thus optimizing the portfolio of the investor. Investors are suggested to assess borrowers in terms of credit quality, information asymmetry, market factors, and macroeconomic conditions. We suggest investors to lend to firms with higher credit quality and firms with lower levels of information asymmetry debt with medium and long maturity and large volume so that investors can enjoy long-term favourable returns, and to lend to firms with low credit quality and higher levels of information asymmetry debt with short maturity and small volume. Creditors can mitigate debt in default by syndicating with counterparts or well-designed maturity structures. Additionally, we also suggest investors emphasize existing creditor-borrower relationships which contribute largely to future returns.

Future Studies

Future studies could focus on the effect of the four major factors on the maturity structure of debt, on even wider selection of debt sources on similar studies, on the debt performance of marginal decisions, or on the firm performance after debt issue. Apparently, the effect of the four major factors could also be examined with international data. Additionally, alternative proxies of the four principal factors could be examined for additional robustness.

CHAPTER FOUR

EXTERNAL FINANCING: HOLDING PRECAUTIONARY CASH OR REPAYING DEBT?

4 External Financing: Holding Precautionary Cash or Repaying Debt

4.1 Introduction

In recent years firms have been increasing their cash holdings (e.g., Foley et al., 2007; Bates et al., 2009; Pinkowitz et al., 2014). Popular media also reports evidence of an increase in the cash holdings of US firms. For example, a recent article in *Reuters* reports that cash hoardings of non-financial firms in the US reached $1.65 trillion in 2014, which is a record high.[70] One possible source of extra cash in the balance sheet (i.e., cash holdings) is external financing. Prior studies have found that there is a secular increase on precautionary cash retained from external capital (e.g., Bates et al., 2009; McLean, 2011). One reason is that external capital relative to internally generated cash flow for precautionary cash holdings provides financially constrained firms with opportunities to cover cash shortfalls. Another reason is that firms could achieve their target leverage ratio by issuing securities. The majority of the literature stream on precautionary cash holdings suggests that precautionary cash is retained from one particular channel (i.e., equity issue) although several studies have examined precautionary cash retained from debt issues and have found that firms retained cash from debt issues (e.g., McLean, 2011; Seifert and Gonenc, 2013). A number of studies have found that increasing the firm's cash balance is the primary purpose of security issues, especially equity issues (e.g., Kim and Weisbach, 2008; Hertzel and Li, 2010; McLean, 2011). However, in addition to precautionary cash holdings, previous studies indicate that externally raised capital could also be used for other purposes such as debt repayment (e.g., Wyatt, 2014). As a result, firms using external financing to repay debt are less levered than those that do not use external capital to repay debt. Having a low leverage provides firms with opportunities to raise external capital when they need funding, thus reducing precautionary motives for cash holdings. Conversely, firms that need external financing for precautionary cash holdings may reduce the use of proceeds

[70] Richard Leong, "U.S. Nonbank Cash Holdings at Record High $ 1.65 trillion: Moody's", *Reuters*, 20 October. 2014. Web. 29 April. 2015.

from security issues for debt repayment. Therefore, this empirical chapter examines whether external financing is leading to an increase in cash holdings for precautionary motives or, alternatively, whether external financing is used to repay debt.

Compared to other motives for cash holdings (i.e., transactions motives and speculative motives) the precautionary motive is often attributed to the rationale behind the increase in cash holdings of corporations (McLean, 2011; Almeida et al., 2014).[71] The precautionary motive for holding cash was first introduced by Keynes (1936) as the object of securing cash and cash equivalent to finance unforeseen contingencies caused by uncertainty of cash flow and potential financial constraints, and to finance valuable investment opportunities. Keynes (1936) contends that firms hold cash to hedge risk of adverse cash flow shocks that might force them to forego valuable investment opportunities due to costly external financing. This motive suggests that a precautionary cash reserve alleviates adverse cash flow shocks and difficulty in accessing external capital markets. Popular media also reaches a consensus regarding the notion of precautionary motive. For instance, a recent article in *Wall Street Journal* states that "*cash can make it possible to afford choices, flexibility, and be able to deal with whatever life throws at you, whether it is bad, like a lost job, really bad, like a serious medical event or, conversely, is an opportunity*".[72] An alternative to firms is to raise external capital whenever there are cash shortfalls. However, this approach is not likely to be wise in practice. Richard Passov, Treasurer of Pfizer, states in an article in *Harvard Business Review* that *"in times of need external financing can be exorbitantly expensive or simply unavailable".*[73] Instead, corporate liquidity and financial frictions are closely related (Keynes, 1936). Acharya and Pedersen (2005) and McLean (2011) argue that financing constraints vary over time in the capital market and lead to both good times and bad times for the firm to raise external capital. Survey studies report that the unique role that cash holdings play on liquid management is substantially recognized

[71] Other motives include transaction motive, agency motive, and tax motive.
[72] Morgan Housel, "The Investing Lesson of 1937: Holding Some Cash", *Wall Street Journal*, 27 March. 2015. Web. 29 April. 2015.
[73] Richard Passov, "How Much Cash Does Your Company Need?" *Harvard Business Review*, November. 2003. Web. 15 May. 2015.

by CFOs (e.g., Graham and Harvey, 2001; Almeida et al., 2014). Considering the fundamental relationship between liquidity management and the financial frictions that firms can face, recent studies emphasize the precautionary motive of cash holdings, a common approach to maintain liquidity (e.g., Opler et al., 1999; Han and Qiu, 2007; Bates et al., 2009). According to Almeida et al. (2014), sufficient precautionary cash holdings not only ensure efficient investment in the future but also motivate management to perform for the maximum benefit of shareholders. Additionally, Riddick and Whited (2009), among others, show that precautionary cash holdings ensure a trade-off between the cost of external financing and taxation of interest income.[74]

The motivations of studying the relationship between precautionary cash holdings and external financing as a whole are expressed as follows. First, Harford et al. (2014) find that debt issues increase cash holdings largely. This finding suggests the relevance of debt issues on precautionary cash holdings. Second, co-issuance of debt and equity reduce the cost of issuance (Hann et al., 2013). Harford et al. (2014) argue that issuing both equity and debt diversify the risk of refinancing. Seifert and Gonenc (2013) show that firms with insufficient internal funds reserve cash from both equity issues and debt issues and usually use multiple channels rather than one single channel, for example equity issue, for cash holdings. Finally, firms with financing constraints may try to issue more securities including both equity and debt to cover the current need of money and reserve extra proceeds as cash for future unpredicted needs (Seifert and Gonenc, 2013) because adverse financial shocks are costly and the cost of accessing external capital could be extremely expensive (Almeida et al., 2004). Ferreira and Vilela (2004) also discuss that firms with financial constraints in raising external capital may forego current investment opportunities to finance possible profitable future investment opportunities. Therefore, we argue that financially constrained firms may hold precautionary cash from proceeds of security issues regardless of equity or debt. Although there are some studies on the role of security issues on cash holdings the relevance of external financing as a whole (i.e., both equity and debt) on precautionary

[74] Firms with large amounts of cash reserve attempt to earn some rate of return from reasonable short-term investment (Bates et al., 2009; Duchin et al., 2010).

cash holdings is not yet fully understood. In the first part of this empirical chapter, we aim to investigate whether precautionary cash holdings are dependent on external financing.

Prior studies show that without sufficient precautionary cash holdings, firms may experience financial constraints caused by volatile cash flow, R&D activities, or intended dividend pay-out (e.g., Han and Qiu, 2007; Bates et al., 2009; McLean, 2011).[75] Practitioners have also realized this precautionary view. For example, a recent report titled "*Investing in the future*" by *KPMG International* financial service team evaluates the value of today's action for tomorrow.[76] They argue that firms with great opportunities may face insoluble problems due to lack of inadequate financial preparation. On the other hand, firms with design for the future have the potential to achieve considerable changes.

Cash flow volatility has been documented in a fair amount of literature as a proxy of the need for precautionary cash balance (e.g., Han and Qiu, 2007; Denis and Sibilkov, 2010). On the one hand, Bates et al. (2009) argue that a financially constrained firm does not have enough financing capacity to make the first-best investments in the current period and in the future, while a financially unconstrained firm has enough financing capacity to make the first-best investments over both periods regardless of volatility of future cash flow. On the other hand, financially constrained firms may have to forego current investment opportunities to undertake additional positive NPV future investment projects if volatility of future cash flow increases and access to external capital is constrained. Therefore, these firms maintain precautionary cash to hedge future cash flow volatility and to mitigate the possibility of cutting current investment opportunities for additional future investment opportunities.

Similarly, investments on R&D (i.e., expenditures) reflect growth opportunities and R&D spending has been documented as a driver of precautionary cash holdings (Bates et

[75] These studies emphasize the uncertainty of cash flow, R&D expenditure, and dividend payment as proxies of precautionary motive.
[76] KPMG International, 2014, "Investing In the Future". Web. 19 May. 2015.

al., 2009; Al-Najjar and Belghitar, 2011). Ferreira and Vilela (2004) argue that firms with high growth opportunities tend to hold more cash than firms with lower growth opportunities in order to minimize financial distress costs. Sufficient cash holdings also minimize the possibility of foregoing current investment opportunities and maximize the possibility of making additional investment opportunities (Ferreira and Vilela, 2004; Bates et al., 2009).

Finally, dividend policy is regarded as an important determinant of precautionary cash holdings (McLean, 2011; Al-Najjar and Belghitar, 2011). Ferreira and Vilela (2004) argue that dividend payers are anticipated to have less cash holdings than non-dividend payers because dividend payers have a greater reputation, leading to relatively easier access to capital markets. Furthermore, being capable of paying dividend when needed could signal a firm's favourable future performance and strong financial position in securing positive NPV projects (Frankfurter and Wood, 2002).

Regarding the use of externally raised capital, repaying debt can carry equal importance with holding precautionary cash. Modigliani and Miller (1958) argue that, under certain assumptions, firms' operating, investing, and financing activities are separable and independent. This implies that the use of proceeds raised from security issuances is independently classified by activity. Pecking order theory (Myers and Majluf, 1984) posits that with the concern of asymmetric information cost, firms follow a pecking order to fund positive NPV investment projects. These firms first use the cheapest source of capital (i.e., internally generated cash flow), and use external capital when the internal funds are exhausted. The work of Myers and Majluf (1984) implies that when the current need of cash for investments has been satisfied, firms may use external capital to repay debt. Stulz (1990) and Wyatt (2014) argue that considering the management of mispricing of assets, the manager of the firm is concerned that the debt level among the capital structure may cause friction to achieve its committed performance, thus lowering assessment of the financial accomplishment and managing benefit. Wyatt (2014) adds that managers may discipline themselves when paying down debt as over-indebtedness relates to uncertainty of expected future cash flow and capital-raising. Furthermore, Acharya et al. (2007) and Autore et al. (2009) suggest that recapitalization in the means of repaying debt increases investment as creditors have priority on cash balance and can limit the use of proceeds for investment projects. This implies the need of proceeds for debt repayment. Bates et al. (2009) find that with the increase of security issues, firms can retire their debt obligations. Wyatt (2014) shows that the largest fraction of IPO proceeds is used for debt repayment.

However, firms are less likely to rely on debt capital to repay debt for a number of reasons. First, covenants associated with debt issues often contain restrictions on discretionary use of debt proceeds (Smith and Warner, 1979). Second, Chaderina (2013) argues that it might be optimal for firms to reserve proceeds of debt issues and to add value for managing capital structure in the future as default is costly when there is insufficient liquidity. Third, according to Nini et al. (2009) and Fee et al. (2013), given that the use of debt proceeds on investment projects is often restricted by credit agreements, firms may avoid using debt capital to repay debt. On the other hand, using equity capital to repay debt reduces restrictions of credit agreements. Therefore, we argue that firms may use the amount raised from the issue of equity to repay debt.

Although there are some studies on the role of equity issues (i.e., IPOs) on debt repayment issuing equity regardless of its form (i.e., IPOs or SEOs) to repay debt as an alternative to precautionary cash holdings has not been investigated in the literature. The second part of this empirical chapter examines whether firms use the amount raised from the issue of equity to repay debt.

Our findings are presented from two aspects. First, the relationship between external financing and precautionary cash holdings can be summarized as follows. Our results show that external capital is the largest source of cash compared to operational cash flow and other sources. We find that firms retain 27% of external capital as cash, which is the highest among the three sources of cash. Cash holding financed by external capital is persistently increasing over time. This seems to be driven by precautionary motives. Evidence can be found on the three major proxies of precautionary need of cash, namely

R&D spending, cash flow volatility, and dividend payments, as well as an index which takes the first components of major proxies of precautionary motives. Specifically, firms with growth opportunities, firms with uncertain cash flow, and non-dividend payers are likely to retain cash raised from external financing. We also find that firms are likely to retain cash raised from equity issue for precautionary reasons when cost of equity issue is low.

Second, the relationship between equity issuances and debt repayment can be summarized as follows. Our results show that equity issuers use cash proceeds raised from equity to repay debt. Firms tend to issue large amounts of equity at low issuance cost for the purpose of debt repayment. Firms bearing high levels of leverage are more likely to use newly raised equity capital to repay debt. This is consistent with the view that firms may have target leverage ratios and try to revert to the target when possible. Additionally, we also examine the relationship between cash holdings and debt repayment. We find that debt repayment has a negative effect on cash holdings, suggesting that firms repaying debt retain less cash raised from external capital than their counterparts who do not repay debt. The results also show that cash holdings have an adverse effect on debt repayment, which suggests that firms retaining cash raised from external capital are less likely to repay debt. The findings indicate that there exits simultaneity between cash holdings and debt repayment.

The contribution of this empirical chapter to the knowledge is three-fold. First, we add novel evidence to the cash holdings literature by demonstrating that firms persistently increase precautionary cash holdings through external financing. This chapter differentiates from prior studies by emphasizing the relevance of external financing as a whole (i.e., both equity and debt) on precautionary cash holdings. Our study adds an understanding of the role of external financing in the form of either debt or equity, the largest contributor to precautionary cash balance of the firm, to the literature.

Second, this chapter sheds light on the use of newly raised equity capital to repay debt, which adds understanding on the role of financing decisions and the use of issue proceeds. Our study differentiates from others by focusing on the application of all forms of equity issues on debt repayment and provides novel evidence to the literature that firms tend to issue equity for the purpose of repaying debt to achieve a target debt-equity ratio.

Finally, we add knowledge to the literature with new evidence that cash holdings and debt repayment are inversely related. Unlike prior studies, this chapter addresses the simultaneous relationship between the two decisions (holding precautionary cash and repaying debt). Specifically, firms that retain cash from external financing are less likely to repay debt with external capital and firms repaying debt are less likely to hold precautionary cash. This adds understanding of use of security issue proceeds and of how firms may alternatively use proceeds raised from external financing to achieve a target debt-equity ratio.

The remainder of this chapter is structured as follows. Section two reviews both theoretical and empirical literature. Research questions and hypothesis development are presented in section three. Sample selection and summary statistics are reported in section four. The fifth section presents the research methodology. Empirical results are presented and interpreted in section six. The last section concludes this chapter.

4.1. Related Literature

This part reviews related theoretical and empirical literature in three aspects of the topic, namely: motives of cash holdings; cost of capital and cash holdings; and the use of proceeds on debt repayment.

4.1.1. Motives of Cash Holdings

Firms hold cash for a number of reasons. The widely recognized motives are transaction motive, agency motive, repatriation tax motive, and precautionary motive. We review each of the four motives for cash holdings in this sub-section.

4.1.1.1. Transactions Motive and Cash Holdings

Keynes (1936) proposes three motives of cash holdings, of which the transactions motive is one.[77] Transactions motive refers to the demand for cash to finance current and capital account payments. It is a result of cash needs that emerges in the ordinary course of business. It offers a solution to handle liquidity required by transactions and bridges the gap over the period between cash generated and money spent. The transactions motive for cash holdings has been identified as a classic thought in terms of the pattern to convert liquid assets into cash for payments (Miller and Orr, 1966; Han and Qiu, 2007). Miller and Orr (1966), among others, derive optimal cash balance for the transaction need that incurs with transaction costs in relation to conversion of non-cash financial assets into cash. Myers and Majluf (1984) suggest that it is optimal to manage cash balance at a level that covers transaction expenditures given that external capital is more costly than internally generated cash flow. As transactions motive is related to economies of scale (Mulligan, 1997), larger firms hold less cash and are expected to manage cash demand from transactions more efficiently than others. This implies that these firms are less concerned regarding the transactions motive of holding cash.

4.1.1.2. Agency Motive and Cash Holdings

With respect to agency motive, according to Jensen and Meckling (1979), managers of the firm may entrench themselves and pursue their own interests against those of shareholders due to separation of operational control from ownership. This may, accordingly, lead to excess cash holdings when the firm does not have favourable investment opportunities (Jensen, 1986). The excess cash holdings are typically derived from estimations after controlling for transaction motive and precautionary motive (Bates et al., 2009). Jensen and Meckling (1976) and Jensen (1986) find that cash reserved by entrenched managers is a result of high transaction costs in the market that

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[77] Another two motives are, respectively, precautionary motives, which is the focus of this chapter, and speculative motive, defined as "*the object of securing profit from knowing better than the market what the future will bring forth*". The money retained for speculative motive is referred to as "idle balance" (Davidson, 1965), which does not directly reflect the dynamics of the economic system and the level of cash flow. Therefore, this is not a concern of external financing for cash holdings in this study.

the firm would strategically not bear. Bates et al. (2009) argue that firms reserve cash for management discretion. Entrenched managers are likely to reserve cash rather than increase dividend pay-outs as these managers may intend to use cash holdings for excessive perquisite consumption, sub-optimal investment decision (e.g., empire building), and other activities that may maximize their own interests in order to strategically increase their voting power (Stulz, 1988; Hodrick, 2013).

4.1.1.3. Repatriation Tax Motive and Cash Holdings

Foreign operated affiliates of domestic US firms are required to pay tax on foreign operations and are granted tax credits for taxes on foreign income paid abroad (Foley et al., 2007). Foley et al. (2007) find that multinational firms experiencing high repatriation tax costs from repatriating earnings operated abroad are likely to hold cash abroad, particularly in affiliates based in countries with lower tax rates. The tax consequence arises from the difference between taxes already paid abroad and taxes that are due to be paid in the US if foreign income was taxed at the US rate after repatriating foreign earnings. This repatriation tax provides motivation for those US firms with affiliates abroad to reserve cash abroad if there are no profitable investment opportunities in the homeland. In other words, those firms do not bring cash to the US but their consolidated balance sheet shows a high cash balance.

4.1.1.4. Precautionary Motive and Cash Holdings

Keynes (1936) defines precautionary motive as the desire for security as to the future cash equivalent of a certain proportion of total resources. The notion of Keynes' (1936) precautionary motive is that firms experience some sort of financial constraints subject to the state of the real world. Unpredicted financial constraints result in moral problems that are against the financial commitments of the manager. Cash holding, which is a two-sided affair, is dependent on what investment has been chosen and on what consumption has reduced (Keynes, 1936). This elevates the close relations between cash holdings and growth investment opportunities, and between cash holdings and uncertainty of future cash flow or the need to pay dividend. Keynes argues that firms accumulate holdings to invest in valuable projects and to hold higher liquidity for future uncertainty of internally generated cash flow. Bates et al. (2009), among others, argue that firms with potential investment opportunities, volatile cash flow, and dividend pay-out policy accumulate cash in order not to have to forego valuable investment opportunities, suffer insufficient internal cash flow, or bear financial pressure from cash dividend preparation for investors. This implies that precautionary cash reserved today provides possibilities to cope with the urgent need of cash in the future.

A number of prior studies have found evidence that firms holding precautionary cash are characterized by large R&D expense (e.g., Bates et al., 2009; Brown and Petersen, 2011; McLean, 2011), high cash flow volatility (e.g., Han and Qiu, 2007; Brav, 2009; McLean, 2011), and high cash dividend pay-out (e.g., Han and Qiu, 2007; Bates et al., 2009; McLean, 2011).

Private firms that have more growth opportunities are more constrained to cash flow volatility and the cost of borrowing as they have limited access to external markets (Brav, 2009; Saunders and Steffen, 2011).[78] Bates et al. (2009) and McLean (2011) argue that increased volatility in cash flow should be expected by a financially constrained firm as limited access to external capital could be costly. Moreover, Almeida et al. (2004) and Han and Qiu (2007) document that financially constrained firms with investments in the current period and in the future cannot diversify uncertainty of future cash flow. Hence, a financially constrained firm is likely to be keen to hold precautionary cash to hedge against the risk of future cash shortfalls.

Bates et al. (2009) argue that firms with large R&D expenditures may face higher external financing costs due to relatively lower asset tangibility, thus they hold cash to hedge future adverse financial shocks. Moreover, Brown and Petersen (2011) point out that large R&D expenditure is associated with large adjustment costs as a large fraction of R&D expenditure is payment to highly skilled employees. These adjustment costs require firms to hoard cash against adverse financial shocks and financial friction.

[78] They focus on exclusively debt market due to relatively higher cost of equity to cost of debt.

Al-Najjar and Belghitar (2011) and Chung et al. (2014) argue that paying dividend to shareholders could be a tool to reduce the amount of money manipulated by managers and to minimize the agency problem and managers may be allowed to hold increasing amounts of cash given that managers can be effectively monitored. Saunders and Steffen (2011) find that public firms with relatively higher cash-to-asset ratios and less growth opportunities are likely to pay out dividends as they are concerned with the uncertainty of future cash flow. Dividend payers are less likely to be financially constrained given that they are more likely to hold more cash than non-dividend payers (Almeida and Philippon, 2007; Han and Qiu, 2007).[79] However, non-dividend payers primarily hold precautionary cash to minimize the cost of financial distress and the cost of raising external capital.

4.1.2. Capital Structure Theories Related to the Precautionary Motive of Cash Holdings

First, the pecking order theory of Myers and Majluf (1984) contends that firms with information asymmetry tend to use internal funds against external capital and among external capital issue debt first and issue equity as a last resort when alternatives are exhausted, due to adverse selection costs. This implies that when firms do not experience financial deficit in funding investments they may hold cash or repay debt. Conversely, when firms have insufficient cash, they may have to forego profitable projects for potential future profitable investment opportunities and raise external capital.

Second, trade-off theory is concerned with the fact that firms may set a trade-off between marginal benefits and costs related to cash holdings (Al-Najjar and Belghitar, 2011). Firms tend to maintain a feasible cash-to-assets ratio in order to cope with adverse financial shocks and limited access to external capital when cost of capital is expensive (Bates et al., 2009; McLean, 2011). Bates et al. (2009) argue that with the increase of total value of assets, firms increase cash holdings to maintain a cash-to-assets

[79] Some others also find agency cost is substantial to firms' cash holding policy. Public firms experiencing more severe agency problems cause managers to hold more cash reserve than private firms (Gao et al., 2013).

target. Holding an optimal level of cash can enable firms always to have sufficient capital reserved for unforeseen cash shortfalls or financial frictions involved in capital raising. It could also fund investment opportunities effectively so that firms can avoid financial constraints due to lack of cash reserve or restrictions on external financing. Furthermore, cost of security issuance or costs related to financial constraints can be reduced or minimized by holding cash.

Third, agency theory posits that firms generate free cash flow after financing profitable projects (Jensen, 1986). Information asymmetry between managers and outsiders of the firm may lead to misuse of free cash flow by the manager as monitoring managerial behaviour may become opaque and less effective, thus resulting in conflict between maximization of shareholders' interests and pursuit of managers' interest. Jensen and Meckling (1976) find that such a conflict leads to monitoring costs related to the conflict, a cost that ensures managers work for the maximization of shareholders' interests, cost that relates to the accomplishment of managers' financial commitments, and cost involved in external financing. To mitigate the conflict, some suggest reducing the level of cash holdings by paying dividends or investing in R&D (Rozeff,1982; Al-Najjar and Belghitar, 2011), while others suggest increasing cash holdings as managerial monitoring costs closely relate to the cost of external financing (Chung et al., 2014).

R&D: Based on pecking order theory, firms with large R&D spending, which reflects growth opportunities, would issue securities to fund additional future investment opportunities (Ferreira and Vilela, 2004; Bates et al., 2009).[80] This also considers adverse financial shocks and the cost of accessing external capital when needed which may be more costly than adverse selection cost. Conversely, if there is insufficient cash

[80] According to Bates et al. (2009), McLean (2011), and Sanchez and Yurdagul (2013), firms with high R&D expenses tend to have more feasible investment opportunities and are likely to experience financial distress and adverse financial shocks. Brown and Peterson (2011) argue that R&D investment is largely financed by external capital, and cash holdings from external financing should be particularly relevant for R&D.

hoarding, the firm would reduce other financial activities but funding investment opportunities and raise external capital which could be unexpectedly expensive.[81]

Regarding trade-off theory, Ferreira and Vilela (2004) argue that firms with more R&D expenses hold excess cash to minimize costs of financial constraints. Financial constraints on R&D operation may derive expensive additional cost e.g., the employment cost of skilled workers (Brown and Petersen, 2011). In other words, R&D investment is not constrained by corporate liquidity if the firm holds sufficient cash. Further, cash holdings minimize the possibility of foregoing current investment opportunities for future investments or foregoing future profitable investment opportunities (Ferreira and Vilela, 2004).

With respect to agency theory, managers of the firm may hold cash for investment opportunities to discipline with financial commitments in spite of the estimation of feasibility (Ferreira and Vilela, 2004). Chung et al. (2014) argue that with similar investment opportunities, sufficient cash reserve avoids flotation costs and adverse selection costs involved in external financing. Hence, to protect the interests of shareholders the firm is expected to hold cash when the information environment is opaque.

Cash flow volatility: Given adverse selection costs, firms would, in order, reduce dividends and cash holdings, and issue securities when internal funds are insufficient (Ferreira and Vilela, 2004). This implies that cash flow volatility could inversely affect dividend payment and the level of cash balance which is particularly related to profitable future investment, and positively affects the cost of security issuance. Precautionary cash holdings cover cash flow volatility so that financially constrained firms do not have to reduce dividend payment to shareholders, to forego positive NPV projects, and to face the expensive cost of security issuance.

[81] Expensive cost of issuance includes adverse selection cost, cost of financial distress, and cost of financial friction.

As contended by Han and Qiu (2007), firms under the threat of the possibility of financial distress hold cash to maintain an inter-temporal trade-off between current and future investment in order to deal with volatile cash flow. Should future cash flow uncertainty not be mitigated, the trade-off between current and future investment will rely heavily on the cash holdings of the firm. On the other hand, they demonstrate that firms with financial constraints tend to raise external capital to invest in the first-best investment opportunities and hold cash to hedge future cash flow uncertainties.[82] Hence, firms experiencing high cash flow risk tend to hold large amounts of cash. Increasing cash holdings will allow constrained firms with hedging needs that are likely holding small cash balances due to low levels of cash flow to undertake favourable opportunities (Denis and Sibilkov, 2010). Consistent with the hypothesis, McLean (2011) shows that firms with high cash flow risks tend to have small internal cash flow balances in the financial statement and are easily experiencing negative liquidity shocks. This creates an incentive to hold cash for the trade-off between the marginal benefits and the costs in relation to cash holdings. Bates et al. (2009) and McLean (2011) report a positive effect of cash flow volatility on cash holdings.

According to agency theory, firms facing cash flow volatility are likely to experience more severe conflicts between managers and investors due to restrictions on the accomplishment of financial commitments and on maximization of shareholders' interests (Jensen, 1986). Hence, cash reserve is expected to cover profitable projects that may be foregone due to cash shortfalls. Chang and Rhee (1990) argue that firms without volatile cash flow are likely to generate expected cash flows so that they do not have to forego projects with positive NPVs. This suggests that the agent-principal conflict will be reduced by increasing cash holdings.

Dividend: as implied by pecking order theory, without financial deficit, firms are able to pay dividend and have more cash holdings than non-dividend payers (Ferreira and Vilela, 2004; Han and Qiu, 2007). Harford et al. (2015), among others, conclude that firms

[82] First-best investment is decided when expected future marginal return (of the investment) equals marginal cost of borrowing.

paying dividend, or with a reputation for paying dividend, have a more transparent shareholder relationship and easier access to external capital and have less financial distress (the threat), thus leading to less cash than non-dividend payers.

According to the trade-off proposition, cash holdings minimize financial distress costs, secure investments with straight funding, and minimize the cost of raising external capital (Ferreira and Vilela, 2004). This implies that firms paying dividends retain less cash than non-dividend payers as costs involved in raising external capital are relatively lower for firms with a reputation for paying dividend.[83] Accordingly, this generates an incentive to firms to hold cash for the maintenance of an optimal level between the benefit from a lower possibility of financial constraint, and refinancing costs, and earn a prestigious reputation for dividend pay-out. Bates et al. (2009) and Brown and Petersen (2011) find that dividend is not positively related to cash holdings for dividend payers.

Regarding agency theory, Rozeff (1982) argues that paying dividend could be a tool to mitigate conflict between managers and outsiders, thus resulting in less cash being available to managers and reduced possibilities of misuse of cash. Aivazian et al. (2003) and Ho (2003) also suggest that dividend payers are likely to have more growth opportunities as these firms have a better reputation in the market than non-dividend payers and experience lower cost of raising external capital if needed.

4.1.3. Cost of Security Issue and Cash Holdings

The cost of security issue, one of many costs that relate to the capital structure of the firm, is an important concern in relation to cash holdings. Hann et al. (2013) argue that other costs such as agency cost, transaction cost, and adverse selection cost, along with cash holdings, are likely to be reflected in the cost of security issue. Firms under financial distress (the threat) in funding favourable investment projects may have to relinquish growth opportunities due to the expensive cost of security issues, and liquidation costs. The low cost of security issue during good times becomes an incentive to increase external financing for cash holdings. Wyatt (2014) argues that cash holdings

[83] Dividend payers would experience lower cost of raising external capital as less external capital would be needed after reducing dividend payments.

could enable firms to sufficiently finance growth investment, production development, and financing transactions.

Similarly, the clue related to the relationship between cost of security issue and precautionary cash holdings is that firms without sufficient cash may experience more expensive cost of external financing when there are unfavourable shocks on cash flow (McLean, 2011). Financial frictions that relate to the expensive cost of security issue may also lead firms to forego valuable investment opportunities. Brav (2009) argues that precautionary cash reserved when the cost of security issue is low concern financial shocks incurring expenses, favourable investment opportunities incurring cash outflow, and potential subsequent liabilities requiring cash. With precautionary cash holdings firms enable them to reduce refinancing risk from the market side, and to mitigate the risk of corporate liquidity and obtaining cash from other limited sources such as the sale of valuable assets (Harford et al., 2014). Firms with high levels of information asymmetry between managers and external fund providers experience limited access to external capital due to adverse selection costs and are likely to hoard cash when the cost of raising external capital is cheaper (Brav, 2009; McLean, 2011). Hence, firms tend to hold more precautionary cash to reduce or minimize the cost of accessing external capital.

Collateral value may be reduced by contagions of firms with high likelihood of financial distress through collateral channels, and by selling key assets for cash, thus increasing the cost of debt financing. Benmelech and Bergman (2011) argue that firms using the same type of fixed assets as firms with bankruptcy possibility for debt financing collateral experience increasing costs of debt because firms with the same type of collateral may use the same asset pricing model. The rising possibility of bankruptcy decreases the value of collateral assets and, consequently, decreases the collateral value of other firms which are in the same line. Moreover, Harford et al. (2014) document that selling key assets deteriorates the reputation of the firm with particularly long-term debt maturity among credit markets and results in higher refinancing risk and issuance costs.

McLean (2011), among others, leads the argument that the cost of equity issuance is negatively related to precautionary cash retained from equity issues. In other words, firms retain precautionary cash from equity issues when the cost of equity issues is low. Consistent with earlier discussion, low cost of equity issue indicates low financial friction in the market. Brav (2009) argues that issuing equity at a low cost of issuance allows firms to have sufficient precautionary cash holdings, which mitigates future financial shocks, avoids foregoing favourable investment opportunities, and enables sufficient payment for potential subsequent liabilities. McLean (2011) argues that should firms issue equity at a high issuance cost for urgent funds during bad times when credit market conditions are inferior, they spend the proceeds immediately on their intended use.[84]

4.1.4. Use of Proceeds on Debt Repayment

According to Wyatt (2014), the use of proceeds from security issuance is classified into three types: growth investment, production investment, and financing transactions. Growth investment and production investment are involved in precautionary cash holding, which is the focus of this empirical chapter. Myers (1977) argues that growth investment is in relation to future operation of cash flow, including R&D spending, healthy cash flow, and dividend payment.[85] Production investment has an association with assets in place and the current cash flow (Myers, 1977). Ritter (1999) demonstrates that precautionary cash hoardings could reduce the likelihood of under-pricing. Use of proceeds, as production investment, creates a certain adequacy of future cash flow.

On the other hand, repaying debt is documented as an important use of proceeds disclosed to the security regulators in the literature (e.g., Leone et al., 2007; Hanley and Hoberg, 2012; Wyatt, 2014). The intended use of equity proceeds on debt repayment increase transparency of information on value and risk of the firm shared between

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[84] According to Hann et al. (2013), diversified firms with co-issuance can mitigate systematic risk by hedging deadweight financing cost during bad times.

[85] R&D expenditure could create growth opportunities, sufficient cash flow could secure profitable investment opportunities, and dividend payment could accumulate reputation for the firm presented in the market.

managers and investors.[86] According to information asymmetry theory, managers of the firm who know more about valuable projects and risk of the firm are assumed to make financing decisions for the maximization of shareholder's value (Myers and Majluf, 1984). This implies that when investments are sufficiently covered, the firm may use external capital to repay debt, for example. One explanation is that continuous debt liability could cause financial distress to the firm and sharply restrict making potential future investments. Debt payment can be recognized as a signal of expected cash flow and smooth future performance (Al-Najjar and Belghitar, 2011). Furthermore, Hann et al. (2013) argue that firms repaying debt gain reputation in the capital market, thus experiencing lower cost of raising external capital and refinancing risk.[87]

Moreover, equity issues relative to debt issues are more suitable to repay debt. First, debt covenants often contain restrictions on discretion in the use of debt proceeds such as debt repayment (Smith and Warner, 1979). Second, Chaderina (2013) argues that it might be optimal for firms to reserve the proceeds of debt issues and be valuable for firms to manage capital structure in the future as default is costly when there is insufficient liquidity. Third, according to Nini et al. (2009) and Fee et al. (2013), given that the use of debt proceeds on investment projects are often restricted by credit agreements, firms may avoid using debt capital to pay down debt. In other words, using equity capital to repay debt reduces the restrictions of credit agreements.

4.2. Research Questions and Hypotheses Development

As discussed in the introduction section, this chapter focuses on the role of alternative sources of corporate financing, particularly external financing on relevant uses. Specifically, we examine whether external financing is leading to an increase in precautionary cash holdings or whether externally raised capital is used to repay debt.

[86] Those firms are usually large and mature, with good reputations among investors. Disclosure of repaying debt by security issuances enables to exploit and reduce mispricing of firm value (Leone et al., 2007; Wyatt, 2014).

[87] We also note that the debt level of the firm may be a key performance indicator to assess the managerial and financial commitment of the manager, disclosure of an intended use of proceeds on debt repayment to the market and security regulator ought to be targeting for one's own interests (Rozeff, 1982; Al-Najjar and Belghitar, 2011).

Research questions are presented below:

A. Is precautionary cash holding dependent on external financing?
B. Do firms issue equity to repay debt?

Survey studies report that liquidity management is one of the most important jobs of CFOs as they emphasize securing funds to finance investments proposed by CEOs (e.g., Graham and Harvey, 2001; Almeida et al., 2014). CEOs are mainly concerned with the optimal level of cash balance and how to maintain sufficient cash to liquidity management. Precautionary cash holdings can be highly related to liquidity management. Extensive studies show that cash balance represents a large part of the balance sheet of the firm and cash-to-asset ratio becomes larger (e.g., Bates et al., 2009; McLean, 2011; Hodrick, 2013). Nevertheless, the literature is limited to the issue of equity as an explanatory solution to precautionary cash holdings, and the role of security issues as a whole including both equity and debt on increase in precautionary cash holdings is not clear. An increasing number of new listings, regardless of debt or equity, not only curtails the cost of external capital and saves weaker firms but, also, more importantly, brings expansion of cash holdings (Fama and French, 2004).[88] Almeida and Philippon (2007) and Hann et al. (2013) argue that diversified issues of security (i.e., external financing) enable the firm to maintain business cash flow at a target cash balance and to avoid deadweight costs that the firm may face.[89] Moreover, compared to counterparts, it is suggested that firms using external financing as a source for precautionary cash enables the management of cash flexibly by transferring from cash-rich units to cash-poor units, thus minimizing systematic risk (Hann et al., 2013). Hann and her colleagues also show that firms with precautionary cash retained from external

[88] Other aspects of importance of issuing both debt and equity for precautionary cash holdings have been discussed in the introduction of this empirical chapter.
[89] These costs include countercyclical deadweight costs of financial distress, adverse selection costs, costs of raising external capital, and costs of foregoing investments.

financing enable themselves adequacy and flexibility in managing uncertainties and credit constraints.[90] Therefore, we hypothesize the following:

Hypothesis 4.1: Firms that need financing for precautionary motive are likely to retain cash raised from external financing.

One implication of pecking order theory is that when the needs of funding investment projects are satisfied firms use funds to repay debt. Repaying debt is needed given that over-debt may lead to insufficient value of collateral and financial constraints (Leone et al., 2007). Bates et al. (2009) suggest that debt obligations could be retired by issues of equity. Intuitively, this provides the possibility that firms may use proceeds from equity issues for debt payment as an alternative to precautionary cash holdings, which has not been touched in the literature.[91] Acharya et al. (2007), among others, argue that paying down current debt is a relatively more effective way to make additional future investments in terms of hedging future income shortfalls as debt repayment will gain reputation for the firm and future investments will be less restricted by mandatory liabilities. Although repaying debt lowers the debt-equity ratio of the firm it, in turn, reduces the cash need for precautionary motive from external markets as a lower leverage ratio provides opportunities to raise external capital when they need funding. Therefore, as an alternative hypothesis to the first hypothesis, we hypothesize the following:

Hypothesis 4.2: Debt level is inversely related to net equity issue.

4.3. Sample and Descriptive Statistics

4.3.1. Sample Selection

Corporate financial data are collected from Compustat and data on stock prices and returns are obtained from CRSP. The sample period ranges from 1st January 1971 to 31st

[90] Unforeseen uncertainties may arise from changes in future transactions or fiscal policies while credit constraints may arise when firms raise external capital for feasible investment opportunities (Sanchez and Yurdagul, 2013).
[91] See detailed discussions on equity preferred to debt for debt repayment in the introduction of this empirical chapter.

December, 2011 as data on cash proceeds from equity issuance is not available in Compustat until 1971. The sample includes non-financial and non-utilities US firms (both surviving and non-surviving). Financial firms and utilities firms are excluded because they are highly regulated and may hold cash to meet mandatory capital requirements rather than for the economic reasons that we study here. The sample excludes firms that are not reported in the CRSP/Compustat merged database.[92] We also exclude observations that have missing cash and short-term investments (Compustat item 1), total assets (Compustat item 6), or proceeds from equity issuance (Compustat item 108) and proceeds from debt issuance (Compustat item 111).[93] Observations with negative proceeds from equity or debt issuance are also excluded from the sample.[94] We require observations with positive value of book equity (Compustat item 60). Groups of firm-year observations with gaps are excluded from our sample. This is because gaps in the group may cause biased and inconsistent estimations (Greene, 2011). Consistent with McLean (2011), all accounting variables are winsorized at 1% level (i.e., at 1st and 99th percentile) given that Compustat might make occasional errors; doing this also offsets the influence of outliers in the data. This process leads to a sample of firm-year 99,411 observations.

4.3.2. Descriptive Statistics

Cash ratio (*Cash*) is calculated as cash and marketable securities divided by total assets. To have an overview of cash-to-asset ratio over years, we calculate the difference of cash balances (Δ*Cash*) at end of year t and cash balance at the beginning of year t, t-1, t-2, and t-3, standardized by total assets at the end of year t-1, t-2, t-3, and t-4 respectively (i.e., lagged total assets). Cash proceeds are obtained from three channels, namely, externally raised capital, internally generated cash flow, and other sources (e.g., sales of assets and investments). Externally raised capital (*External financing)* represents cash proceeds raised from both equity issues and debt issues. Proceeds from equity issuance

[92] We use security identity *PERMNO* to match CRSP/Compustat merged database.
[93] This differentiates from McLean (2011) that requires both proceeds from equity and debt to be non-negative.
[94] As negative values are simply caused by recapitalization such as conversion of class A share to common stock or other type of shares.

(*Equity*) include all forms of equity issue (i.e., IPOs, SEOs, conversion of preferred stock and/or debt into common stock, exercise of stock options, and/or warrants etc.) that lead to cash inflow to the firm. Proceeds from debt issuance (*Debt*) include long-term debt sales (i.e., private placement, bonds, capitalized lease obligations, and/or note obligations, long-term debt and warrants, line of credit, and long-term debt adjustments etc.) that result in cash inflow to the firm.[95] Internally generated cash flow (*Cash flow)* represents cash flow from operations, measured as the sum of net income plus depreciation and amortisation. Other sources (*Other)* include other forms of cash sources (i.e., sale of fixed assets, sale of investment, and other sources of funds) that result in cash holdings. Absence of information on sale of fixed assets, sale of investment, and other sources of funds in database indicate no such transaction hence they are treated as zeros.

Precautionary motives proxies may contain both a precautionary motives component and a non-relevant precautionary motives component (McLean, 2011). In addition to individual proxies of precautionary motives (namely, R&D spending, cash flow volatility, and dividend payment), this study includes an index (*PREC*) which takes the first component of the three proxies that relate to precautionary motive by using principal component analysis.[96] Following Bates et al. (2009), cash flow volatility (*volatility*) is calculated as follows: step one, we calculate the standard deviation of each firm's cash flow, scaled by lagged assets over the past 10 years, which has at least five observations; step two, we take the average value of these standard deviations calculated in step one in the industry (two-digit SIC). R&D spending (*R&D*) is the research and development expenses standardized by lagged assets, missing research and development expense is set to zero (i.e., no investment on R&D). Dividend payment (*dividend*) is the cash dividend standardized by lagged assets, missing dividend is set to zero (i.e., non-dividend payment).

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[95] There are no direct cash flows from capitalized lease obligations, but the use of such leases does reduce capital expenditure.

[96] Principal components analysis (PCA) involves "*a model in which a small set of principal components are constructed from the measured variables, and the ability of these components to predict the measured variables is assessed.*" (Fabrigar and Wegener, 2011: p.10) First components explain majority of precautionary motive proxies.

We also control for net change in debt (*ΔDebt*) and net change in equity (*ΔEquity*) in some regressions as changes in book value of both debt and equity issuances reflect use of proceeds from external financing. *ΔDebt* is the difference between the sum of short and long-term debt at the end of the year and the sum of short and long-term debt at the beginning of the year. This considers the possibility that working capital and current liabilities may not be constant, although conventional studies mainly focus on designated long-term debt (e.g., Leone et al., 2007). *ΔEquity* is the difference between book value of equity at the end of the year and book value of equity at the beginning of the year.

Table 4.1 reports the summary statistics of cash sources and proxies of the precautionary motive. Cash balance accounts for 18.3% of total assets over the sample period. Cash difference between cash balance at the end of year t and that at the beginning of year t, scaled by total assets at the beginning of year t shows a positive value of 2.4% of total assets. This means that the average increase of cash balance relative to total assets over the sample period is 2.4%. For $\Delta Cash_{1,}$ $\Delta Cash_2$, and $\Delta Cash_3$, change in cash level on average increases from 6.0% to 13.9%, all scaled by total assets at the corresponding year end.

Increasing cash level from $\Delta Cash_1$ to $\Delta Cash_3$ suggests that the cash holdings of the firm persistently increase over the year. On average, new capital in the firm is primarily raised from external financing (i.e., 18.5% of lagged total assets), wherein the proceeds from debt issue exceeds, on average, the proceeds from equity issue (i.e., 10.9% vs. 7.6%, of lagged total assets). Operational cash flow and other sources contribute less to the cash balance of the firm, namely, 4.4% and 4.0% of lagged total assets respectively. This preliminary observation is consistent with that of McLean (2011) and can be explained by pecking order theory whereby when there are insufficient internal funds, firms tend to issue debt, and issue equity as a last resort, due to adverse selection costs. R&D spending shows an average value of 4.8% of lagged total assets. Cash flow volatility has a value of -6.092 on average.[97] The average dividend is 1.1% of lagged total assets. The average precautionary motive index is -3.998.[98]

Table 4.1 Summary Statistics

	Mean	Standard deviation	25th percentile	Median	75th percentile	N
Cash	0.183	0.218	0.030	0.090	0.256	99,411
Δ*Cash*	0.024	0.283	-0.030	0.001	0.039	85,727
Δ*Cash1*	0.060	0.545	-0.033	0.004	0.065	74,269
Δ*Cash2*	0.097	0.647	-0.031	0.009	0.091	64,480
Δ*Cash3*	0.139	0.761	-0.028	0.014	0.120	55,987
Equity	0.076	0.358	0.000	0.003	0.017	85,727
Debt	0.109	0.310	0.000	0.006	0.098	85,727
External	0.185	0.489	0.004	0.036	0.166	85,727
Cash flow	0.044	0.258	0.017	0.088	0.143	85,727
Other	0.040	0.176	0.000	0.002	0.017	85,727
Δ*equity*	0.078	0.464	-0.020	0.037	0.102	85,727
Δ*debt*	0.047	0.269	-0.018	0.000	0.055	85,493
R&D	0.048	0.120	0.000	0.000	0.048	85,727
Volatility	-6.092	0.771	-6.708	-5.793	-5.483	99,406
Dividend	0.011	0.029	0.000	0.000	0.014	85,727
PREC	-3.998	0.540	-4.429	-3.838	-3.589	85,725

Descriptive statistics of cash sources, and proxies of the precautionary motive. *Cash* is the ratio of cash and short-term investment to total assets. *ΔCash* is the difference between cash (t) and cash (t-1). *ΔCash1* is the difference between cash (t) and cash (t-2). *ΔCash2* is the difference between cash (t) and cash (t-3). *ΔCash3* is the difference between cash (t) and cash (t-4). *Equity* is the ratio of sale of common and preferred stock to lagged total assets. *Debt* is the ratio of sale of long-term debt to lagged total assets. *External* is the ratio of overall security (equity and debt) to lagged total assets. *Cash flow* is the ratio of sum of net income plus depreciation and amortization to lagged total assets. *Other* is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to lagged total assets. Δ*equity* is the book equity at end of the year minus book equity at the beginning of the year. Δ*debt* is total debt (short and long term) at the end of the year minus total debt at the beginning of the year. *R&D* is the ratio of research and development expense to lagged total assets. *Volatility* is the log of average variance of industry cash flow over the past 10 years, with a five consecutive years' requirement. *Dividend* is the ratio of cash dividend to lagged total assets. *PREC* takes the first component of *R&D*, *Volatility*, and *Dividend*.

[97] Consistent with McLean (2011), cash flow volatility is defined as the log of the average cash flow volatility within each firm's two-digit standard industrial classification code, measured over the past ten years (at least five years). The negative sign on cash flow volatility is a result of 'log' of very low average cash flow volatility value. Therefore, we are not surprising to have a negative value of log of the average cash flow volatility.

[98] The precautionary motives index is obtained from estimation of first components of individual proxies.

Table 4.2 Spearman's Correlation Matrix

	ΔCash	*External*	*Cash flow*	*Other*
ΔCash	1.000			
External	0.161	1.000		
Cash flow	0.274	0.002	1.000	
Other	0.037	-0.004	0.058	1.000

Correlations between cash holdings and sources of cash resulted from Spearman's Correlation estimates. *ΔCash* is the difference between cash (t) and cash (t-1). *External* is ratio of the amount of externally raised capital divided by total assets. *Cash flow* is the ratio of sum of net income plus depreciation and amortization to lagged total assets. *Other* is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to lagged total assets.

Spearman's correlation matrix, as reported in Table 4.2, shows positive correlations between change in cash balance and each of the three cash sources studied in this chapter meaning that a change in cash level of the firm is positively associated with external capital, internal cash flow, and other sources. The change in cash level shows a strongest correlation with internally generated cash flow. As internal cash flow is the cheapest for the cash holdings of the firm, alternative sources such as external capital which is the main source of cash proceeds may involve adverse selection costs, transaction costs of raising external capital and costs of foregoing investments.

Table 4.3 shows yearly cash proceeds raised from the three channels of cash studied in this empirical chapter, scaled by lagged total assets. Over the past four decades, cash proceeds raised from external financing (to total assets) increase from an average rate of 8.1% in the 1970s to 24.3% in the 1990s.[99] The average rate of cash proceeds relative to total assets drops to 19.8% in the first decade of the 21st century. This is mainly because US firms experienced economic recession at the beginning of the 2000s and global financial crisis at the end of the first decade in the new century. The amount of cash generated from operational cash flow decreases from the 1970s-1980s and remains stable onwards except for negative financial shocks in the early 2000s and 2007/2008.

[99] This is calculated by averaging, respectively, amounts of yearly cash proceeds raised from external capital for each decade.

Table 4.3 Capital Raised from Alternative Sources

Year	External	Cash flow	Other
1972	0.079	0.102	0.024
1973	0.078	0.109	0.025
1974	0.080	0.116	0.024
1975	0.065	0.099	0.023
1976	0.067	0.112	0.025
1977	0.084	0.112	0.027
1978	0.096	0.122	0.027
1979	0.102	0.118	0.030
1980	0.112	0.113	0.031
1981	0.152	0.105	0.034
1982	0.122	0.074	0.039
1983	0.182	0.074	0.041
1984	0.154	0.068	0.041
1985	0.150	0.056	0.045
1986	0.178	0.044	0.051
1987	0.201	0.052	0.045
1988	0.144	0.060	0.028
1989	0.139	0.054	0.027
1990	0.151	0.051	0.018
1991	0.171	0.037	0.019
1992	0.210	0.043	0.023
1993	0.244	0.034	0.027
1994	0.238	0.032	0.032
1995	0.247	0.038	0.036
1996	0.347	0.018	0.036
1997	0.281	0.013	0.041
1998	0.268	0.019	0.041
1999	0.278	0.016	0.041
2000	0.320	-0.017	0.059
2001	0.178	-0.038	0.047
2002	0.135	-0.027	0.051
2003	0.179	0.015	0.049
2004	0.218	0.035	0.059
2005	0.202	0.027	0.067
2006	0.214	0.025	0.060
2007	0.243	0.016	0.064
2008	0.152	-0.005	0.062
2009	0.145	0.001	0.039
2010	0.192	0.037	0.046
2011	0.180	0.047	0.046
Mean	0.185	0.044	0.040

Yearly capital raised from the three major sources of capital (i.e., external financing, cash flow, and other sources), scaled by total assets. External is the ratio of the amount of externally raised capital divided by total assets. Cash flow is the ratio of sum of net income plus depreciation and amortization to total assets. Other is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to total assets.

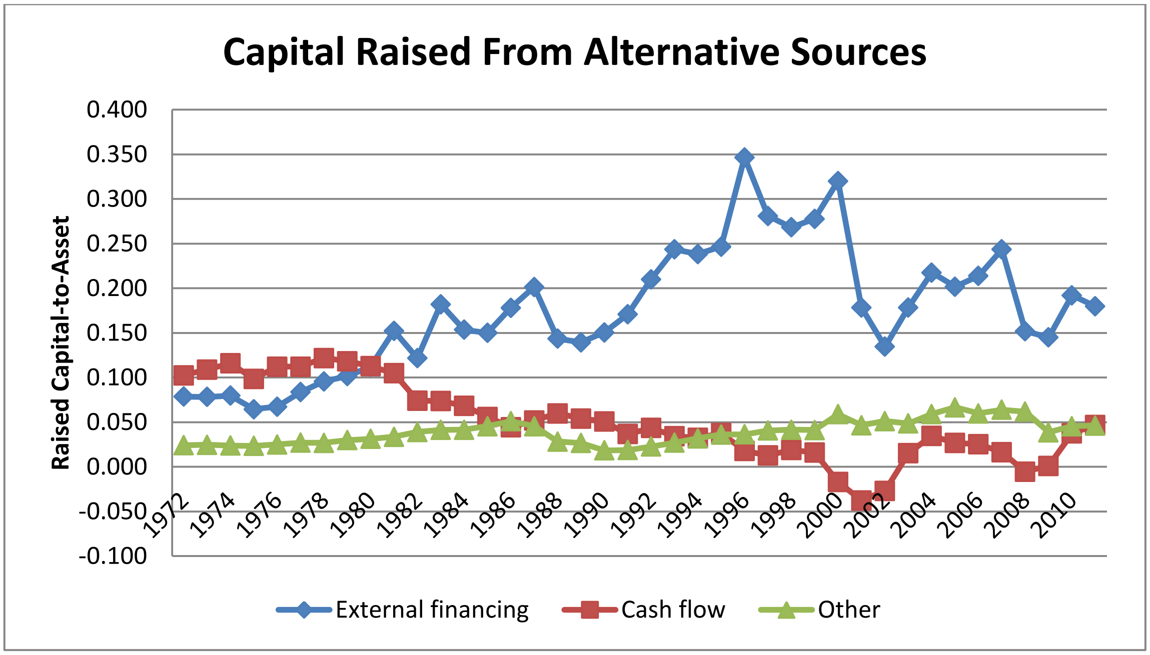

Figure 4-1 Capital Raised from Alternative Sources

Yearly capital raised from the three major sources of capital (i.e., external financing, cash flow, and others), scaled by total assets. External financing is the ratio of the amount of externally raised capital divided by total assets. Cash flow is the ratio of the sum of net income plus depreciation and amortization to total assets. Other is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to total assets.

On average, cash generated from operational cash flow decreases over time. Specifically, it accounts for 11.1% of total assets in 1970s but only accounts for 0.32% of total assets. Cash raised from other sources is relatively steady over the past 40 years, which is far less than that raised from security issues. This reflects that external markets, relative to internal funds, contribute increasingly more capital to liquidity management against cash shortfalls.

4.4. Research Methodology

This section discusses the empirical techniques conducted in this chapter. We adopt consistently similar models with previous studies (e.g., Kim and Weisbach, 2008; McLean, 2011). For example, we include interactions between a time variable and the source of cash variables, or firm effect/year effect, or interaction between firm and market factors.

4.4.1. Amount of Cash Holdings

Similar to that used in Hertzel and Li (2010) and McLean (2011), we start our analysis with a single model as follows:

$$\Delta Cash_i = \alpha + \beta_1 External_i + \beta_2 Cash\ flow_i + \beta_3 Other_i + \beta_4 Asset_i + \varepsilon_i \qquad (4.1)$$

where $\Delta Cash_i$ is the change in cash balance between the end of year t and the beginning of year t, $External_i$ is net security raised from external markets, $Cash\ flow_i$ is the sum of net income plus depreciation and amortization, $Other_i$ is the sum of sale of PPE, sale of investment, and other sources of funds, all scaled by lagged total assets. $Asset_i$ is log of total assets. This expression shows that change in cash is a function of capital raised from the three sources, namely, external financing, operational cash flow, and other cash sources. We are mainly concerned with cash retained from external financing in this chapter.

Equation (4.1) takes the notion of Fama and MacBeth (1973) that values the proportion of cash proceeds retained from various cash sources. The coefficients of cash sources (i.e., external financing, operational cash flow, and other sources) are explained as a percentage of cash reserved from one unit of capital raised or generated for the change of cash balance. In this study, these coefficients indicate the amount of cents retained from one dollar of capital raised through various cash sources for the change of cash balance. In the spirit of Fama and MacBeth (1973), we evaluate this model yearly rather than conducting estimation for the whole period with a single pooled regression.[100] This action is driven by our intention to seek evidence on changes of cash holdings year after year.

4.4.2. Cash Holdings, External Financing, and Precautionary Motives

Given on-going concerns about future cash flow volatility and profitable investment opportunities, the precautionary motive has long been a focus for cash holdings that should not be ignored. Keynes (1936) assumes that firms with profitable investment

[100] For example, Kim and Weisbach (2008) and Hertzel and Li (2010) only research the change of cash holdings over a pooled dataset.

opportunities and concerns on future cash flow uncertainty tend to save cash. When internal cash flow is not sufficiently generated, seeking funds from external markets becomes essential. However, market conditions may be adverse to raise external capital, thus causing costs of external financing to be expensive. Possible explanations of higher cash balance include reduced cost of holding cash due to lower interest rates. When markets have become more accessible and efficient, firms bear lower interest rates, thus decreasing the cost of holding cash. Hence, firms tend to increase cash balance. Another explanation is that there are more R&D (e.g., biotechnology, IT) firms in the market that need higher cash at short notice. When the liquidity of the market increases, these firms reserve more cash for future use.

To evaluate the effect of the precautionary motive on external financing-cash holdings, similar to that used in McLean (2011), we adopt panel regressions with control for both firm effect and year effect and adjust *Equation (4.1)* to include the proxy of the precautionary motive and an interaction term between the precautionary motive and external financing. Net change in book debt and net change in book equity are also controlled. A new equation showing these concerns is expressed as follows:

$$\Delta Cash_{i,t} = \alpha_i + a_t + \beta_1 External_{i,t} + \beta_2 Cash\ flow_{i,t} + \beta_3 Other_{i,t} + \beta_4 Asset_{i,t} + \beta_5 \Delta Equity_{i,t} + \beta_6 \Delta Debt_{i,t} + \beta_7 Precautionary\ motives_{i,t} + \beta_8 Precautionary\ motives_{i,t} * External_{i,t} + \varepsilon_{i,t} \quad (4.2)$$

Where α_i represents the firm effect and a_t represents the year effect. $Precautionary\ motive_{i,t}$ is the proxy of the precautionary motive. Similar to that used in Han and Qiu (2007) and Bates et al. (2009), we use two traditional proxies of the precautionary motive, namely R&D expenditures and cash flow volatility. Following Han and Qiu (2007) and McLean (2011), we also use another important proxy to measure the precautionary motive in this chapter, namely dividend payment. $Precautionary\ motives_{i,t} * External_{i,t}$ is the interaction term between the precautionary motive and external financing. The firm effect controls for the within-firm change over time on independent variables that may cause the change on the dependent variable. The firm effect gives each firm its own intercept. As summarized in McLean (2011), "*because of the firm-intercepts, the firm-fixed effects framework relies on within-firm changes over time in the right-hand-side variables to explain within-firm changes over time in the left-hand-side variable*". Hence, the coefficient for interaction term between the precautionary motive and external financing, is a test of whether within-firm changes in precautionary motives cause within-firm changes in cash holdings reserved from externally raised capital. Zhou (2001), among others, discusses that firm effect restricts the influence of cross-sectional variances on coefficients of independent variables. Hence, an inclusion of interaction terms gives unbiased estimations of external financing on precautionary cash holdings or of precautionary motives on cash holdings retained from external financing. The year effect controls for the change of independent variables over time that may also cause change on the dependent variable over time. With the control of time effect, increasing (or decreasing) trend of cash holdings rate is observed on a yearly basis. The interaction term $Precautionary\, motives_{i,t} * External_{i,t}$ investigates the effect of firm-level change for precautionary motives on the firm-level change on cash holdings from external financing. Interaction terms are used in the situations where two independent variables (i.e., $Precautionary\, motives_{i,t}$ and $External_{i,t}$) have simultaneous effects on the dependent variable (i.e., $\Delta Cash_{i,t}$).

As these proxies of the precautionary motive may contain both components of the precautionary motive and components of non-precautionary motives, we conduct an index of precautionary motives. We run principal component analysis or factor analysis for the three proxies. First, components of these variables explain around 50% of precautionary motives. Referring to the first components of the three proxies, we take coefficients of the first components from principal component analysis to calculate an index of precautionary motives. Similar to the work of some previous studies (e.g., Bharath et al., 2009; Cai et al., 2009), an index measure of the precautionary motive relative to individual proxies has some outstanding features: (1) the index captures the functions of R&D expense, cash flow volatility, and dividend on the firm's precautionary thoughts that the literature has studied widely; (2) our index picks the precautionary components of these proxies but excludes the non-precautionary components; (3) constituents of dynamic proxies for precautionary motives have multiple and ad hoc interpretations; (4) the index regarding corporate finance studies also expresses sensible economic traits.

4.4.3. Cash Holdings, External Financing, Precautionary Motives, and Cost of Security Issue

According to Opler et al. (1999), the reason why firms hold precautionary cash is mainly because sufficient precautionary cash holdings can mitigate the financial pressure caused by profitable income shortfalls and expensive security issuance cost at the situation where firms urgently need money for unforeseen oncoming corporate issues such as profitable investment opportunities and dividend payment. The implication of this theory is that during good times when the cost of external financing is in favour of financing decisions firms are likely to issue and retain more precautionary cash from external capital, and during bad times when the cost of external financing goes against benefits of other cash sources firms decrease security issue for cash hoardings.[101]

To examine the relationship between precautionary motives, external financing, and cost of external financing, we add cost of security issues, and an interaction term between external financing, precautionary motives and cost of security issues on the right-hand side of *Equation (4.2)*, which is similar to that applied by McLean (2011). The following expression shows additions:

$$\Delta Cash_{i,t} = \alpha_i + a_t + \beta_1 External_{i,t} + \beta_2 Cash\,flow_{i,t} + \beta_3 Other_{i,t} + \beta_4 Asset_{i,t} + \beta_5 \Delta Equity_{i,t} + \beta_6 \Delta Debt_{i,t} + \beta_7 Precautionary\ motives_{i,t} + \beta_8 COSI_{i,t} + \beta_9 Precautionary\ motives_{\,i,t} * External_{i,t} * COSI_{i,t} + \varepsilon_{i,t} \quad (4.3)$$

Where $COSI_{i,t}$ is the weighted average cost of security issues, which measures cost for security issuance. $Precautionary\ motives_{i,t}$ is the proxy of the precautionary motive. $Precautionary\ motives_{\,i,t} * External_{i,t} * COSI_{i,t}$ is the interaction term between precautionary motives, external financing, and cost of security issue to capture the role

[101] These arguments are based on the assumption that financial frictions exist on external financing. According to the perfect market proposition of Modigliani and Miller (1958), there should be no difference between good times and bad times if the market is frictionless.

of external financing with precautionary motives and cost of security on cash holdings. Other definitions are consistent with those defined in *Equation (4.2)*.

Hann et al. (2013) discuss that co-issuance among a firm's financing decisions (i.e., issuing both equity and debt) reduces cost of stand-alone capital. Ex-post realized returns as a measure of expected return capture time varying effect of issuance cost. Following Hann et al. (2013), free cash flow weighted average cost of issues is used in this research.

$$COSI_{i,t} = D_{i,t-1}Y_t^{BC} + (1 - D_{i,t-1})COEI_{i,t} \tag{4.4}$$

Where $COSI_{i,t}$ is cost of security issues for firm *i* in year *t*, Y_t^{BC} represents the aggregate bond yield from the Barclays Capital Aggregate Bond Index (formerly, the Lehman Brothers Aggregate Bond Index) to measure cost of debt issues, $D_{i,t-1}$ stands for debt proportion of the firm and $(1 - D_{i,t-1})$ is the equity proportion. Debt proportion is calculated by using the total debt of short-term debt and long-term debt (Compustat item 34 plus Compustat item 9) divided by total market assets (Compustat item 34 plus Compustat item 9 plus Compustat item 199 * Compustat item 25). $COEI_{i,t}$ represents the cost of equity issues for firm *i* in year t. Lamont and Polk (2001) and Hann et al. (2013) argue that valuation method differences result in difference in valuation results. Hence three conventional and one macro-effect measures of cost of equity issues are used in this chapter, aiming to show relatively more unbiased results. Following McLean (2011), this study uses time-varying proxies to catch equity issuance cost: three Joel Hasbrouck's cost of equity issues measures and one macroeconomic measure of equity issues cost.[102] First, Hasbrouck (2009) uses the popular illiquidity measure (*Amihud*) of Amihud (2002) to catch the price effect, calculated by taking the absolute value of daily returns standardized by total volume. In this chapter, we apply as log of one plus *Amihud* illiquidity measure. Second, Amihud et al. (1997), among others, we use an illiquidity measure (*Amivest*) computed by Kerry et al. (1985) as the average ratio of volume to absolute return to catch price effect. We use as log of one plus *Amivest's* illiquidity measure. Third, Hasbrouck (2004), among others, computes the *Gibbs* spread

[102] Thanks to Joel Hasbrouck for sharing illiquidity measures.

estimate by using Roll (1984) spread model. Fourth, consistent with Antoniou et al. (2007), our macroeconomic measure takes a business cycle effect, taking into account not only GDP but also other dynamic economic measures such as real income, employment, and industrial production.[103]

4.4.4. External Financing, Precautionary Motives, and Cost of Security Issue

McLean (2011) finds that precautionary motive drives share issuance. We aim to examine whether precautionary motive drives external financing regardless of equity or debt in this chapter. Consistent with McLean (2011) and similar to that used in Rajan and Zingales (1995), traditional determinants of financing decisions are also controlled because these variables are found to be related to external financing in Antoniou et al. (2008a) and McLean (2011). The framework is shown below:

$$External_{i,t} = \alpha_i + a_t + \beta_1 Cash\,flow_{i,t} + \beta_2 MB_{i,t-1} + \beta_3 Blev_{i,t-1} + \beta_4 Tang_{i,t-1} + \beta_5 Asset_{i,t-1} + \beta_6 Precautionary\,motives_{i,t} + \beta_7 \Delta Equity_{i,t} + \beta_8 \Delta Debt_{\,i,t} + \beta_9 COSI_{i,t} + \beta_{10} Precautionary\,motives_{i,t} * COSI_{i,t} + \varepsilon_{it} \quad (4.5)$$

Where $MB_{i,t-1}$ represents growth opportunities, is the log of the ratio of a firm's market value of equity to its book equity at the beginning of the year; $Blev_{i,t-1}$ is the total debt to total assets at the beginning of the year; $Tang_{i,t-1}$ represents tangibility, is the ratio of property, plant, and equipment to total assets at the beginning of the year. $Precautionary\,motives_{i,t}$ is the proxy of precautionary motive. $Precautionary\,motive_{si,t} * COSI_{i,t}$ is the interaction term between precautionary motives and cost of security issues. We also control for firm effect (α_i) and year effect (a_t).

4.4.5. Debt Repayment and External Financing

According to pecking order theory, firms with financial deficit seek capital from security markets and tend to issue debt prior to equity due to adverse selection cost (Myers and

[103] Business cycle data is collected from the National Bureau of Economic Research (NBER) via http://www.nber.org/cycles.html.

Majluf, 1984). When the cost of equity issues is lower than the cost of debt issues, firms may issue equity for capital. With respect to security issuances, debt issue incurs post-issue expenses continuously, while equity issue does not incur post-issue fixed cost. Hence, firms may use equity issuances to pay down debt as a healthy capital structure enables a healthy firm operation as well as satisfactory assessment of managers' action towards financial commitments (Stulz, 1990; Wyatt, 2014). This sub-section is also motived by the findings of earlier empirical results that net change in book debt is inversely related to new cash holdings and change in net change in book equity is positively related to cash retaining (e.g., McLean, 2011). The hypothetical situation that the dependent variable which is the difference between cash at the end of the year and cash at the beginning of the year and other explanatory variables remain unchanged, increase in new equity issuance decreases the debt level of the firm. Consistent with McLean (2011), this part sets a model similar to *Equation (4.1)* to examine the possibility of repaying debt by equity issuances:

$$Debt\ repayment_{i,t} = \alpha_i + \alpha_t + \beta_1 Equity_{i,t} + \beta_2 Debt_{i,t} + \beta_3 Cash\ flow_{i,t} + \beta_4 Other_{i,t} + \beta_5 Asset_{i,t} + \varepsilon_i \tag{4.6}$$

Where $Debt\ repayment_{i,t}$ considers expenses regarding previously matured debt as well as fixed cost related to existing debt. According to Eaton et al. (1986), a firm that is expected to repay its debt should be able to meet any current debt-service obligations. This intuitively implies that firms that have the capacity to meet current liabilities could strongly indicate their ability to repay debt. Moreover, the work of Harris and Raviv (1990) implies that failing to repay debt could be reflected on the failure of required payment (current debt). Failure to repay debt also results in a costly investigation that reveals confidential information of the firm regarding income and firm quality. Hence, to cover the direct cost of debt repayment and additional costs associated with failure to repay debt, we measure debt repayment, i.e., how much debt to repay, as the ratio of current debt to total assets. α_i is the firm effect and α_t is the time effect. $Equity_{i,t}$ is the ratio of equity issuance to lagged total assets. $Debt_{i,t}$ is the ratio of long-term debt issuance to lagged total assets. $Cash\ flow_{i,t}$ is the ratio of sum of net income plus depreciation and amortization to lagged total assets. $Other_{i,t}$ is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to lagged total assets. $Asset_{i,t}$ is log of total assets. *Equation (4.6)* shows that debt repayment is a function of equity issue, debt issue, operational cash flow, and other sources. This empirical chapter primarily focuses on the role of equity issues on debt repayment.

Taking the spirit of Rajan and Zingales (1995) and Huang and Ritter (2009), we adjust *Equation (4.2)* into the following model to control for conventional determinants of capital structure determinants on debt repayment:

$$Debt\ repayment_{i,t} = \alpha_i + a_t + \beta_1 Equity_{i,t} + \beta_2 Cash\ flow_{i,t} + \beta_3 MB_{i,t-1} + \beta_4 Blev_{i,t-1} + \beta_5 Tang_{i,t-1} + \beta_6 Asset_{i,t-1} + \beta_7 \Delta Equity_{i,t} + \beta_8 \Delta Debt_{i,t} + \varepsilon_{i,t} \quad (4.7)$$

Where $\Delta Equity_{i,t}$ is net change in equity, measured by the difference between book equity at the end of the year and book equity at the beginning of the year. $\Delta Debt_{i,t}$ is net change in debt, measured by the difference between book debt at the end of the year and book debt at the beginning of the year. Definitions of other variables are identical to those used in *Equations (4.5)* and *(4.6).*

4.4.6. Debt Repayment, Equity Issues, and Cost of Equity Issue

Firms issuing equity for repaying debt may also be concerned with the cost of equity issuance. Similar to that discussed in McLean (2011), given that repaying debt could lower leverage of the firm, firms benefit more from equity issuances for debt payment than non-equity issuers when cost of equity issuance is low during good times. To assess the influence of equity issuance cost on debt repayment, we follow McLean (2011) and construct a model, which is also similar with *Equation (4.2)*:

$$Debt\ repayment_{i,t} = \alpha_i + a_t + \beta_1 Equity_{i,t} + \beta_2 Debt_{i,t} + \beta_3 Cash\ flow_{i,t} + \beta_4 Other_{i,t} + \beta_5 Asset_{i,t} + \beta_6 \Delta Equity_{i,t} + \beta_7 \Delta Debt_{i,t} + \beta_8 COEI_{i,t} + \beta_9 Equity_{i,t} * COEI_{i,t} + \varepsilon_{it} \quad (4.8)$$

Where $COEI_{i,t}$ is the cost of equity issuance. $COEI_{i,t} * Equity_{i,t}$ is the interaction term between cost of equity issuance and equity issues. All other variables are defined consistently with previous sub-sections.

Similar to Huang and Ritter (2009) and McLean (2011), the influence of conventional determinants of capital structure decisions (i.e., market-to-book ratio, book leverage, tangibility, and asset) on debt repayment is controlled. We also include the cost of equity issuance, and an interaction term between equity issues and cost of equity issues into the model as shown below:

$$Debt\ repayment_{i,t} = \alpha_i + a_t + \beta_1 Equity_{i,t} + \beta_2 Cash\ flow_{i,t} + \beta_3 MB_{i,t-1} + \beta_4 Blev_{i,t-1} + \beta_5 Tang_{i,t-1} + \beta_6 Asset_{i,t-1} + \beta_7\ COEI_{i,t} + \beta_8 COEI_{i,t} * Equity_{i,t} + \varepsilon_{i,t} \quad (4.9)$$

Where $COEI_{i,t}$ is the cost of equity issuance. $COEI_{i,t} * Equity_{i,t}$ is the interaction term between cost of equity issuance and equity issue. As discussed in the earlier text, our models assume that firms issue equity when cost of equity issue is low and avoid issuing equity when cost of equity is high. As we assume firms use equity issue to repay debt, coefficient for equity issue is positive and the cost of equity issue and the interaction term are negative. Other right-hand side variables are consistent with those used in *Equation (4.7).*

4.4.7. Debt Repayment Dynamics

This sub-section emphasizes that this year's debt to repay may be determined by the debt level of previous season(s) (endogeneity bias). Al-Najjar and Belghitar (2011) argue that explanatory variables could significantly (endogenously) affect cash holdings models. Similarly, explanatory variables could significantly (endogenously) affect debt repayment models. Controlling for endogeneity problem while studying the relationship between cash holdings and other factors could, weaken their endogenous relationship. Dynamic behaviours of corporate finance have also been argued in Greene (2011). Similar to Al-Najjar and Belghitar (2011), the dynamic behaviour of debt repayment can be expressed in an equation as follows:

$$Debt\ repayment_{i,t} = \alpha_i + \alpha_t + \beta_1 Debt\ repayment_{i,t-1} + \beta_2 Equity_{i,t} + \beta_3 Cash\ flow_{i,t} + \beta_4 MB_{i,t-1} + \beta_5 Blev_{i,t-1} + \beta_6 Tang_{i,t-1} + \beta_7 Asset_{i,t-1} + \varepsilon_{i,t} \quad (4.10)$$

Where $Debt\ repayment_{i,t}$ is the ratio of current debt to total assets. $Debt\ repayment_{i,t-1}$ is the lagged ratio of current debt to total assets. Consistent with *Equation (4.5)*, traditional capital structure determinants are controlled. *Equation (4.10)* expresses that debt repayment is a function of lagged debt repayment and equity issues.

According to Devereux and Schiantarelli (1990), one period lagged debt repayment variable is included to the right-hand side of the equation as this allows for the possible effect of the autoregressive process on the stochastic term and the implications of adjustment costs. The dynamic behaviour of the dependent variable is assessed by using Generalized Method of Moments (GMM) models, including difference GMM (i.e., GMM-LEV) and system GMM (i.e., GMM-SYS). According to Antoniou et al. (2006), additional instruments derived from utilizing the orthogonal conditions associated with the error term and the lagged dependent variable are employed by GMM. Hansen (1982) states that "*a GMM estimator of the true parameter vector is obtained by finding the element of the parameter space that sets linear combinations of the sample across products as close to zero as possible*" (p. 1029). As defined in Roodman (2009), GMM-LEV estimator employed by Arellano and Bond (1991) "*transforms all regressors, usually by differencing, and uses the GMM (Hansen, 1982)"* (p. 86). Regarding the definition of GMM-SYS, Roodman (2009) describes that "*the Arellano and Bover (1995) estimator augments Arellano-Bond estimator by making an additional assumption that first differences of instrument variables are uncorrelated with the fixed effect, which allows the introduction of more instruments and can dramatically improve efficiency. It builds a system of two equations – the original equation and the transformed one-and is called system GMM*" (p. 86).

In general, as summarized in Roodman (2009), both GMM-LEV and GMM-SYS are designed for cases where: i) the sample contains few time periods and many observations; ii) variables are linearly correlated; iii) the dependent variable is dynamic and relies on its own past realizations; iv) predictors are not strictly exogenous and are correlated with past and possibly current realizations of the error; v) fixed individual effects; and vi) heteroscedasticity and autocorrelation within observations but not across them.

Antoniou et al. (2006) discuss that GMM-LEV controls for the inefficient problem which remains in the OLS estimator that unobservable firm effects may be correlated with some of all the other (independent and/or dependent) variables of the model. By applying an instrument derived from an orthogonal relationship between the error term and the lagged dependent variable (Arellano and Bond, 1991), GMM-LEV differentiates with the estimator of instrumental variable with a second lag (Anderson and Hsiao, 1982) and first differencing estimator (Hsiao, 1985). This considers all the linear moment restrictions that are not controlled by other estimators. Antoniou et al. (2006), among others, summarize other superior features of GMM-LEV, including consistency of estimation with a large number of observations over a long sample period; improved efficiency from one potential step to construct an asymptotic optimal weighting matrix; eliminating heteroscedasticity; and concern of simultaneity. However, the first differencing estimator causes information loss for cross-sectional cases, thus amplifying measurement error and inefficiency of the estimator.

GMM-SYS offers an efficient system of instrument inclusion to improve this. Antoniou et al. (2006) and Antoniou et al. (2008a) pertinently summarize the design and relevant benefits of GMM-SYS: (1) Arellano and Bover (1995) set instruments in first differences for equations in levels and instruments in levels for equations in first differences, thus adding information to the parameters in levels; (2) Blundell and Bond (1998) claim the particular suitability of incorporation of lagged first difference and lagged levels instruments into instruments for GMM-LEV's poor estimation for observations with a short time span, thus increasing the efficiency of the estimator and reducing measurement error biases; (3) adjustment of the instrument set considers endogenous variables in both first differences and levels, thus leading to consistency and partial retention of variations of firm-specific characteristics across firms.

To mitigate inefficient problems that may arise from a weak instrument set, On the one hand, we treat lagged dependent variable $Debt\ repayment_{i,t-1}$ and capital raised from equity issuance as endogenous and the second lag of capital raised from equity issuance as an instrument. On the other hand, we treat all explanatory variables as endogenous and the second lag of these variables as instruments.

4.4.8. Cash Holdings Dynamics

Similarly, this sub-section examines the dynamic behaviour of cash holdings. Following Al-Najjar and Belghitar (2011), this equation is presented below:

$$\Delta Cash_{i,t} = \alpha_i + \alpha_t + \beta_1 \Delta Cash_{i,t-1} + \beta_2 External_{i,t} + \beta_3 MB_{i,t-1} + \beta_4 Blev_{i,t-1} + \beta_5 Tang_{i,t-1} + \beta_6 Asset_{i,t-1} + \beta_7 PREC_{i,t} + \beta_8 \Delta Equity_{i,t} + \beta_9 \Delta Debt_{i,t} + \varepsilon_{i,t} \quad (4.11)$$

Where $\Delta Cash_{i,t}$ is the change in cash balance between cash balance at the end of the year and cash balance at the beginning of the year, and $\Delta Cash_{i,t-1}$ is the lagged change in cash balance. $PREC_{i,t}$ is the precautionary motive index calculated from the three major proxies of precautionary motives. Other variables are consistent with previous sub-sections. This sub-section uses consistent treatments with those used for examination of dynamic behaviour of debt repayment. To mitigate inefficiency problems that may arise from a weak instrument set, On the one hand, we treat lagged dependent variable $\Delta Cash_{i,t-1}$ and capital raised from external financing as endogenous and the second lag of capital raised from external financing as an instrument. On the other hand, we treat all explanatory variables as endogenous and the second lag of these variables as instruments.

4.4.9. Cash Holdings and Debt Repayment

Greene (2011) argues that simultaneity may cause biased, inconsistent, and ambiguous estimates. This chapter also examines the simultaneity of cash holdings and debt repayment. Specifically, cash holdings may be dependent on debt repayment, and similarly debt repayment may be dependent on cash holdings. To show a clear relationship between cash holdings and debt repayment, the dynamics behaviour of cash holdings and debt repayment are examined respectively with the other as an explanatory variable. In line with that used in Al-Najjar and Belghitar (2011), our models can be presented as follows:

$$\Delta Cash_{i,t} = \alpha_i + \alpha_t + \beta_1 \Delta Cash_{i,t-1} + \beta_2 Debt\ repayment_{i,t} + \beta_3 MB_{i,t-1} + \beta_4 Blev_{i,t-1} + \beta_5 Tang_{i,t-1} + \beta_6 Asset_{i,t-1} + \varepsilon_{i,t} \quad (4.12)$$

$$Debt\ repayment_{i,t} = \alpha_i + \alpha_t + \beta_1 Debt\ repayment_{i,t-1} + \beta_2 \Delta Cash_{i,t} + \beta_3 MB_{i,t-1} + \beta_4 Blev_{i,t-1} + \beta_5 Tang_{i,t-1} + \beta_6 Asset_{i,t-1} + \varepsilon_{i,t} \quad (4.13)$$

Similar with the methods used in the previous sub-sections, we use consistent treatments to mitigate inefficient problems that may arise from weak instrument sets. On the one hand, we treat lagged dependent variable $\Delta Cash_{i,t-1}$ $(Debt\ repayment_{i,t-1})$ and $Debt\ repayment_{i,t}$ $(\Delta Cash_{i,t})$ as endogenous and $Debt\ repayment_{i,t-2}$ $(\Delta Cash_{i,t-2})$ as an instrument. On the other hand, we treat all explanatory variables as endogenous and the second lag of these variables as instruments.

4.5. Empirical Results

4.5.1. Amount of Cash Holdings

The coefficients of cash sources in relevance with estimations of *Equation (4.1)* are represented in Table 4.4. As we are interested in the change of external capital retained as cash over time, we present coefficients over time by year rather than a single coefficient from a pooled regression. This is similar to the method used in Hertzel and Li (2010) and McLean (2011). We conduct a two-step Fama-MacBeth regression in Stata which includes the first step of a pooled regression and the second step of yearly regressions. The estimation of a pooled regression shows average values of coefficients for the three sources and an R-square. Results from the pooled regression show that the average coefficients for the three sources of cash (i.e., external financing, operational cash flow, and other sources) are 0.266, 0.169, and 0.041 respectively. This means that, on average, firms retain 26.6 cents as cash from every \$1 external capital raised, 16.9 cents as cash from \$1 operational cash flow generated and 4.1 cents as cash from \$1 other sources. The highest rate of cash retained from capital raised from external financing mirrors relation to the first research question of this chapter, namely, *is precautionary cash holding dependent on external financing?* The superiority of the retaining rate from external capital over operational cash flow and other sources is consistent with that of capital raised from external financing over cash flow and other sources as shown in Table 4.3. Although it fluctuates incredibly, as shown in Figure 4-2, the coefficient of external financing shows an upward trend over the sample period, suggesting that firms retain increasing cash from external financing over time. Fluctuations on cash holding rates of operational cash flow and other sources are significantly heavy over time, but the overall trends are quite stable. These fluctuations (cash holding rates of operational cash flow and other sources) move consistently with the retain rate of external financing when the state of economy is poor. This indicates that the three sources of cash provide consistently less capital to the change in cash balance when the state of economy is poor. This is because over poor state of economy, liquidity of both the market and the firm is low, thus leading to lower supply of capital. These fluctuations (cash holding rates of operational cash flow and other sources) move inconsistently with the retain rate of external financing when the state of economy is not poor (normal periods). This means that firms' preference on cash sources for cash holdings is constant (external financing first). This can be explained that external financing has the largest capacity to provide capital for cash holding. This enlightens that firms may hold cash from different sources to reach a target cash level or use proceeds to repay debt to target an optimal debt-equity ratio.

Taking a close look at R-squares in Table 4.4, we observe that R-square moves interestingly consistently with yearly external financing holding rate. This suggests that there exits an increase on the stability of cash holdings from external financing, as well as a persistent cash retaining rate from external issuance. The average R-square that shows a similar value with the work of McLean (2011) indicates the fit of a two-step Fama-MacBeth model (Fama and MacBeth, 1973) on the application of cash holdings and external financing. An increase in R-square may result from an increase in t-statistics of external financing coefficients.

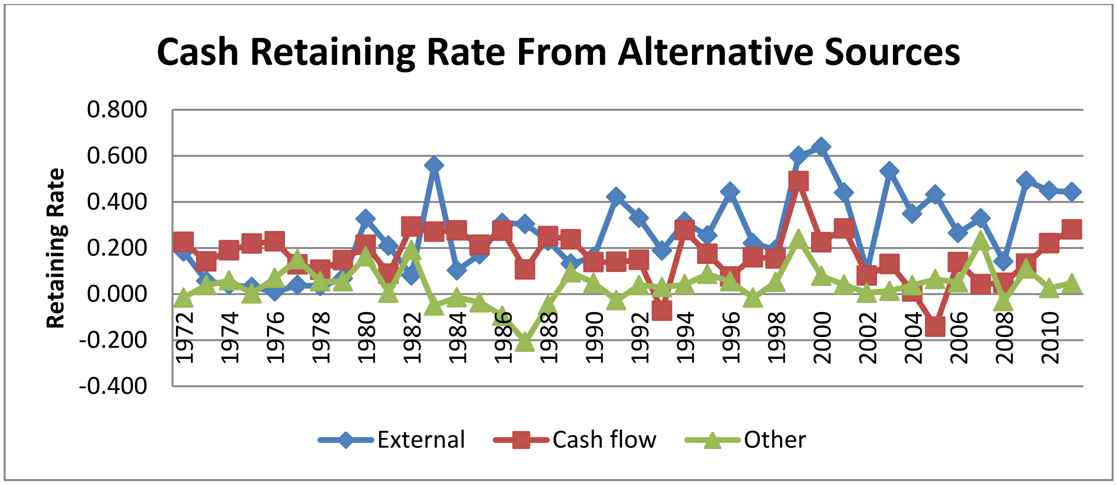

Figure 4-2 Cash Retaining Rate from Alternative Sources

Coefficients (i.e., retaining rate) estimated from the expression below:

$$\Delta Cash_i = \alpha + \beta_1 External_i + \beta_2 Cash\ flow_i + \beta_3 Other_i + \beta_4 Asset_i + \varepsilon_i$$

The dependent variable $\Delta Cash_i$ which is the difference between cash (t) and cash (t-n), is a function of the three cash sources. External financing ($External_i$) is ratio of the amount of externally raised capital divided by total assets. Cash flow ($Cash\ flow_i$) is the ratio of sum of net income plus depreciation and amortization to total assets. Other sources ($Other_i$) is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to total assets.

Table 4.4 Retaining Rate from Alternative Sources

Year	External	Cash flow	Other	Constant	R-square
1972	0.185	0.226	-0.015	-0.027	0.200
1973	0.057	0.141	0.039	-0.017	0.047
1974	0.040	0.190	0.059	-0.036	0.053
1975	0.031	0.219	0.003	-0.002	0.078
1976	0.010	0.229	0.071	-0.007	0.086
1977	0.038	0.129	0.151	-0.017	0.071
1978	0.035	0.105	0.055	-0.011	0.027
1979	0.068	0.147	0.056	-0.013	0.068
1980	0.326	0.214	0.164	-0.027	0.330
1981	0.209	0.088	0.006	-0.017	0.243
1982	0.080	0.293	0.192	-0.061	0.142
1983	0.558	0.270	-0.050	-0.098	0.570
1984	0.103	0.276	-0.014	-0.045	0.146
1985	0.172	0.213	-0.036	-0.065	0.206
1986	0.308	0.274	-0.094	-0.035	0.339
1987	0.304	0.106	-0.207	-0.067	0.341
1988	0.230	0.251	-0.048	-0.052	0.211
1989	0.131	0.238	0.094	-0.034	0.154
1990	0.161	0.138	0.048	-0.041	0.150
1991	0.422	0.141	-0.027	-0.051	0.464
1992	0.330	0.148	0.039	-0.047	0.429
1993	0.189	-0.073	0.030	-0.038	0.290
1994	0.313	0.277	0.043	-0.090	0.467
1995	0.254	0.174	0.087	-0.046	0.268
1996	0.443	0.076	0.055	-0.096	0.544
1997	0.221	0.160	-0.016	-0.068	0.220
1998	0.192	0.154	0.053	-0.066	0.210
1999	0.599	0.489	0.239	-0.080	0.678
2000	0.638	0.225	0.079	-0.141	0.653
2001	0.440	0.284	0.041	-0.061	0.413
2002	0.102	0.080	0.006	-0.092	0.132
2003	0.533	0.131	0.014	-0.047	0.510
2004	0.348	0.011	0.039	-0.015	0.355
2005	0.432	-0.142	0.064	-0.126	0.523
2006	0.266	0.139	0.052	0.016	0.172
2007	0.329	0.043	0.233	-0.066	0.429
2008	0.141	0.048	-0.031	-0.140	0.088
2009	0.492	0.132	0.110	-0.059	0.365
2010	0.449	0.221	0.026	0.041	0.237
2011	0.443	0.280	0.047	-0.027	0.416
Mean	0.266	0.169	0.041	-0.049	0.283

Coefficients (i.e., retaining rate) estimated from the expression below:

$$\Delta Cash_i = \alpha + \beta_1 External_i + \beta_2 Cash\ flow_i + \beta_3 Other_i + \beta_4 Asset_i + \varepsilon_i$$

The dependent variable $\Delta Cash_i$ which is the difference between cash (t) and cash (t-n), is a function of the three cash sources. External financing ($External_i$) is ratio of the amount of externally raised capital divided by total assets. Cash flow ($Cash\ flow_i$) is the ratio of sum of net income plus depreciation and amortization to total assets. Other ($Other_i$) is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to total assets.

Based on yearly capital generated or raised from the three cash sources as reported in Table 4.3 and corresponding yearly cash retaining rates as reported in Table 4.4, we calculate the amount of cash retained (to total asset) from the three channels of cash, namely, the percentage of cash retained from each channel over lagged total assets. For example, 0.08 (or 8%) of one unit lagged total assets in 2011 (as reported in Table 4.5) is calculated as average capital raised from external financing in 2011 (i.e., 18% of lagged total assets as reported in Table 4.3) times 2011's average retaining rate (i.e., 0.443 as reported in Table 4.4). Overall, firms hold, on average, 0.054 (or 5.4%) of one unit lagged total assets from externally raised capital, 0.009 (or 0.9%) of one unit lagged total assets from operational cash flow, and 0.002 (or 0.2%) of one unit lagged total assets from other sources. Cash valued 1.9% of lagged total assets is retained from operational cash flow and cash valued 0.5% of lagged total assets is retained from external capital in the 1970s.[104] This may be caused by the limited access to external capital in the 1970s. Since the 1980s firms have dramatically increased cash holdings from externally raised capital over operational cash flow and other sources. The first decade of the 21st century has seen an increased average value of 7.9% (in cash) of lagged total assets retained from external issuance compared to that of 3.9% (in cash) of lagged total assets in the 1980s while this period has seen a decreased average value of 0.1% (in cash) of lagged total assets retained from operational cash flow compared to that of 1.5% (in cash) of lagged total assets in 1980s. In spite of the significant drops in the early 2000s recession and the 2007/2008 financial crisis, cash retained from external markets bounced back to a favourable level afterwards. Cash reserved from operational cash flow and other sources are relatively less fluctuating over time and close to zero as shown in Figure 4-3, which is consistent with the observation of McLean (2011). This reflects an increase in the importance of external financing against operational cash flow and other sources on contribution to the firm's cash holdings. The above findings indicate direct relevance to the first research question "*is precautionary cash holding*

[104] This is calculated by averaging, respectively, amounts of cash saved from external capital and amounts of cash saved from operation cash flow for the period of 1972 to 1979.

dependent on external financing?" and Hypothesis 4.1 "*firms that need financing for precautionary motive are likely to retain cash from external financing*".

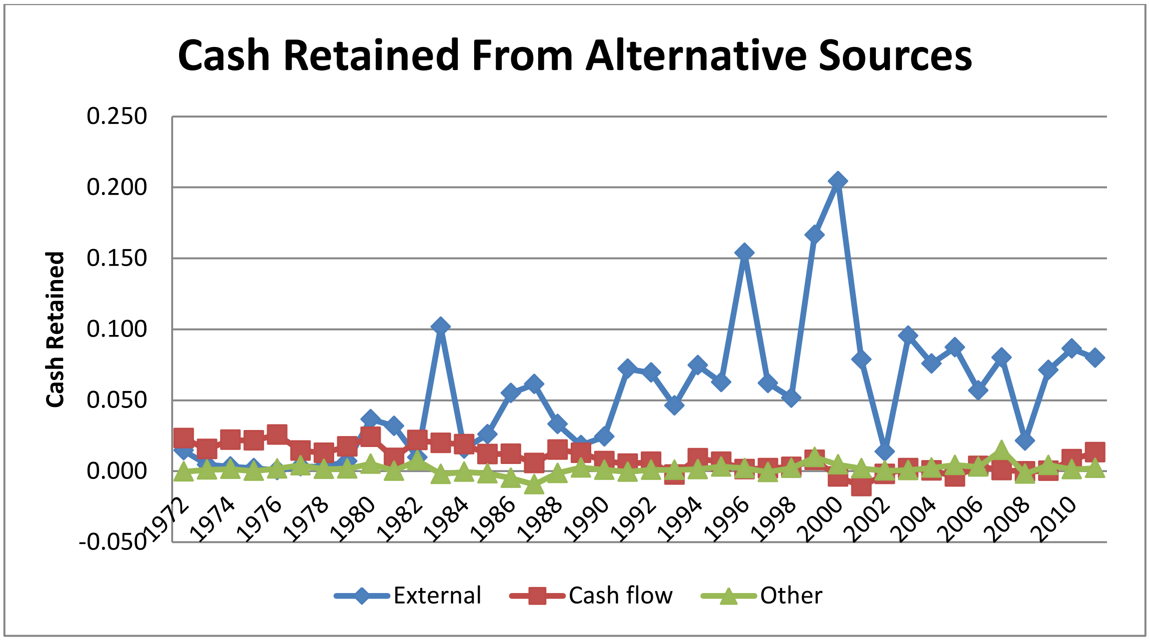

Figure 4-3 Cash Retained from Alternative Sources

Yearly cash retained from capital raised from the three sources, scaled by total assets, which is calculated by using yearly cash retaining coefficients (as shown in Table 4) times capital raised from each source (as shown in Table 3). Yearly cash retaining coefficients (i.e., cash retaining rate) are estimated from the expression below:

$$\Delta Cash_i = \alpha + \beta_1 External_i + \beta_2 Cash\ flow_i + \beta_3 Other_i + \beta_4 Asset_i + \varepsilon_i$$

Change in cash ($\Delta Cash_i$) is the difference between cash (t) and cash (t-n). External financing ($External_i$) is ratio of the amount of externally raised capital divided by total assets. Cash flow ($Cash\ flow_i$) is the ratio of sum of net income plus depreciation and amortization to total assets. Other $(Other_i)$ is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to total assets.

Table 4.5 Cash Retained from Various Sources

Year	External	Cash flow	Other
1972	0.015	0.023	0.000
1973	0.004	0.015	0.001
1974	0.003	0.022	0.001
1975	0.002	0.022	0.000
1976	0.001	0.026	0.002
1977	0.003	0.014	0.004
1978	0.003	0.013	0.001
1979	0.007	0.017	0.002
1980	0.037	0.024	0.005
1981	0.032	0.009	0.000
1982	0.010	0.022	0.007
1983	0.102	0.020	-0.002
1984	0.016	0.019	-0.001
1985	0.026	0.012	-0.002
1986	0.055	0.012	-0.005
1987	0.061	0.006	-0.009
1988	0.033	0.015	-0.001
1989	0.018	0.013	0.003
1990	0.024	0.007	0.001
1991	0.072	0.005	-0.001
1992	0.069	0.006	0.001
1993	0.046	-0.003	0.001
1994	0.075	0.009	0.001
1995	0.063	0.007	0.003
1996	0.154	0.001	0.002
1997	0.062	0.002	-0.001
1998	0.052	0.003	0.002
1999	0.166	0.008	0.010
2000	0.204	-0.004	0.005
2001	0.079	-0.011	0.002
2002	0.014	-0.002	0.000
2003	0.095	0.002	0.001
2004	0.076	0.000	0.002
2005	0.087	-0.004	0.004
2006	0.057	0.004	0.003
2007	0.080	0.001	0.015
2008	0.021	0.000	-0.002
2009	0.071	0.000	0.004
2010	0.086	0.008	0.001
2011	0.080	0.013	0.002
Mean	0.054	0.009	0.002

Yearly cash retained from capital raised from the three sources, scaled by total assets, which is calculated by using yearly cash retaining coefficients (as shown in Table 4.4) times capital raised from each sources (as shown in Table 4.3). Yearly cash retaining coefficients (i.e., cash retaining rate) are estimated from the expression below:

$$\Delta Cash_i = \alpha + \beta_1 External_i + \beta_2 Cash\ flow_i + \beta_3 Other_i + \beta_4 Asset_i + \varepsilon_i$$

Change in cash ($\Delta Cash_i$) is the difference between cash (t) and cash (t-n). External financing ($External_i$) is ratio of the amount of externally raised capital divided by total assets. Cash flow ($Cash\ flow_i$) is the ratio of sum of net income plus depreciation and amortization to total assets. Other ($Other_i$) is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to total assets.

4.5.2. Cash Holdings Persistency

To further understand the climbing trend of cash holdings from external financing over time we take a look at the persistency of cash holdings from external financing as it relates to the first research question and first hypothesis preliminarily. Examination results of cash holding persistency from the three channels of cash sources are reported in Table 4.6. Dependent variable is the difference between cash balance at the end of at end of year t and cash balance at the end of year t-1, t-2, t-3 and t-4, scaled by lagged assets at the end of year t-1, t-2, t-3 and t-4 (i.e., ΔCash, $\Delta Cash_1$, $\Delta Cash_2$, and $\Delta Cash_3$). We consider $\Delta Cash_1$, $\Delta Cash_2$, and $\Delta Cash_3$ as a robustness check for change in cash balance.

Independent variables include proceeds raised or generated from external financing, operational cash flow, and other sources, all scaled by lagged total assets. We also control for total assets, net change in equity, and net change in debt. Independent variables remaining constant, regressions for robustness simply replace the dependent variable ΔCash with $\Delta Cash_1$, $\Delta Cash_2$, and $\Delta Cash_3$. Standard errors of the above regressions are estimated by variance-covariance estimation technique used in Newey and West (1987). This method provides the solution to cope with overlap between dependent variables of robust regressions. It overcomes autocorrelation and heteroscedasticity of error terms in these models.

In Table 4.6, columns (1), (3), (5), (7) show coefficients as evaluated in accordance with *Equation (4.1)*, while columns (2), (4), (6), (8) show coefficients as evaluated in accordance with *Equation (4.1)* but include net change in book debt and net change in book equity as control variables. The relationship between external financing and difference in cash balance is consistently positive over the eight regressions. Among columns (1), (3), (5), (7), the coefficient of external financing increases steadily from the lowest of 0.266 in column (1) to the highest of 0.367 in column (7). This suggests that firms not only persistently retain cash from proceeds of external financing but also increase holding rate. Consistent with McLean (2011), our results indicate that firms are likely to continuously raise capital from external markets after the security issue relative to firms without security issues. Cash flow consistently shows a significant and positive effect on all four dependent variables of difference in cash balance. The increasing magnitude of cash flow coefficients on regressions (1), (3), (5), and (7) express a signal that security issuers also consistently increase cash holdings from operational cash flow. This is consistent with the findings of Irvine and Pontiff (2009). However, other sources do not necessarily play a significant role on firms' cash holdings.

Interestingly, seen from columns (2), (4), (6), (8) coefficients of net change in equity are positive and increase and coefficients of net change in book debt are negative and decrease. This means that proceeds from equity issuance seem to be retained as cash while proceeds from debt issuance are less likely to be retained as cash due to continuous fixed costs associated with debt issues, which are consistent with the finding of McLean (2011) and Acharya et al. (2007). Opler et al. (1999) and Acharya et al. (2007) also argue that increasing the amount of cash balance retained from equity issues can be steadily used to redeem debt. R-square decreases from 0.28 in the first column, namely column (1), to 0.09 in the last column, namely column (7) among odd columns and decreases from 0.43 in the first column, namely column (2), to 0.14 in the last column, namely column (8), for even columns. This can be interpreted as an increase of variability of contribution of other sources on cash holdings and that of cash retained from other sources (McLean, 2011).

4.5.3. Cash Holdings, External Financing, and Precautionary Motives

This sub-section explores the relationship between precautionary motives, external financing, and cash holdings with *Equation (4.2)*. This aims to examine *"Hypothesis 4.1: Firms that need financing for precautionary motive are likely to retain cash raised from external financing."* and to answer "research question A. *Is precautionary cash holding dependent on external financing*".

Table 4.6 Cash Holdings Persistency

	ΔCash		ΔCash1		ΔCash2		ΔCash3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	**-0.049**	**-0.040**	**0.024**	**0.033**	**0.099**	**0.106**	**0.195**	**0.200**
	(-7.98)	(-7.80)	(1.92)	(2.91)	(5.58)	(6.13)	(7.13)	(7.75)
External	**0.266**	**0.128**	**0.296**	**0.122**	**0.337**	**0.179**	**0.367**	**0.181**
	(9.63)	(6.49)	(6.73)	(3.11)	(6.47)	(3.69)	(5.97)	(2.90)
Cash flow	**0.169**	0.005	**0.178**	-0.002	**0.192**	-0.003	**0.228**	-0.033
	(9.71)	(0.25)	(4.32)	(-0.05)	(4.23)	(-0.06)	(3.96)	(-0.55)
Other	**0.041**	**0.031**	0.013	-0.002	0.013	-0.001	0.036	0.020
	(3.17)	(2.69)	(0.73)	(-0.12)	(0.39)	(-0.03)	(0.64)	(0.36)
Assets	**0.002**	**0.003**	**-0.008**	**-0.006**	**-0.018**	**-0.015**	**-0.030**	**-0.027**
	(1.87)	(3.98)	(-3.31)	(-2.90)	(-6.35)	(-5.70)	(-9.21)	(-8.38)
ΔEquity		**0.347**		**0.400**		**0.414**		**0.508**
		(12.06)		(11.52)		(11.75)		(11.68)
ΔDebt		**-0.072**		-0.077		**-0.152**		**-0.158**
		(-4.08)		(-1.51)		(-2.46)		(-2.23)
R-square	0.28	0.43	0.14	0.22	0.11	0.16	0.09	0.14

Estimated results from Fama-MacBeth (1973) regressions in terms of the following model:

$$\Delta Cash_i = \alpha + \beta_1 External_i + \beta_2 Cash\ flow_i + \beta_3 Other_i + \beta_4 Asset_i + \varepsilon_i$$

ΔCash is the difference between cash (t) and cash (t-1). *ΔCash1* is the difference between cash (t) and cash (t-2). *ΔCash2* is the difference between cash (t) and cash (t-3). *ΔCash3* is the difference between cash (t) and cash (t-4). $External_i$ is ratio of the amount of externally raised capital divided by total assets. $Cash\ flow_i$ is the ratio of sum of net income plus depreciation and amortization to lagged total assets. $Other_i$ is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to lagged total assets. Δ*Equity* is the book equity at end of the year minus book equity at the beginning of the year. Δ*Debt* is total debt (short and long term) at the end of the year minus total debt at the beginning of the year. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above is reported in bold.

Table 4.7 Cash Holdings, External Financing, and Precautionary Motives

	(1)	(2)	(3)	(4)	(5)
External	**0.334**	**0.296**	**0.877**	**0.331**	**0.779**
	(12.91)	(11.83)	(8.38)	(12.77)	(11.26)
Cash flow	**0.051**	**0.130**	**0.076**	**0.054**	**0.145**
	(1.66)	(4.75)	(2.66)	(1.75)	(5.31)
Other	**0.070**	**0.076**	**0.060**	**0.070**	**0.067**
	(2.59)	(2.72)	(2.49)	(2.62)	(2.64)
Asset	**0.014**	**0.015**	**0.012**	**0.012**	**0.013**
	(4.08)	(4.55)	(3.70)	(3.63)	(4.24)
ΔEquity	**0.205**	**0.179**	**0.184**	**0.213**	**0.164**
	(7.80)	(7.24)	(7.43)	(7.78)	(6.97)
ΔDebt	**-0.192**	**-0.170**	**-0.180**	**-0.173**	**-0.159**
	(-4.95)	(-4.67)	(-4.85)	(-4.82)	(-4.64)
R&D		**0.160**			
		(2.62)			
*R&D * External*		**0.095**			
		(4.10)			
Volatility			**0.014**		
			(4.08)		
*Volatility * External*			**0.089**		
			(5.46)		
Dividend				-0.110	
				(-1.36)	
*Dividend * External*				**-0.261**	
				(-6.23)	
PREC					**0.258**
					(2.75)
*PREC * External*					**0.121**
					(7.27)
R-square	0.61	0.63	0.63	0.61	0.64

Role of external financing on precautionary cash holdings. Dependent variable is *ΔCash* which is the difference between cash (t) and cash (t-1). *External* is the ratio of overall security (equity and debt) to lagged total assets. *Cash flow* is the ratio of sum of net income plus depreciation and amortisation to lagged total assets. *Other* is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to lagged total assets. Δ*Equity* is book equity at end of the year minus book equity at the beginning of the year. Δ*Debt* is total debt (short and long term) at the end of the year minus total debt at the beginning of the year. *R&D* is the ratio of research and development expense to lagged total assets. *Volatility* is the log of average variance of industry cash flows over the past 10 years, with a requirement for five consecutive years. *Dividend* is the ratio of cash dividend to lagged total assets. *PREC* takes the first component of R&D, cash flow volatility, and dividend. The interaction terms measure the effect of both precautionary motives and external financing on cash holdings. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above is reported in bold.

The results from panel regressions are reported in Table 4.7. As a comparison, we ran a panel regression without controlling for precautionary motives in which coefficients and t-statistics are reported in column (1). Change in cash balance is significantly and positively related to external financing and shows the largest coefficient with a value of 0.334 among the three cash sources, indicating that external financing contributes the most proceeds to the cash level of the firm among the three cash channels. The coefficients of operational cash flow and that of other sources are 0.051 and 0.07 respectively. This suggests that operational cash flow and other sources contribute much less to the firm's cash holdings than external capital. Net change in book debt has a statistically significant and negative impact on the change in cash balance while net change in book equity shows a positive impact. One interpretation is that firms experience no other fixed costs after equity issues but not for debt issues (Kim and Weisbach, 2008). Hence, these firms are likely to reserve cash raised from equity issues. On the other hand, debt that requires being repaid yearly may be financed by new issues of securities, especially equity (Acharya et al., 2007; Custódio et al., 2013).

Columns (2)-(5) display the results from panel regressions in terms of *Equation (4.2)*. All four coefficients of external financing are significantly positive at the 1% level and are greater in magnitude than those of operational cash flow and other sources, which are consistent with the results of Column (1). The complete effect of external financing on change in cash balance takes the form of the external financing coefficient and external financing interaction coefficient.[105] A positive effect of external financing on cash holdings means that firms retain cash from external financing. R&D expenditures, cash flow volatility, and the precautionary index and their related interaction terms are positive. This is consistent with the view that firms with precautionary motives which are concerned with investment opportunities and uncertainty of cash flow are likely to have cash hoardings. We observe that the coefficient of dividend interaction term is negative but that of the dividend variable is insignificant as dividend payers are less

[105] According to McLean (2011), the overall effect of external financing on precautionary cash holding is calculated as the coefficient of external financing and the mean of precautionary motive proxy times the coefficient of external financing interaction term in the model.

likely to be financially constrained; in other words, they are less likely to experience money shortfalls. Hence, they have less cash holdings for precautionary motives. The findings indicate that firms have retained precautionary cash from external capital. This leads to a "yes" answer to the first research question "*is precautionary cash holding dependent on external financing?*"

Table 4.7 shows a greater external financing effect for Columns (2), (3), and (5), but a smaller effect for Column (4). These signs provide evidence to support the first hypothesis of this chapter that "*firms that need financing for precautionary motive are likely to retain cash raised from external financing.*" Firms with investment opportunities and uncertain cash flow are likely to increasingly hold cash, while firms paying dividend retain less cash from security issuance. This is in line with findings and discussions in the previous studies on precautionary cash holdings (e.g., Petersen, 2009; Bates et al., 2009; McLean, 2011). McLean (2011) finds that firms retaining precautionary cash from equity issues have high R&D ratios, cash flow volatility, and precautionary index, but small dividend ratio. We find these features also apply to firms retaining precautionary cash from external financing regardless of equity or debt. One interpretation for our findings is that firms hoard cash for making additional future investments so that they do not have to forego current or future investment projects (Bates et al., 2009). Another explanation is that firms without sufficient cash hoardings may forego current investment projects and use the cash for potential future investment opportunities, and firms experiencing financial constraints may also have to forego future profitable investments (Almeida and Philippon, 2007). Additionally, Opler et al. (1999) and Han and Qiu (2007) argue that firms hold cash to hedge the risk of future income shortfalls and risk of bearing costly external capital when internally generated cash flow is insufficient for urgent needs. Therefore, our results support *Hypothesis 4.1: Firms that need financing for precautionary motive are likely to retain cash raised from external financing* and provide positive answer to research question A.

4.5.4. Cash Holdings, External Financing, Precautionary Motives, and Cost of Security Issue

This sub-section investigates the relationship between external financing and precautionary cash holdings with special concern paid to the cost of security issue. Estimations are conducted to examine *Hypothesis 4.1*. We also intend to find answers for the first research question. Results from panel regressions with firm effect and year effect in accordance with *Equation (4.3)* are displayed in Table 4.8. Coefficients of external financing are significantly positive at 1% level for all the five regressions and are greater in magnitude than those of operational cash flow and other sources. This means that firms retain more cash from capital raised from external markets relative to operational cash flow and other sources. Consistent with Kim and Weisbach (2008) and McLean (2011), our results show that increasing cash balance is positively related to net change in equity issues and is negatively related to net change in debt issues. This is driven by precautionary motives for cash holdings that firms with financial constraints and favourable investment projects accumulate cash to offset cash shortfalls (Keynes, 1936). External capital is the largest source of cash that can satisfy the urgent need for cash (Hertzel and Li, 2010; McLean, 2011). Unlike debt capital, equity capital is not involved in the on-going costs to the firm. Moreover, negative signs for net change in book debt and positive signs for net change in book equity indicate that firms seem to use equity issuance to repay debt. The significantly positive interaction term between external financing and precautionary motives index tells that precautionary motives drive firms to retain cash from external financing. Similar to that applied in McLean (2011), as both interaction terms in the model are statistically significant, the overall effect of external financing with precautionary motive is the sum of an interaction term between external financing and precautionary motives (*External * PREC)* coefficient and coefficients of interaction terms between proxies of cost of security issue (i.e., *cosiamihud*, *cosiamivest, cosigibbs*, *cosicontraction*) and external financing-precautionary motives (i.e., *external*prec*). As a result, the overall effect of external financing for precautionary motives with concerns about the cost of security issues are respectively 0.124 (i.e., 0.108 plus 0.016), 0.169 (i.e., 0.178 plus -0.009), 0.129 (i.e., 0.111 plus 0.018), and 0.138 (i.e., 0.122 plus 0.016). This means that after considering the cost of security issuance and for the sake of precautionary cash holdings, firms are likely to seek external financing. One interpretation is that financial markets may underestimate the continuation value of the firm and do not allow refinancing to take place, thus resulting in refinancing costs and underinvestment problems to the firm (Harford et al., 2014). Conversely, sufficient cash holdings could minimize the costs associated with refinancing. Hann et al. (2013) discuss that the cost of security issuance and deadweight costs faced by the firm can be reduced if diversified issues of security are claimed by the firm. Additionally, total assets are positively related to cash retaining as large firms with more assets find it easier to raise external capital as these firms have better reputations and are more transparent. Total assets also reflect the time varying effect of security issues which is associated with risk on external capital, thus motivating firms to increase cash holdings over time.

Regarding the cost of security issue, the interaction terms of three cost of security issue proxies (i.e.,*cosiamihud, cosigibbs,* and *cosicontraction*) are significantly positive, while the interaction term of the other proxy (i.e., *cosiamivest*) is negative, meaning that precautionary cash retained from external financing increases with the cost of security issues. This is not surprising since we consider both the cost of equity issues and cost of debt issues in calculation for cost of security issues in our empirical analysis. One plausible interpretation of our findings is that the cost of debt issues determines the sign of the cost of security issues. Given that firms experience less financing frictions during economic expansion, they are likely to issue more securities for precautionary cash holdings relative to holding cash from external capital during economic contraction. When the cost of debt issuance is more expensive than the cost of equity, firms tend to issue equity.[106] The low cost of equity occurs in business expansion when there is little financial friction, thus leading to more equity issues. Faulkender and Petersen (2006) argue that firms benefit extensively from equity issues over periods of economic

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[106] This may be the case for firms experiencing no information asymmetry between managers and investors. Firm prefer equity to debt may be because of limited debt capacity.

expansion as equity issuances are strongly observed for precautionary cash holdings with favourable prices.

Table 4.8 Cash Holdings, External Financing, Precautionary Motives, and Cost of Security Issues

	(1)	(2)	(3)	(4)	(5)
External	**0.779**	**0.819**	**0.830**	**0.820**	**0.843**
	(11.26)	(9.88)	(8.43)	(9.81)	(9.95)
Cash flow	**0.145**	**0.188**	**0.147**	**0.192**	**0.169**
	(5.31)	(4.74)	(4.24)	(4.80)	(5.74)
Other	**0.067**	**0.067**	**0.057**	**0.070**	**0.064**
	(2.64)	(2.87)	(2.94)	(2.90)	(2.48)
Asset	**0.013**	**0.015**	0.007	**0.014**	**0.015**
	(4.24)	(3.30)	(1.27)	(2.79)	(4.19)
ΔEquity	**0.164**	**0.126**	**0.153**	**0.126**	**0.139**
	(6.97)	(4.47)	(5.21)	(4.47)	(6.28)
ΔDebt	**-0.159**	**-0.133**	**-0.119**	**-0.140**	**-0.152**
	(-4.64)	(-2.66)	(-2.52)	(-3.02)	(-4.24)
PREC	**0.258**	**0.230**	**0.193**	**0.227**	**0.187**
	(2.75)	(2.07)	(1.88)	(2.02)	(2.02)
*External * PREC (eprec)*	**0.121**	**0.108**	**0.178**	**0.111**	**0.122**
	(7.27)	(4.89)	(6.80)	(5.03)	(5.43)
cosiamihud		**0.014**			
		(6.61)			
*cosiamihud * eprec*		**0.016**			
		(7.93)			
cosiamivest			-0.001		
			(-0.27)		
*cosiamivest * eprec*			**-0.009**		
			(-4.05)		
cosigibbs				**0.014**	
				(5.86)	
*cosigibbs * eprec*				**0.018**	
				(8.05)	
cosicontraction					**0.012**
					(6.89)
*cosicontraction * eprec*					**0.016**
					(8.48)
R-square	*0.64*	0.71	0.70	0.71	0.66

Relationship between precautionary cash holdings and external financing, with special concern about cost of security issues. Dependent variable is *ΔCash*, the difference between cash (t) and cash (t-1). *External* is the ratio of overall security (equity and debt) to lagged total assets. *Cash flow* is the ratio of sum of net income plus depreciation and amortization to lagged total assets. *Other* is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to lagged total assets. Δ*Equity* is the book equity at end of the year minus book equity at the beginning of the year. Δ*Debt* is total debt (short and long term) at the end of the year minus total debt at the beginning of the year. *PREC* takes the first component of R&D, cash flow volatility, and dividend. *cosiamihud* is the cost of security issues based on Amihud illiquidity measure. *cosiamivest* is the cost of security issues based on Amivest illiquidity measure. *cosigibbs* is the cost of security issues based on Hasbrouck (2004) illiquidity measure. *Cosicontraction* is the cost of security issues based on NBER business cycle. The interaction terms measure the effect of both external financing for precautionary motives and cost of security issuance on cash holdings. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above is reported in bold.

With respect to the cost of debt issues, although precautionary cash holdings may increase with the cost of debt issues, firms do not seem to retain cash from capital raised from debt issues as firms issue debt to immediately invest in profitable projects or repay debt. Moreover, debt issue involves on-going mandatory liabilities; hence, precautionary cash retained from debt issue incurs much more cost than that retained from equity issue.

Therefore, the inference is that, On the one hand, the positive relationship between the cost of security issues and precautionary cash holdings is driven by the cost of debt issues as the cost of debt issues plausibly accounts for the major component of the cost of security issues calculation. On the other hand, firms tend to hold precautionary cash from equity issues when the cost of equity issues is low and to restrict cash holdings when the cost of equity issues is high. Additionally, good times see lower cost of equity issues, as well as higher precautionary cash retaining rates from equity issuance. In other words, our findings reflect that external financing for precautionary cash holdings is largely determined by equity issues, which is consistent with the findings of McLean (2011). Therefore, our results support *Hypothesis 4.1: Firms that need financing for precautionary motive are likely to retain cash raised from external financing.*

4.5.5. External Financing, Precautionary Motives, and Cost of Security Issue

This sub-section focuses on the effect of precautionary motives on external financing, with control for conventional determinants of external financing. We intend to test *Hypothesis 4.1: Firms that need financing for precautionary motive are likely to retain cash raised from external financing* with *Equation (4.5)*. Panel regression results are reported in Table 4.9. Positive signs are observed on market-to-book ratio, book leverage, and tangibility. The coefficients of net change in book equity and net change in book debt are significantly and statistically positive. This indicates that firms issue both equity and debt in external markets. A larger coefficient for net change in book debt against the coefficient for net change in book equity illustrates that firms raise more debt capital than equity capital. This can be explained by pecking order theory where firms with high levels of information asymmetry prefer debt to equity due to adverse selection costs (Myers and Majluf, 1984). Our finding is consistent with the descriptive statistics of net debt issuance against net equity issuance relative to lagged total assets mirrored in Table 4.1 (i.e., 10.9% vs. 7.6%, of lagged total assets). The coefficients of precautionary motives index range from 0.725 to 0.802, which reflect large positive influence on the issue of securities. This means that a firm's external financing behaviour is largely driven by precautionary motive. The explanation is that precautionary motive ensures firms to hold a cash buffer such that they use precautionary cash holdings to hedge uncertain cash flow and poor access to external capital (Bates et al., 2009). This also explains why less profitable and smaller firms tend to issue security as seen from the negative coefficients on cash flow and total assets. It is additionally interpreted by pecking order theory that firms experiencing a lack of internal funds leads to seeking funds from external markets.

With regard to interaction terms of cost of security issue for external financing, we observed mixed results. A positive coefficient on the proxy of cost of security issues (*cosiamivest)* interaction term means that a lower cost of security issuance increases external financing, while a positive coefficient on another proxy of the cost of security issues (*cosigibbs)* interaction term means that higher costs of security issuance increase external financing and an insignificant coefficient on alternative proxy of cost of security issues (*cosiamihud)* interaction term has no statistical meaning. A positive sign on the other proxy of cost of security issues (*cosicontraction)* interaction term shows that bad times see increasing external financing. Inconsistent results can be explained in the following way. Proxies for the cost of security issuance may not consistently fit our model (Greene, 2011), which may include some improper components that may not capture the cost of security issues. Moreover, one plausible explanation is that a high cost of debt issues accounts for a large weight in the calculation of the cost of security issues. The high cost of debt issues contains expensive default cost associated with limited or no value for cash hoardings (Kuehn and Schmid, 2014; Chaderina, 2013). Consistent with the previous sub-section, this can also be interpreted that security issuers switch debt equity to equity issue if the cost of debt issues exceeds the cost of equity issues and retain increasing cash from equity issuance.

Table 4.9 External Financing, Precautionary Motives, and Cost of Security Issues

	(1)	(2)	(3)	(4)	(5)
Cash flow	**-0.403**	**-0.401**	**-0.407**	**-0.397**	**-0.392**
	(-3.75)	(-2.53)	(-2.57)	(-2.53)	(-3.40)
MB_{t-1}	**0.035**	**0.025**	**0.037**	**0.041**	**0.039**
	(4.79)	(2.97)	(3.85)	(3.76)	(4.66)
Book $leverage_{t-1}$	**0.256**	**0.394**	**0.205**	**0.269**	**0.261**
	(5.85)	(5.58)	(2.78)	(3.73)	(5.10)
$Tangibility_{t-1}$	**0.172**	**0.235**	**0.231**	**0.229**	**0.189**
	(7.81)	(7.08)	(7.04)	(6.91)	(7.78)
$Asset_{t-1}$	**-0.046**	**-0.059**	**-0.075**	**-0.055**	**-0.051**
	(-6.37)	(-5.11)	(-5.23)	(-5.01)	(-6.34)
Prec	**0.761**	**0.802**	**0.725**	**0.795**	**0.782**
	(3.33)	(2.57)	(2.32)	(2.55)	(3.18)
ΔEquity	**0.467**	**0.461**	**0.451**	**0.462**	**0.457**
	(9.03)	(7.53)	(7.27)	(7.52)	(8.69)
ΔDebt	**0.626**	**0.611**	**0.611**	**0.611**	**0.627**
	(8.77)	(5.95)	(5.96)	(5.94)	(8.38)
cosiamihud		**-0.031**			
		(-2.26)			
*cosiamihud * Prec*		-0.003			
		(-1.16)			
cosiamivest			**0.065**		
			(3.66)		
*cosiamivest * Prec*			**0.011**		
			(2.62)		
cosigibbs				**0.026**	
				(2.05)	
*cosigibbs * Prec*				**0.006**	
				(2.13)	
cosicontraction					**0.017**
					(2.11)
*cosicontraction * Prec*					**0.004**
					(2.23)
R-square	0.69	0.69	0.69	0.69	0.69

Effect of precautionary motives on external financing, with special control for conventional determinants of capital structure decisions. Dependent variable is *External* which is the ratio of overall security (equity and debt) to lagged total assets. *Cash flow* is the ratio of sum of net income plus depreciation and amortization to lagged total assets. *MB* is the log of the firm's market value of equity ot its book equity. *Book leverage* is the ratio of total debt to total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Asset* is the log of total assets. Δ*Equity* is the book equity at end of the year minus book equity at the beginning of the year. Δ*Debt* is total debt (short and long term) at the end of the year minus total debt at the beginning of the year. *PREC* takes the first component of R&D, cash flow volatility, and dividend. *cosiamihud* is the cost of security issues based on Amihud illiquidity measure. *cosiamivest* is the cost of security issue based on Amivest illiquidity measure. *cosigibbs* is the cost of security issues based on Hasbrouck (2004) illiquidity measure. *cosicontraction* is the cost of security issues based on NBER business cycle. The interaction terms measure the effect of both precautionary motives and cost of security issuance on cash holdings. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above is reported in bold.

If access to debt capital is limited by the debt capacity of the firm, issue of equity will be preferred over precautionary cash holdings (Chaderina, 2013). Hence, we cannot conclude that the low cost of security issue increases external financing except that low cost of equity issue or high cost of debt issue is related to an increase in equity issuance. Therefore, we demonstrate that firms that need financing for precautionary motive are likely to retain cash raised from external financing, which supports Hypothesis 4.1.

4.5.6. Debt Repayment and External Financing

We investigate the relationship between debt repayment and equity issue in this sub-section. This aims to answer the second research question *"do firms issue equity to repay debt?"* and to examine *Hypothesis 4.2: Debt level is inversely related to net equity issue.* Data analysis is conducted with the use of *Equation (4.6),* which also includes firm effect and/or year effect. We report empirical results in Table 4.10. Column (1) shows the coefficients without controlling for net change in book equity and book debt, as well as firm effect and year effect. The results in column (2) include the net change in book equity and net change in book debt. Column (3) and column (4) report results from modelling with the net change in book equity and book debt, and either firm effect or year effect. The last column displays results with the net change in book equity and book debt, as well as firm effect and year effect.

We observe significantly negative signs for equity, debt, and operational cash flow after controlling for the net change in book equity and book debt. This means that firms use equity, debt, and operational cash flow to repay debt. Operational cash flow has a greater effect on paying down debt compared to debt and equity as shown in the value of the coefficients (i.e., -0.034 relative to -0.029 and -0.006). This means that firms mostly use operational cash flow to repay debt, followed by debt issues and equity issues. This may be because internal cash flow is cheaper than external capital, and debt issue is cheaper than equity issue in terms of asymmetric information cost (Myers and Majluf, 1984). Moreover, Jensen (1986) explains that the use of internally generated cash flow involves less severe agency problems than security capital.

The coefficient of net change in book equity is negative, and the coefficient of net change in book debt is positive, meaning that net equity issuance decreases the debt level of the firm, and net debt issuance increases debt level. We interpret this finding from the following aspects. At first, firms issuing new equity over debt to repay debt are driven by amortized expenses and costly default costs associated with debt issues over the post-issue period (Chaderina, 2013). Second, Leone et al. (2007) and Autore et al. (2009) argue that firms using equity proceeds to repay debt as a means of recapitalization could accumulate reputation and signal to the financial market that they have the potential to make value-adding investment projects. Third, debt repayment could efficiently reduce the financial constraints associated with high debt levels (Fee et al., 2013). Fourth, debt covenants usually contain restrictions on firms' discretion in the use of proceeds for debt repayment that firms may have to pay a large fee in default (Nini et al., 2009).

Table 4.10 Debt Repayment and Equity Issues

	(1)	(2)	(3)	(4)	(5)
Equity	**-0.029**	**-0.035**	**-0.006**	**-0.015**	**-0.006**
	(-6.32)	(-4.20)	(-2.07)	(-3.94)	(-2.01)
Debt	**0.017**	**-0.038**	**-0.030**	**-0.009**	**-0.029**
	(7.60)	(-3.92)	(-6.51)	(-2.99)	(-6.45)
Cash flow	**-0.110**	**-0.119**	**-0.034**	**-0.033**	**-0.034**
	(-6.61)	(-5.50)	(-6.66)	(-7.98)	(-6.63)
Other	**0.041**	**0.039**	0.000	**-0.008**	0.001
	(2.96)	(2.90)	(0.35)	(-4.09)	(0.80)
Asset	**-0.003**	**-0.004**	**-0.002**	**-0.004**	0.000
	(-8.97)	(-8.97)	(-5.92)	(-22.27)	(0.21)
ΔEquity		0.004	**-0.009**	**-0.011**	**-0.010**
		(0.58)	(-3.40)	(-3.49)	(-3.56)
ΔDebt		**0.088**	**0.047**	**0.045**	**0.046**
		(7.33)	(6.14)	(7.65)	(5.99)
Firm-effect			Yes		Yes
Year-effect				Yes	Yes
R-square	0.06	0.09	0.06	0.07	0.06

Results from panel regressions with firm effect and year effect on the relationship between debt repayment and equity issues. Dependent variable is debt repayment which is the ratio of current debt to total assets. *Equity* is the ratio of equity issuance to lagged total assets. *Debt* is the ratio of long-term debt issuance to lagged total assets. *Cash flow* is the ratio of sum of net income plus depreciation and amortization to lagged total assets. *Other* is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to lagged total assets. Δ*Equity* is the book equity at end of the year minus book equity at the beginning of the year. Δ*Debt* is total debt (short and long term) at the end of the year minus total debt at the beginning of the year. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above is reported in bold.

Table 4.11 shows the regression results according to *Equation (4.7)* with control for conventional firm characteristics, firm effect and/or year effect. We adopt this model to answer the second research question and to test *Hypothesis 4.2.* This table reports that equity issuance and cash flow are negatively related to a firm's debt level for all regressions. This means that firms use both operational cash flow and equity issuances to repay debt. A negative coefficient on net equity issue also consistently explains the use of equity proceeds for debt repayment. Consistent with interpretations for Table 4.10, our results can be interpreted by the view that excessive costs associated with debt issue (Chaderina, 2013), a signal of positive NPV projects (Autore et al., 2009), and restrictions contained in credit agreements (Nini et al., 2009; Fee et al., 2013) determine firms' choice to use equity issues instead of debt issues for debt repayment.

Firm-level characteristics including market-to-book ratio, book leverage, and assets are significant for all five regressions. A negative relationship between market-to-book ratio and the level of debt indicates that firms with more growth opportunities are likely to have low levels of debt as financial distress associated with high debt level restricts investments on profitable projects (Autore et al., 2009). Conversely, low debt level reduces the likelihood of foregoing favourable investments. This is also consistent with the view that repaying debt reveals profitable investments (Autore et al., 2009). The positive book leverage ratio expresses that the higher the debt level of the firm, the more debt there is to repay. This indicates the need for firms to repay debt as high levels of debt are associated with a greater likelihood of financial constraints (Fee et al., 2013). Additionally, debt repayment is inversely related to firm size. According to Rajan and Zingales (1995) and Huang and Ritter (2009), given that large firms are more mature, more transparent, and have better reputations in the financial market, they can attract more investments from the market and experience relatively cheaper transaction costs so that they are able to repay debt more efficiently with external capital. Therefore, we accept *Hypothesis 4.2 debt level is inversely related to net equity issuance*. Our answer to the second research question "*Do firms issue equity to repay debt?*" is evident.

Table 4.11 Debt Repayment, Equity Issues, and Conventional Capital Structure Determinants

	(1)	(2)	(3)	(4)	(5)
Equity	**-0.015**	**-0.008**	**-0.007**	**-0.009**	**-0.006**
	(-9.82)	(-1.17)	(-2.27)	(-2.90)	(-2.18)
Cash flow	**-0.035**	**-0.048**	**-0.029**	**-0.024**	**-0.028**
	(-6.73)	(-6.22)	(-6.38)	(-7.65)	(-6.34)
MB (t-1)	**-0.002**	**-0.002**	**-0.002**	**-0.004**	**-0.002**
	(-3.83)	(-2.67)	(-3.49)	(-9.76)	(-4.68)
Book leverage (t-1)	**0.136**	**0.206**	**0.165**	**0.209**	**0.163**
	(38.47)	(32.45)	(34.82)	(82.06)	(34.31)
Tangibility (t-1)	**0.009**	**-0.053**	0.005	**-0.047**	0.005
	(2.53)	(-10.29)	(1.50)	(-29.30)	(1.39)
Asset (t-1)	**-0.004**	**-0.007**	**-0.004**	**-0.008**	**-0.003**
	(-7.93)	(-20.61)	(-10.64)	(-46.86)	(-6.23)
ΔEquity		**-0.035**	**-0.011**	**-0.013**	**-0.011**
		(-7.85)	(-4.07)	(-4.11)	(-4.09)
ΔDebt		**0.074**	**0.044**	**0.041**	**0.044**
		(9.69)	(7.58)	(8.93)	(7.51)
Firm-effect			Yes		Yes
Year-effect				Yes	Yes
R-square	0.61	0.24	0.62	0.22	0.62

Coefficients on the effect of equity issues on debt repayment, with an addition of control for conventional determinants of capital structure decisions. Dependent variable is debt repayment which is the ratio of current debt to total assets. *Equity* is the ratio of equity issuance to total assets. *Cash flow* is the ratio of sum of net income plus depreciation and amortisation to lagged total assets. *MB* is the log of the firm's market value of equity to its book equity. *Book leverage* is the ratio of total debt to total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Asset* is the log of total assets. Δ*Equity* is the book equity at end of the year minus book equity at the beginning of the year. Δ*Debt* is total debt (short and long term) at the end of the year minus total debt at the beginning of the year. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above are reported in bold.

4.5.7. Debt Repayment, Equity Issues, and Cost of Equity Issue

This sub-section analyses the use of equity issues for repaying debt, controlling for the cost of equity issues. We intend to examine research question B and the second hypothesis. Given that the cost of equity issues affects the choice of new equity issues for debt repayment, we include the cost of equity issues and an interaction term between cost of equity issues and equity issues in the framework as shown in *Equation (4.8)*. The results reported in Table 4.12 show that equity issue, debt issue, and operational cash flow are significantly related to debt repayment, which are consistent with the results reported in Table 4.10. The results suggest that firms use equity issues, debt issues, and operational cash flow to repay debt, which can be interpreted by the view that operational cash flow is the cheapest to fund, and debt is preferred to equity due to adverse selection costs (Myers and Majluf, 1984). Interaction terms for proxies of cost of equity issues (i.e., *amihud*, *gibbs*, and *contraction*) are negatively related to debt repayment. While the interaction period for the other proxy of cost of equity issue (*amivest*) has a positive relationship with the dependent variable as high *amihud* and *gibbs* mean low cost of equity issuance, and low *amivest* means low cost of equity issuance. The corresponding interaction coefficients for cost of equity issuance interpret that firms are likely to issue equity at low cost of equity issuance to repay debt. This finding can be consistently explained by the view that recapitalization by issuing cheap equity to repay debt could reduce the likelihood of overvaluation (Autore et al., 2009). The benefit of cheap equity issuance costs could also offset related adverse selection costs (McLean, 2011). The lower cost of equity issuance could not only satisfy debt repayment but also motivate cash holdings for future investment projects and income shortfall (Bates et al., 2009; McLean, 2011).[107] Consistent with Dittmar and Dittmar (2008), issuing equity at low costs occurs in good economic times. This is mainly because good economic times see low cost of equity.[108] The above findings support the statement of Hypothesis 4.2 "*Debt level is inversely related to net equity issue*" and respond positively to research question B "*Do firms issue equity to repay debt?*"

[107] Analysis of debt repayment and cash holdings are discussed in sub-section 4.6.10.
[108] The low cost is associated with more profitable investment opportunities and less financial friction.

Consistent with earlier analysis of cash holdings that includes control variables on firm characteristics, we include conventional determinants of capital structure in the analysis of the equity issue role on debt repayment. The regression results modelled in *Equation (4.9)* are reported in Table 4.13. Consistent with the results shown in Table 4.11 and 4.12, the proceeds from equity issuances and operational cash flow are used to repay debt. At the firm level, book leverage and tangibility are significantly related to debt repayment for all five regressions. This also reflects that given the influence of equity issuance cost, book leverage and tangibility are much more important than market-to-book ratio and assets.

One explanation is that firms concerned with debt repayment are likely to have high leverage (Fee et al., 2013). High leverage is associated with a high possibility of financial constraints, which involves expensive default costs and may restrict both current and future investment projects (Bates et al., 2009; Chaderina, 2013). Another explanation is that over-debt may be the result of agency problems that hinder managers' discipline to fulfil financial commitments. Positive ratios of fixed assets reflect the firm's strong ability to borrow debt. This could explain why there exists debt to be paid down for the firm. Negative coefficients for interaction terms of proxies of cost of equity issues (i.e., *amihud*, *gibbs*, and *contraction*) and a positive coefficient sign for the interaction period of the other proxy (i.e., *amivest*) show statistical meanings. In short, it means that low cost of equity issuance during good times increases the possibility of equity issue for repaying debt. This is consistent with the view that issuing equity at low cost reduces the likelihood of overvaluation and reveals value-adding investment projects (Autore et al., 2009). Therefore, we also find evidence to support Hypothesis 4.2 and favourably answer the second research question.

Table 4.12 Debt Repayment, Equity Issues, and Cost of Equity Issues

	(1)	(2)	(3)	(4)	(5)
Equity	**-0.014**	**-0.009**	**-0.020**	**-0.006**	**-0.014**
	(-10.39)	(-6.33)	(-5.74)	(-3.34)	(-9.69)
Debt	**-0.003**	**-0.003**	**-0.003**	**-0.003**	**-0.003**
	(-2.65)	(-2.15)	(-2.41)	(-1.96)	(-2.35)
Cash flow	**-0.039**	**-0.029**	**-0.030**	**-0.030**	**-0.041**
	(-7.07)	(-4.84)	(-4.75)	(-4.83)	(-6.75)
Other	**0.003**	-0.001	-0.001	0.000	**0.003**
	(1.86)	(0.51)	(-0.71)	(-0.08)	(1.87)
Asset	**0.001**	**0.007**	**0.008**	**0.005**	**0.001**
	(2.52)	(9.66)	(10.11)	(7.08)	(2.40)
amihud		**0.014**			
		(19.42)			
*Equity * amihud*		**-0.005**			
		(-2.45)			
amivest			**-0.007**		
			(-17.44)		
*Equity * amivest*			**0.002**		
			(4.45)		
gibbs				**0.824**	
				(15.67)	
*Equity * gibbs*				**-0.378**	
				(-3.07)	
contraction					**0.003**
					(2.22)
*Equity * contraction*					**-0.007**
					(-2.38)
R-square	0.58	0.59	0.59	0.59	0.59

Role of equity issues on debt repayment with control for cost of equity issues. Dependent variable is the debt repayment which is the ratio of current debt to total assets. *Equity* is the ratio of equity issuance to lagged total assets. *Debt* is the ratio of long-term debt issuance to lagged total assets. *Cash flow* is the ratio of sum of net income plus depreciation and amortisation to lagged total assets. *Other* is the ratio of the sum of sale of PPE, sale of investment, and other sources of fund to lagged total assets. Δ*Equity* is the book equity at end of the year minus book equity at the beginning of the year. Δ*Debt* is total debt (short and long term) at the end of the year minus total debt at the beginning of the year. *amihud* is the proxy of cost of equity issues measured by Amihud illiquidity proxy. *Amivest* is the proxy of cost of equity issues measured by Amivest illiquidity proxy. Gibbs is the proxy of cost of equity issues measured by Hasbrouck (2004) illiquidity proxy. Contraction the proxy of cost of equity issues based on NBER business cycle. The interaction terms measure the effect of both equity issuance and cost of equity issuance on debt repayment. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above is reported in bold.

Table 4.13 Debt Repayment, Equity Issues, Cost of Equity Issues, and Conventional Capital Structure Determinants

	(1)	(2)	(3)	(4)	(5)
Equity	**-0.015**	**-0.009**	**-0.022**	**-0.006**	**-0.014**
	(-9.82)	(-5.93)	(-5.47)	(-3.34)	(-9.20)
Cash flow	**-0.035**	**-0.027**	**-0.028**	**-0.027**	**-0.037**
	(-6.73)	(-4.68)	(-4.58)	(-4.65)	(-6.44)
MB (t-1)	**-0.002**	**0.002**	0.000	0.000	**-0.002**
	(-3.83)	(2.33)	(0.67)	(0.14)	(-3.38)
Book leverage (t-1)	**0.136**	**0.118**	**0.122**	**0.121**	**0.136**
	(38.47)	(28.46)	(29.20)	(29.09)	(37.38)
Tangibility (t-1)	**0.009**	**0.010**	**0.011**	**0.010**	**0.009**
	(2.53)	(2.12)	(2.41)	(2.24)	(2.31)
Asset (t-1)	**-0.004**	0.000	-0.001	**-0.002**	**-0.005**
	(-7.93)	(-0.61)	(-0.87)	(-2.51)	(-8.03)
amihud		**0.011**			
		(14.32)			
*Equity * amihud*		**-0.006**			
		(-2.86)			
amivest			**-0.004**		
			(-9.47)		
*Equity * amivest*			**0.003**		
			(4.45)		
gibbs				**0.616**	
				(12.00)	
*Equity * gibbs*				**-0.415**	
				(-3.35)	
contraction					**0.002**
					(1.95)
*Equity * contraction*					**-0.007**
					(-2.64)
R-square	0.61	0.61	0.60	0.61	0.61

Relationship between equity issues and debt repayment with an inclusion of cost of equity issues and conventional capital structure determinants as control variables. Dependent variable is debt repayment which is the ratio of current debt to total assets. *Equity* is the ratio of equity issuance to total assets. *Cash flow* is the ratio of sum of net income plus depreciation and amortisation to lagged total assets. *MB* is the log of the firm's market value of equity to its book equity. *Book leverage* is the ratio of total debt to total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Asset* is the log of total assets. Δ*Equity* is the book equity at end of the year minus book equity at the beginning of the year. Δ*Debt* is total debt (short and long term) at the end of the year minus total debt at the beginning of the year. *Amihud* is the proxy of cost of equity issues measured by Amihud illiquidity proxy. *Amivest* is the proxy of cost of equity issues measured by Amivest illiquidity proxy. *Gibbs* is the proxy of cost of equity issues measured by Hasbrouck (2004) illiquidity proxy. *Contraction* is the proxy of cost of equity issues based on NBER business cycle. The interaction terms measure the effect of both equity issuance and cost of equity issuance concerns on debt repayment. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above is reported in bold.

4.5.8. Debt Repayment Dynamics

We aim to answer the second research question and to test the second hypothesis by conducting analysis based on *Equation (4.10)* for debt repayment dynamics in this sub-section. We also control conventional capital structure determinants in the model. The results of GMM estimators are reported in Table 4.14. Lagged debt repayment is significantly and positively related to debt repayment. This indicates that firms have a target level of debt to repay. Similar to that used in Al-Najjar and Belghitar (2011), the coefficient for adjustment to the target ratio is given by 1-β_1. High adjustment coefficients can result from significant costs derived from target debt level.

Table 4.14 Debt Repayment Dynamics and Equity Issues

	GMM-LEV		GMM-SYS	
	(1)	(2)	(3)	(4)
L.Debt repayment	**0.245**	**0.304**	**0.385**	**0.649**
	(18.81)	(39.08)	(16.95)	(58.13)
Equity	**-0.014**	**-0.010**	**-0.015**	**-0.018**
	(-7.51)	(-8.94)	(-4.59)	(-6.43)
Cash flow	**-0.034**	**-0.016**	**-0.021**	**-0.030**
	(-6.52)	(-8.60)	(-2.43)	(-5.58)
MB (t-1)	0.001	**0.003**	**-0.014**	**-0.002**
	(0.51)	(3.45)	(-4.43)	(-3.74)
Book leverage (t-1)	**0.089**	**0.021**	**0.116**	**0.051**
	(6.34)	(3.87)	(5.05)	(18.00)
Tangibility (t-1)	**0.051**	**0.033**	-0.009	**-0.008**
	(3.07)	(4.32)	(-0.49)	(-4.74)
Asset (t-1)	0.004	**0.007**	**-0.010**	**-0.002**
	(1.46)	(4.98)	(-3.83)	(-9.46)
Year dummies	Yes	Yes	Yes	Yes
AR(1)	-72.54	-85.07	-20.76	-22.95
	(0.00)	(0.00)	(0.00)	(0.00)
AR(2)	0.29	1.54	1.87	4.22
	(0.77)	(0.13)	(0.06)	(0.00)
Sargan test (p-values)	0.00	0.00	0.00	0.00
Firms	7,226	7,146	8,456	8,367
Obs	54,572	53,928	63,279	62,544

Dynamic behaviour of debt repayment, with equity issues and conventional capital structure determinants as control variables. Dependent variable is debt repayment which is the ratio of current debt to total assets. *L.Debt repayment* is the lagged debt repayment. *Equity* is the ratio of equity issuance to total assets. *Cash flow* is the ratio of sum of net income plus depreciation and amortization to lagged total assets. *MB* is the log of the firm's market value of equity to its book equity. *Book leverage* is the ratio of total debt to total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Asset* is the log of total assets. Columns (1) and (2) show the one-step Arellano-Bond (1991) difference GMM estimator and columns (3) and (4) display the two-step Arellano-Bond system GMM estimator. Columns (1) and (3) report the estimates where equity issues (*Equity*) is treated as endogenous and $Equity_{t-2}$ is used as instrument. Columns (2) and (4) report the estimates where all the explanatory variables are treated as endogenous and their respective second lag variables are used as instruments. Year and firm effects are controlled in our analysis. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above is reported in bold.

Significant and negative coefficients for equity issuance and cash flow mean that firms use equity issuance and operational cash flow to repay debt. This finding is consistent with that reported earlier in section 4.6.6: the more equity issued or cash flow generated, the more debt is repaid. Consistent with the findings in the previous sections, firms use more operational cash flow to repay debt relative to equity issuance as internal funds are cheaper than external capital which involves additional costs such as adverse selection cost and transaction cost (Myers and Majluf, 1984). Our findings are also consistent with other views that using equity capital for debt repayment signals positive NPV projects (Autore et al., 2009) and that debt covenants and credit agreements may contain restrictions on the use of proceeds such as debt repayment (Nini et al., 2009; Fee et al., 2013). Apart from book leverage, other firm-level factors show inconsistent signs between difference and system GMM estimator. This may be caused by variances between difference and system GMM on control for the correlation of errors over time, heteroscedasticity across firms, simultaneity, and measurement errors arising from the utilization of orthogonal conditions on the variance-covariance matrix, which has been discussed as controversial in the literature (e.g., Antoniou et al., 2008a; Greene, 2011). The significant and positive lagged book leverage adds further evidence that firms have a target leverage level and are likely to repay debt, which supports *Hypothesis 4.2: debt level is inversely related to net equity issue*.

4.5.9. Cash Holdings Dynamics

Similarly, this sub-section examines the dynamic behaviour of cash holdings with *Equation (4.11)*. We present the results in Table 4.15. A negative coefficient on lagged cash difference indicates that firms do not hold cash to a target level. In this case, the speed of adjustment is greater than 1. The high adjustment coefficient can be in relation to the significant costs incurred by firms that have deviated from adjusting their cash holdings. However, firms may stay off the target if the cost of adjustment to the target is higher than the cost of staying off the target. Our results are not consistent with Ozkan and Ozkan (2004) and Al-Najjar and Belghitar (2011), firms do not always adjust cash balance to achieve their target cash level quickly. The coefficients on external findings are significant and positive, while signs of cash flow are mixed and do not appear to be consistently significant. The positive role of precautionary motives on cash holdings could be interpreted as firms that hoard cash for precautionary motives are concerned about the risk of having to forego investment opportunities due to shortage of cash. Our results indicate that firms tend to increase cash holdings consistently from security issuance but do not use the proceeds generated from operational cash flow for cash holdings consistently, which support *Hypothesis 4.1: Firms that need financing for precautionary motive are likely to retain cash raised from external financing.* This is because firms may not persistently have sufficient internal funds retained as cash or may use internally generated cash flow for various purposes whenever necessary (Wyatt, 2014). The finding that firms persistently retain cash from external capital is consistent with the view that precautionary cash holdings could potentially minimize substantial costs related to foregoing positive NPV investment projects (Opler et al., 1999; Bates et al., 2009).

Book leverage and net change in book debt are both negatively related to cash difference in the analysis of the dynamic behaviour of cash holdings. This suggests that high book leverage decreases cash holdings, which is consistent with the finding of Al-Najjar and Belghitar (2011). As high leverage may require large amounts of cash to repay debt that firms may have to face in financial distress, firms are, accordingly, less capable of reserving cash from various sources (Fee et al., 2013). Moreover, trade-off theory explains that leverage can reveal the firm's ability to raise external capital and a highly leveraged firm does not need to hold cash (Al-Najjar and Belghitar, 2011). Opler et al. (1999) and Kim and Weisbach (2008) provide further explanation that debt might be used as a substitute for cash holdings. The positive sign on net change in book equity means that firms use new share issues for cash holdings, which is consistent with McLean (2011). This can be largely explained by precautionary motives that firms hold cash to hedge the risk of foregoing profitable investments and the risk of cash shortages (Han and Qiu, 2007; Bates et al., 2009). Therefore, our results support Hypothesis 4.1.

Table 4.15 Cash Holdings Dynamics and External Financing

	GMM-LEV		GMM-SYS	
	(1)	(2)	(3)	(4)
L.ΔCash	**-0.018**	**-0.051**	**-0.044**	**-0.059**
	(-4.41)	(-16.81)	(-4.10)	(-6.10)
External	**0.194**	**0.260**	**0.192**	**0.215**
	(17.36)	(70.43)	(1.94)	(7.09)
Cash flow	**-0.098**	**0.152**	**-0.384**	0.015
	(-4.02)	(26.12)	(-4.06)	(0.36)
MB (t-1)	**0.023**	**-0.010**	0.013	-0.006
	(3.24)	(-4.43)	(0.53)	(-1.46)
Book leverage (t-1)	**-0.319**	**-0.046**	**-0.752**	**-0.085**
	(-7.76)	(-3.46)	(-3.60)	(-7.78)
Tangibility (t-1)	**0.580**	**0.296**	**0.445**	0.000
	(11.83)	(14.47)	(3.98)	(0.07)
Asset	**-0.025**	0.004	**0.032**	**0.002**
	(-2.55)	(1.17)	(1.73)	(1.68)
PREC	**1.956**	**1.120**	0.001	**0.010**
	(26.10)	(40.75)	(0.01)	(4.41)
Δ*Equity*	**0.296**	**0.267**	**0.398**	**0.346**
	(26.57)	(70.97)	(2.66)	(6.85)
Δ*Debt*	**-0.305**	**-0.128**	**-0.279**	**-0.110**
	(-18.65)	(-26.47)	(-1.80)	(-2.46)
Year dummies	Yes	Yes	Yes	Yes
AR(1)	-74.00	-90.17	-9.36	-10.96
	(0.00)	(0.00)	(0.00)	(0.00)
AR(2)	-0.15	-3.51	-2.21	-2.43
	(0.88)	(0.00)	(0.03)	(0.02)
Sargan (p-values)	0.00	0.00	0.00	0.00
Firms	7,225	7,158	8,423	8,340
Obs	54,534	54,010	63,080	62,474

Dynamic behaviour of cash holdings, controlling for external financing and precautionary motives. Dependent variable is *ΔCash,* calculated by taking the difference between cash (t) and cash (t-1). *L.ΔCash* is the lagged *ΔCash. External* is the ratio of overall security (equity and debt) to lagged total assets. *Cash flow* is the ratio of sum of net income plus depreciation and amortization to lagged total assets. *Asset* is the log of total assets. Δ*Equity* is the book equity at end of the year minus book equity at the beginning of the year. Δ*Deb*t is total debt (short and long term) at the end of the year minus total debt at the beginning of the year. Columns (1) and (2) show the one-step Arellano-Bond (1991) difference GMM estimator and columns (3) and (4) display the two-step Arellano-Bond system GMM estimator. Columns (1) and (3) report the estimates where equity issues (*Equity*) is treated as endogenous and $Equity_{t-2}$ is used as instrument. Columns (2) and (4) report the estimates where all the explanatory variables are treated as endogenous and their respective second lag variables are used as instruments. Year and firm effects are controlled. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above are reported in bold.

4.5.10. Cash Holdings and Debt Repayment

Estimations on the relationship between cash holdings and debt repayment are conducted as part of *Equation (4.12)* and *Equation (4.13)*. This part is designed to examine whether there's simultaneous relationship between cash holdings and debt repayment. Through these examinations, we can have answers to the two main objectives of this chapter. The two objectives concern whether external financing is leading to an increase in cash holdings for precautionary motives or, alternatively, whether external financing is used to repay debt. Our empirical results are reported in Tables 4.16 and 4.17. Table 4.16, which show the dynamic behaviour of cash holdings, reports that cash holding is negatively related to debt repayment. Consistent with previous studies (e.g., Ozkan and Ozkan, 2004; Al-Najjar and Belghitar, 2011), firms have a target level of cash-to-asset ratio as shown in the value of adjustment coefficients that are greater than 0.5. Debt repayment has a negative effect on cash holdings, suggesting that firms repaying debt hold less cash from capital raised given that high leverage in the capital structure restricts managers' operation decisions as high debt levels drive managers to design operation strategies to meet their financial commitments (Jensen, 1986). The result is consistent with Leone et al. (2007) and Wyatt (2014) that firms use large amounts of raised capital to repay debt. According to Ferreira and Vilela (2004), high levels of leverage could be regarded as a firm's ability to raise external capital and, hence, firms require less cash hoardings. This implies that firms that have low leverage relating to less debt repayment are likely to a have lower ability to raise external capital, thus reserving more cash. Another plausible explanation is that cash is the "negative" of debt given that cash can be used to repay debt (Acharya et al., 2007). Moreover, low debt to repay could potentially increase value-adding investment projects to the firm (Autore et al., 2009). As a result, these projects could attract external capital so that the firm does not necessarily reserve much cash given that access to external markets is less costly. Additionally, the finding is also consistent with the view that repaying debt results in lower gearing and provides opportunities to raise external capital when funding is needed, thus reducing cash holdings for precautionary motives.

Therefore, the above findings indicate that firms using external capital for repaying debt are less likely to reserve cash for precautionary motives.

Table 4.16 Cash Holdings Dynamics and Debt Repayment

	Difference GMM		System GMM	
	(1)	(2)	(3)	(4)
L.ΔCash	**-0.028**	**-0.048**	**-0.030**	**-0.042**
	(-5.45)	(-10.45)	(-1.88)	(-2.48)
Debt repayment	**-0.426**	**-0.250**	**-0.273**	**-0.143**
	(-9.61)	(-7.55)	(-8.58)	(-10.24)
MB (t-1)	**0.098**	**0.058**	**0.073**	**0.051**
	(9.93)	(14.03)	(4.75)	(17.97)
Book leverage (t-1)	**0.104**	**0.092**	**0.178**	0.005
	(2.95)	(4.32)	(4.59)	(0.63)
Tangibility (t-1)	**0.642**	**0.278**	**0.198**	0.006
	(8.68)	(7.33)	(3.40)	(1.17)
Asset	**-0.115**	**-0.096**	**-0.029**	**-0.010**
	(-8.54)	(-13.93)	(-2.79)	(-11.29)
Year dummies	Yes	Yes	Yes	Yes
AR(1)	-82.32	-108.43	-9.36	-8.25
	(0.00)	(0.00)	(0.00)	(0.00)
AR(2)	-0.68	-0.68	-0.35	-0.16
	(0.50)	(0.50)	(0.73)	(0.87)
Sargan (p-values)	0.00	0.00	0.00	0.00
Firms	8,379	7,160	9,696	8,345
Obs	62,691	54,046	72,588	62,538

Dynamic behaviour of cash holdings with control for debt repayment. Dependent variable is *ΔCash,* calculated by taking the difference between cash (t) and cash (t-1). *L.ΔCash* is the lagged *ΔCash. Debt repayment* which is the ratio of current debt to total assets. *MB* is the log of the firm's market value of equity to its book equity. *Book leverage* is the ratio of total debt to total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Asset* is the log of total assets. Columns (1) and (2) show the one-step Arellano-Bond (1991) difference GMM estimator and columns (3) and (4) display the two-step Arellano-Bond system GMM estimator. Columns (1) and (3) report the estimates where equity issues (*Equity*) is treated as endogenous and $Equity_{t-2}$ is used as instrument. Columns (2) and (4) report the estimates where all the explanatory variables are treated as endogenous and their respective second lag variables are used as instruments. Year and firm effects are controlled. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above are reported in bold.

Table 4.16 also shows that market-to-book ratio positively affects firms' cash holdings, while assets negatively affect firms' cash holdings. This means that firms with growth opportunities and small firms tend to hold cash. This can be explained by precautionary cash holdings theory that firms hold cash from the three channels of cash sources (i.e., external financing, operational cash flow, and other sources) to invest in profitable opportunities and to hedge cash flow volatility, which are often related to small firms as their ability to raise external capital is weaker (Bates et al., 2009; McLean, 2011). High growth firms are likely to face severe agency problems incurring excessive costs, thus holding cash to mitigate the likelihood of being restricted by expensive external capital (Ozkan and Ozkan, 2004). High-growth firms are likely to experience financial distress (the threat) caused by increasing investment opportunities, hence they hold cash for the purpose of minimizing costs associated with financial distress (Ferreira and Vilela, 2004).

Table 4.17 shows the results from dynamic behaviour of debt repayment with control for cash holdings. The positive sign for lagged debt repayment is statistically meaningful. This expresses that firms have a target debt level that managers may need to repay or issue new debt. The adjustment coefficient which is given by 1-β_1 is greater than 0.5, suggesting that managers adjust the capital structure of the firm quickly. This may incur relevant costs derived from the optimal ratio, as well as costs resulting from foregoing profitable investment projects or experiencing cash flow uncertainty that could have been reduced by precautionary cash holdings. Cash holdings have an adverse effect on debt level. This means that firms holding cash have less debt to repay in the current year meaning that firms holding cash for precautionary motives may have lowered gearing through issuing equity given that equity issues contribute largely to precautionary cash holdings, thus leading to less need to repay debt.

One explanation is that firms holding cash could mitigate information and contracting frictions associated with high deadweight costs on external financing and are able to hedge on-going debt liability, thus experiencing less pressure on current liability (Acharya et al., 2007). Another explanation is that firms may use retaining cash derived from target cash levels to repay debt (Ozkan and Ozkan, 2004). Another plausible explanation is that cash holdings can be used as a substitute for debt (Opler et al., 1999). Therefore, it is evident that firms that increase precautionary cash holdings are less likely to use equity issues to repay debt.

Table 4.17 Debt Repayment Dynamics and Cash Holdings

	GMM-LEV		**GMM-SYS**	
	(1)	(2)	(3)	(4)
L.Debt repayment	**0.246**	**-0.175**	**0.374**	**0.586**
	(18.72)	(-31.21)	(17.19)	(46.93)
ΔCash	**-0.008**	**-0.029**	**-0.009**	**-0.128**
	(-4.36)	(-11.39)	(-4.15)	(-9.45)
MB (t-1)	0.002	**0.009**	**-0.016**	**0.001**
	(1.10)	(10.77)	(-5.73)	(1.97)
Book leverage (t-1)	**0.074**	**-0.017**	**0.134**	**0.069**
	(4.97)	(-3.35)	(6.40)	(21.26)
Tangibility (t-1)	**0.058**	**0.093**	-0.021	**-0.139**
	(4.13)	(12.78)	(-1.29)	(-7.62)
Asset	0.002	**0.026**	**-0.009**	**-0.004**
	(0.81)	(18.86)	(-4.01)	(-16.86)
Year dummies	Yes	Yes	Yes	Yes
AR(1)	-71.51	-47.83	-20.84	-21.56
	(0.00)	(0.00)	(0.00)	(0.00)
AR(2)	0.07	-24.42	1.79	3.50
	(0.94)	(0.00)	(0.07)	(0.00)
Sargan (p-values)	0.00	0.00	0.00	0.00
Firms	7,226	7,160	8,456	8,375
Obs	52,572	54,046	63,279	62,687

Dynamic behaviour of debt repayment with control for cash holdings. Dependent variable is *Debt repayment* which is the ratio of current debt to total assets. *L. Debt repayment* is lagged debt repayment. *ΔCash* is calculated by taking the difference between cash (t) and cash (t-1). *MB* is the log of the firm's market value of equity to its book equity. *Book leverage* is the ratio of total debt to total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Asset* is the log of total assets. Columns (1) and (2) show the one-step Arellano-Bond (1991) difference GMM estimator and columns (3) and (4) display the two-step Arellano-Bond system GMM estimator. Columns (1) and (3) report the estimates where equity issues (*Equity*) is treated as endogenous and $Equity_{t-2}$ is used as instrument. Columns (2) and (4) report the estimates where all the explanatory variables are treated as endogenous and their respective second lag variables are used as instruments. Year and firm effects are also controlled. Standard errors are robust to heteroscedasticity and clustered. t-Statistics are reported in parentheses. Significance at 10% or above are reported in bold.

4.6. Conclusion

This chapter investigated whether firms use external finance to raise their cash balance or firms issue equity to repay debt. Our sample covers a period of 41 years, 1971, the first year with available cash holdings data on Compustat, to 2011.

Findings

The findings on external financing and cash holdings are summarized as follows. Firms raise the majority of their capital from external financing, followed by operational cash flow and other sources. Firms hoard 27% of external capital as cash on average, and 16.9% of operational cash flow and 4.1% of other sources respectively. The results show that cash holdings financed by external capital among US firms are persistently increasing over time, which is not the case with operational cash flow and other sources. Consistent with the findings of McLean (2011), firms are likely to retain more cash from equity issue relative to debt issue. We find that precautionary motives drive the external financing of the firm. This is reflected in all major proxies of precautionary motives: R&D spending, cash flow volatility, and dividend payments, as well as an index which takes the first components of major proxies of precautionary motives. Specifically, cash retained from external financing is an increasing function of growth opportunities and uncertainty of cash flow, and a decreasing function of dividend payment. Moreover, firms are likely to issue equity for precautionary cash holdings when cost of equity issue is low. Our results positively answer the first research question: *Is precautionary cash holding dependent on external financing?* We have no evidence to reject *Hypothesis 4.1: Firms that need financing for precautionary motives are likely to retain cash from external financing*.

With respect to the relationship between equity issuances and debt repayment, we summarize the findings below. We find that equity issue decreases the debt level of the firm. This suggests that firms use the cash proceeds raised from equity issues to repay debt. High levered firms and small firms are more likely to issue equity for debt repayment. Our results show that firms are more likely to issue equity at low cost of equity issue to repay debt. Equity issuers tend to issue large amounts of equity at low issue cost to repay debt. Firms bearing high levels of leverage are likely to use equity capital for debt repayment. This suggests that firms have a target debt-equity ratio. Equity issuers are likely to use the cash raised from equity issue to repay debt for the purpose of adjusting gearing to an optimal level. Our results are favourable to answer the second research question: *Do firms issue equity to repay debt?* We also accept *Hypothesis 4.2: Debt level is inversely related to net equity issue*.

Furthermore, we also examined the relationship between the two alternatives (i.e., cash holdings and debt repayment). Our results show that cash holding is a decreasing function of debt repayment. This suggests that firms repaying debt with cash raised from equity issues are less likely to retain cash. The explanation may be that high gearing may restrict managers' operation decisions and future access to capital markets. Similarly, we also find that cash holding plays an adverse role on the debt level. This suggests that firms retaining cash raised from external financing are less likely to use issue proceeds to repay debt as cash holding (i.e., precautionary) has reflected the firm's ability to repay debt when there are cash shortfalls. We conclude that firms that reserve precautionary cash are less likely to issue equity for repaying debt, and that firms repaying debt are less likely to reserve cash for precautionary motives.

Contributions

The contributions of this empirical chapter are in three aspects. First, this chapter adds novel evidence to the cash holdings and cash sources literature by demonstrating that firms persistently increase precautionary cash retained from external capital. The distinction of our study is that firms retain cash raised from external financing regardless of its form (i.e., equity or debt). This chapter adds understanding of an increasing importance of external capital, as the largest cash contributor, on precautionary cash holdings.

Second, this chapter sheds light on the use of equity capital to repay debt. Unlike prior studies, we emphasized equity issues regardless of form. This part contributes to the knowledge by suggesting an alternative to precautionary cash holdings in terms of use of issue proceeds. Our study adds understanding of the relevance of using equity issue to repay debt on adjustment towards a target leverage ratio.

Finally, this chapter contributes to the literature by examining precautionary cash holdings and debt repayment as alternative uses of issue proceeds, which has not been investigated by others. Direct comparisons with prior studies were conducted in this chapter. This chapter adds novel evidence to the literature on the simultaneity between cash holdings and debt repayment. Specifically, the addition to knowledge is that firms retaining precautionary cash are less likely to repay debt with external capital and that firms repaying debt are less likely to retain precautionary cash raised from external financing. Our study adds understanding of the role of both precautionary cash holdings and debt repayment on a target leverage ratio.

Implications

This chapter emphasized the importance of external capital including both debt and equity on precautionary cash holdings, illustrating to managers why the majority of cash is retained from security issuances relative to operation cash flow and other sources. We suggest managers of the firm increase equity issue when cost of equity issue is low for precautionary cash holdings. Given the dynamics of financial markets (i.e., financial friction), our results highly suggest managers reserve precautionary cash holdings. We also suggest managers of the firm increase precautionary cash holdings for all possible future use given that money shortages in the future are devastating to positive NPV investments. Additionally, we suggest managers issue equity for other purposes such as debt repayment as this creates opportunities to firms for external capital. Debt repayment is a proper way to achieve the target debt-equity ratio of the firm.

From the perspective of investors, we suggest investors increase investment in firms with increasing precautionary cash holdings as our results indicate that these firms are likely to have sufficient cash for all corporate activities that may relate to investors' interests. In other words, the precautionary cash holdings of the firm through external financing signal prospective value-adding returns to investors. We also suggest investors pay attention to firms' actions on repaying debt. The results of our study indicate that a lower leverage results in more opportunities to raise external capital, which could somehow offset the need for precautionary cash holdings and secure profitable investment opportunities.

Future Research

We hope to investigate the relationship between external financing and the value of cash in order to add managers' understanding of precautionary cash holdings. Alternatively, firm performance of precautionary cash holdings retained from new security issues is also interesting. Another extension of this empirical chapter is to examine extent to which firms issue (or do not issue) debt or repay debt. Additionally, alternative proxies of precautionary motives, market conditions, and macroeconomic conditions could be examined for additional robustness.

CHAPTER FIVE

CONCLUSION

5 Conclusion

This thesis has presented an analysis of three interesting topics in external financing. The following issues have been examined respectively in individual empirical chapters: a) whether the choice of security to issue is dependent on the level of information asymmetry and whether the market reaction to the announcement of security issue is affected by the level of information asymmetry; b) what determines the choice of debt between public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt?; c) whether cash holdings of firms concerning precautionary motives is dependent on external financing or, alternatively, whether debt is repaid with new equity issues.

The first chapter introduced the importance of external financing and the motivations of this thesis. We presented the research objectives for each of the three empirical chapters. The research findings and research contributions are well presented. We also discussed the general implications of this thesis and practical implications of our research for managers and investors.

The first empirical chapter (chapter 2) examines the effect of information asymmetry between managers and investors on firms' external financing decisions, and the market reaction to issue announcements. This chapter specifies information asymmetry between managers and investors. We conclude our findings on the following four aspects.

Firstly, when financing is needed, firms with high levels of information asymmetry between managers and investors are likely to use internal cash flow relative to external capital, which is consistent with the prediction in the first-order of pecking order theory (i.e., internal funds followed by external capital). We also find that firms that prefer internal to external funds are also characterized by higher profitability, lower tangibility, and lower credit quality.

Secondly, when external financing is needed, firms with high levels of information asymmetry between managers and investors are likely to issue equity relative to debt for the full sample in the data, which violates the prediction on the second-order of pecking order theory (i.e., debt followed by equity). However, we find that the probability of issuing debt relative to equity is positively related to the level of information asymmetry for the sub-samples of smaller firms (sub-sample 1, sub-sample 2, and sub-sample 3), which is supportive to pecking order theory. We also find that information asymmetry has the strongest positive effect on the choice of debt issue relative to equity issue for the smallest firms (sub-sample 1) compared to larger firms (sub-sample 2 and sub-sample 3). Information asymmetry seems to have no significant influence on the choice of security to issue for the sub-sample of the largest firms. Additionally, we find that firms with a preference of debt to equity are characterized by older age, higher cash need, more investment opportunities, and experiencing a price drop prior to announcement.

Thirdly, we find that the share price of equity issuers increases after announcement of equity issue. However, we find that the level of information asymmetry has no significant explanatory power on the firm performance after issue announcement of security in the multivariate analysis. The results violate the implication of pecking order theory (i.e., share price drops after announcement of equity given information asymmetry). This can be explained by the stock volatility of the firm, which is found to be in positive relation to cumulative abnormal returns after announcement of equity issue in our analysis. Additionally, we find that an increase in share price of the firm after equity issue announcement is negatively related to profitability.

Finally, in the long term, equity issuers experience stock depreciation after the completion of equity issue. The share price of the firm decreases similarly for one year after the completion of equity issue and for five years after the completion of equity issue. We find that there is only a weak difference in price drop between small equity issuers and large equity issuers for one year after the completion of equity issue and for five years after the completion of equity issue. Moreover, our results show that the level of information asymmetry does not significantly influence the share price of the firm in one or five years after completion of equity issue. However, we find that the share price of the firm is inversely affected by stock volatility of the firm in one year after completion of equity issue.

In the second empirical chapter (Chapter 3), we examine the effect of four major factors (credit quality, information asymmetry, market conditions, and macroeconomic conditions) on the choice of debt sources (i.e., public debt, syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt). In particular, we distinguish syndicated loans with bilateral loans under the category of bank loans. We examine all the comparisons between the five debt sources and examine one of the five debt categories with all other more general debt categories that it does not belong to. We conclude our findings on four aspects in terms of the four major factors.

First, consistent with the literature (e.g., Denis and Mihov, 2003; Arena, 2011), credit quality remains a decisive factor in determining the debt financing of the firm. This refreshes existing understanding of the role of credit rating in corporate financial decisions with an updated sample period covering the most recent global financial crisis. We find that firms with credit ratings tend to issue public bonds against any category of private debt borrowings (i.e., syndicated loans, bilateral loans, 144A private debt, and traditional non-bank private debt), and wherein private debt sources they prefer 144A private debt and syndicated loans to non-bank traditional debt placements and bilateral loans for the full sample. Given investment grade ratings, public debt and non-bank traditional private debt are preferred to 144A private debt, syndicated loans, and bilateral loans for the full sample.

Second, having found information asymmetry as an important determinant of external financing in Chapter 2, we consistently find in this chapter that information asymmetry significantly affects the choice of debt sources. We find that firms with low levels of information asymmetry are likely to issue public bonds first, non-bank private debt second and, lastly, bank loans for the full sample. Information asymmetry affects the probability of 144A private debt over traditional non-bank private debt for the full and the three sub-samples. However, information asymmetry does not seem to influence the choice between syndicated loans and bilateral loans.

Third, we find that the choice of syndicated loans relative to bilateral loans is a decreasing function of market conditions for the full sample and sub-sample of high GDP growth years. The probability of issuing 144A private debt against traditional non-bank private debt is negatively determined by market conditions for the full and sub-sample of low GDP growth years. We also find that market conditions have negative relations to the choice of bank loans relative to non-bank private debt and to the choice of private debt relative to public debt for the full sample.

Fourth, with the effect of macroeconomic conditions, public debt is the first choice, 144A private debt follows, and syndicated loans is the last choice. With the upturn of economic conditions, traditional private debt comes first and public debt is followed by 144A private debt. Bilateral loans are preferred to 144A private debt in years of medium GDP growth, and switches position in years of high GDP growth. Over periods of low GDP growth, macroeconomic conditions positively drive the choice of debt sources in the following pecking order: syndicated loans, 144A private debt, and public bonds. Short term variations in the state of economy do not reflect short termism in the companies that need debt capital. However, short term variations in the state of economy may cause short termism in the relevant companies. Over weak aggregate economy when the market is not liquid, costs of borrowing are higher and probability of financial distress increases. Hence, firms prefer to borrow from lenders who provide efficiency in renegotiation and liquidation. Similarly, when the market is not liquid due to weak aggregate economy, costs of lending increase and probability of have debt in default increases. Hence, lenders prefer to share such costs and risk with counterparts.

In Chapter 4, we examined whether external financing is attributable to precautionary cash holdings and whether firms use equity issue to repay debt. First, we find that firms hoarded more than a quarter of external capital as cash on average in the past four decades, which is far more than operational cash flow and other sources. We conclude that firms that need cash reserves for precautionary motives are likely to raise external capital. We emphasize precautionary motives in this empirical chapter and we find that precautionary motives, the three proxies (volatility of cash flow, R&D spending, dividend payment) as well as the index which takes the first component of the three proxies, drive choice of issuing security. Specifically, firms experiencing volatile cash flow, firms concerned with growth opportunities and non-dividend payers are likely to rely on external financing for precautionary cash holdings. The cost of equity issue has a negative influence on precautionary cash holdings. We also find that an increase in cash holdings is affected by its realization of past cash holdings.

Secondly, the second aspect of this empirical chapter summarizes that firms use equity issue to repay debt and the debt level of the firm is negatively related to equity issue. Our results show that equity issuers tend to issue large amounts of equity at low issuance cost to repay debt. We find that the debt level of the firm is increased by new debt issues and debt to be repaid increases with debt financing, too. Highly levered firms are more likely to use equity capital to repay debt. This reflects that firms may have a target debt-equity ratio that they need to balance. In addition, we find that firms repaying debt are less likely to retain new cash from cash sources, and firms that increase cash holdings are less likely to use new cash to repay debt. We find that firms have a target level of cash holdings and this can be primarily explained by the view of precautionary motives.

Research Implications

In general, this thesis provides some general implications as follows.

For managers, our results regarding determinants and sequences of the choice of security to issue, and the use of proceeds provide a novel insight on stories around external financing. Our results help managers understand the crucial factors on external financing and make the correct choice of security to issue. In particular, managers should be aware of the important role of influencing factors on the choice of security to issue diagnosed by analysts and avoid issue choices that destroy firm value. This facilitates the maintenance of a harmonious agency relationship that could maximize shareholder interests. On the other hand, cash holdings could protect the firm's ability to grow and innovate and allow managers to out-invest competition with counterparts to a large extent.

For investors, having knowledge of determinants and sequences of firms' external financing policy and possible use of cash proceeds helps identify potential investments. They are suggested to be wary of corporate financial disclosure for value and risk of firm assets, and reputation in the market. Different market reactions to the firm's security issue announcements are useful for investors to revise the need for short-term or long-term returns. Investors should be aware that returns from lending or investing in a selected firm are a combined function of firm-, market-, and economic effects. In addition, for investors, cash holdings are like a security blanket that could ensure sufficient dividend yield such that they are suggested to invest in firms with high cash-to-assets ratios.

Specifically, we present the practical implication of this thesis on aspects related to the three empirical chapters.

Our study on information asymmetry as an important determinant of external financing, in Chapter 2, implies that the decisions of the manager to issue security signals important firm information to the market. Managers should be aware of valuable investment opportunities, the potential risk of assets communicated to the public via security issue announcements and the market responding to these announcements. With regard to external financing decisions, managers are suggested to take into account a comprehensive assessment of firm characteristics, market drivers, and macroeconomic influences. Distinctions between short-term and long-term firm performance after issue announcement imply that it is necessary for managers working on maximization of shareholder value to clarify interest pursuers into short-term and long-term groups. From the perspective of investors, those who prefer abnormal return (either short-term or long-term) should consider other factors such as agency conflict, cost of equity issuance, or (inter)temporary variance of information asymmetry other than intrinsic information asymmetry in the observation. Comprehensive analysis of the long-term firm performance is based on various time-varying shocks from all around. Relevant analyst reports may be a reference for investment decisions.

The findings of the second empirical chapter imply that managers should be aware of bilateral bank loans as an important alternative among various debt sources including syndicated loans, 144A private debt, public bonds, and traditional private debt placement. Managers' debt financing decisions are also dependent on the availability of debt supplies and financing design is tailored by financing strategies. Given the vital role credit quality plays on debt financing, managers are suggested to work on upgrading their credit rating so that firms are able to benefit from large capital needs and cheaper costs. This study also indicates that a change in the external financial environment results in a change in friction when accessing credit markets. For investors (creditors), Chapter 3 provides suggestions on investment. This piece of work extends investors' understanding of what matters in a firm's choice of debt, thus optimizing the portfolio of the investor. Investors are suggested to assess borrowers in terms of credit quality, information asymmetry, market factors, and macroeconomic conditions. We suggest investors lend to firms with higher credit quality and lower levels of information asymmetry debt with a medium and long maturity and large volume so that investors can enjoy long-term favourable returns, and lend to firms with low credit quality and higher levels of information asymmetry debt with short maturity and small volume. Creditors can mitigate debt in default by syndicating with counterparts or well-designing the maturity structure. Additionally, we also suggest investors emphasize the existing creditor-borrower relationship which contributes largely to future returns.

The findings of Chapter 4 have implications for managers of the firm as we report that external financing is the primary source compared to alternative sources (cash flow and other sources) contributing to firms' precautionary cash holdings and firms' use of equity issuance to repay debt. We suggest managers emphasize raising external capital for cash holdings but be aware of the hazards of retaining cash from debt issues although, for firms encountering limited access to external capital retaining cash from internal funds, it is necessarily important for precautionary thoughts. The high cost of debt could result in future financial distress for the firm. As a result, managers are suggested to pay attention to the debt level of the firm because high gearing incurs large amounts of debt to be repaid and uses of cash for other purposes will be reduced. For managers, special concerns about existing shareholders' interest behind new equity issue may also be raised as new equity issue dilutes current share value. However, they should be aware that cash holdings for precautionary motives could mitigate existing shareholders' worries.

Moreover, the findings of Chapter 4 also have implications for investors. From the perspective of debt creditors, they should be aware that the debt repayment of the borrower is also attributable to the ability to raise equity capital as our results also indicate that firms use equity issuance to repay debt. Creditors are suggested to approach firms that have sufficient precautionary cash holdings because repaying debt is an important alternative to precautionary cash holdings on the use of externally raised capital. Creditors should also be aware that expensive costs associated with the debt issue of the firm dramatically reduce one's need of debt capital. From the perspective of equity holders, they should be aware that equity issue contributes largely to the precautionary cash holdings of the borrower because precautionary cash holdings may boost the firm's value due to favourable investment opportunities being unlikely to be foregone. Those equity investors who look for long-term benefit may like to invest in firms with increasing precautionary cash holdings. Equity investors are suggested to invest in firms that repay debt with capital raised from the issue of equity as these firms are likely to have sufficient buffer for potential cash shortfalls or have access to external markets.

Limitations and Future Research

As part of future research, seeking solutions for the limitations of this thesis could be meaningful.

The first limitation of this thesis is availability of obtaining debt announcement date data for the analysis of firm performance after security announcement, which could provide a comparable analysis with existing findings regarding the announcement of equity issues. Future research could focus on post-issue performance of debt announcements.

Another limitation includes other proxies of information asymmetry, credit quality, market conditions, macroeconomic conditions, precautionary motives, and cost of security issue, which could be used for additional robustness. Future research could be conducted by examining alternative measures of the above mentioned variables for robustness.

The second part of future research is to extend empirical studies of this thesis on alternative sources of corporate financial decisions and relevant uses. For the topic of the first empirical chapter, on the one hand, information asymmetry between managers and investors will be possibly extended to information asymmetry among external investors. We would like to examine the effect of such information asymmetry on external financing, as well as firm performance after issue announcement. On the other hand, similar to the logic of the first empirical chapter, future research will also be focused on other aspects of pecking order theory or specific aspects of an alternative stand-alone capital structure such as trade-off theory and market time theory on external financing.

As to the extension of the second empirical chapter, we hope to investigate the market reactions to financing choice among selected debt sources. As a comparable study, examination of financing choice among equity sources particularly shares and private investment in public equity (PIPE) is possibly to be conducted. Future studies could also focus on the effect of the four major factors on maturity structure of debt, the debt performance of marginal decisions, or debt choice with international data.

With respect to the third empirical chapter, we would like to explore the relationship between external financing and the value of cash in order to add managers' understanding of precautionary cash holdings. Alternatively, firm performance of precautionary cash holdings retained from new security issues is also interesting. Another extension of this empirical chapter is to examine extent to which firms issue (or do not issue) debt or repay debt.

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Appendix

Appendix A1 (Chapter 2)

Variable Definitions

Variables	Definitions
Information asymmetry (IA)	
1) Number of analysts	*1)* The number of analysts that make annual earnings forecasts any month over a 12-month period prior to the announcement of issue.
2) Firm Size	*2)* Market capitalization: the number of shares outstanding multiplied by the closing stock price at the end of the fiscal year
∗ *Market capitalization*	
∗ *Assets*	Assets: book value of assets.
∗ *Sales*	Sales: book value of sales
∗ *Age*	Age: number of years since first observation in Compustat
3) Tobin's Q	*3)* The sum of market value of equity and book value of debts divided by book value of assets
4) Number of shareholders	*4)* Common shareholders
5) R&D expense to asset ratio	*5)* Ratio of R&D expense to total assets, R&D expenses are set to 0 if missing
6) Net purchase ratio	*6)* The number of shares purchases minus shares sold by insiders in the last six months before the issuance month divided by the number of shares purchased and sold during the same period.
Firm Size	
1) Market capitalization	1) The number of shares outstanding multiplied by the closing stock price at the end of the fiscal year.
2) Assets	2) Book value of assets.
3) Sales	3) Book value of sales
4) Age	4) Number of years since first observation in Compustat
Profitability	Ratio of operating profit to total assets
Nature of assets	
1) Tangibility	1) Ratio of net plants, property and equipment to total assets
2) R&D expense to asset ratio	2) Ratio of R&D expense to total assets
Growth	
1) Market-to-book ratio (MB)	1) Ratio of market assets (total assets + market value of equity - book value of equity) to total assets
2) Capital expenditure to asset ratio	2) Ratio of capital expenditure to total assets

Appendix A1 (Chapter 2)

Variable Definitions

Variables	**Definitions**
Probability of bankrupt	
1) Z-score	1) (3.3×pre-tax income + sales + 1.4×retained earnings + 1.2×(current assets - current liabilities))/total assets
2) Financing deficit	2) The sum of dividends paid, capital expenditures, change in net working capital, current portion of long-term debt at start of period less operating cash flows after interest and taxes, or the sum of dividends paid, investment, change in net working capital less operating cash flows after interest and taxes.
Leverage decisions	
1) Book leverage	1) Ratio of total debt (debt in current liabilities + long-term debt) to total assets
2) Market leverage	2) Ratio of total debt (debt in current liabilities + long-term debt) to market value of assets (total assets + market value of equity - book value of equity)
Stock volatility	Stand deviation of monthly stock returns over the previous 12 months
Tax	
1) Net operating loss carry forward	1) Ratio of net operating loss carry forward to total assets
2) Effective tax rate	2) Ratio of total tax to total taxable income
Debt market condition	
1) Term structure of interest rates	1) Annualized difference between the yields on long-term government bonds and three-month Treasury bills, with one period lag, and matched with fiscal year-end.
Industry conditions	
1) Deviation from target leverage	1) The deviation of a firm's book/market leverage minus its target leverage; target leverage is the median of total debt to book assets or market value of assets by SIC code and by year. Industry is defined at the four-digit SIC code level.
2) Median industry leverage	2) Median value of total debt to book value of assets or market value of assets by SIC code and by year. Industry is defined at the four-digit SIC code
Supply-side condition	
1) Debt rating	1) Dummy variable, taking one if the firm has a debt rating assigned by Standard & Poor's, and zero

Appendix A1 (Chapter 2)

Variable Definitions	
Variables	**Definitions**
	otherwise.
Share price performance	Annual change in the share price. On average, a lag of six months is expected to cover the time required for decision making, preparing documents raising debt or equity capital from the market, seek approval from the stock exchanges, the issue to be subscribed by the investors, and the effect to appear in the annual books of accounts. Therefore, the change in share price is marched to the month of the firm's fiscal year-end with a six-month lag.

Appendix A2 (Chapter 2)
Calculations of Principal Variables from Compustat/CRSP data items

Variables	**Database item**
Size of net debt issued	[DLTIS (item 111) – DLTR (item 114)] / AT[t-1] (item 6)
Size of net equity issued	[SSTK (item 108) – PRSTKC (item 115)] / AT[t-1] (item 6)
Profitability	OIBDP (item 13) / AT [t-1] (item 6)
Tangibility	PPENT (item 8) / AT [t-1] (item 6)
Book leverage	[DLC (item 34) + DLTT (item 9)] / AT (item 6)
Z-score	[3.3 * OIBDP (item 13) + SALE (item 12) + 1.4 * RE (item 36) + 1.2 * (ACT (item 4) – LCT
Market capitalization	PRCC (item 199) * CSHO (item 25)
Market-to-book ratio	[AT(item 6) + PRCC (item 199) * CSHO (item 25) –SEQ (item 216)] / AT (item 6)
Net operating loss carry	TLCF (item 52) / AT (item 6)
Age	The number of years since the first date of Compustat data
Dividend ratio	DV (item 127) / AT (item 6)
Debt rating dummy	It takes 1 if debt ratings (item 280, 320) are assigned by S&P, and 0 otherwise
Share price performance	PRCC (item 199) - PRCC[t-1] (item 199)
Market leverage	[DLC (item 34) + DLTT (item 9)] / [AT(item 6) + PRCC (item 199) * CSHO (item 25) –SEQ

Appendix B (Chapter 3)

Variable Definitions

Variables	Definition	Sources
Debt characteristics		
1) Principal	The amount of capital a firm has raised from the issue: Facility/tranches amount.	SDC/DealScan
2) Years to final maturity	The number of years to final maturity of debt issues: Maturity data in DealScan has been converted from "months" into "years".	SDC/DealScan
3) Yield to maturity	Yield spread to maturity of public debt and 144A private debt.	SDC/DealScan
4) Investment grade rating	A dummy variable equals 1 if the firm has an existing debt rating of BBB or higher, 0 otherwise prior to issue date for issue choice study.	Compustat/SDC
5) Not rated	A dummy variable equals 1 if the firm has debt rating, 0 otherwise prior to issue date for issue choice study.	Compustat/SDC
Firm Size		
1) Market capitalization	The number of shares outstanding (item 25 CSHO) multiplied by the closing stock price (item 199 PRCC) at the end of the fiscal year prior to issue date for issue choice study.	Compustat
2) Assets	Book value of assets (item 6 AT) prior to issue date for issue choice study.	Compustat
3) Sales	Book value of net sales (item 12 SALE) prior to issue date for issue choice study.	Compustat
Age	Number of years since first observation in Compustat (CBEGDT) to issue date for issue choice study.	Compustat
Profitability	Ratio of EBITDA (*item 18 IB+ item 15 XINT+ item 16 TXT + item 14 DP*) to lagged total assets (*item 6 AT*) prior to issue date for issue choice study. Ratio of operating income before depreciation (*item 13 OIBDP*) to total assets (*item 6 AT*) prior to issue date for issue choice study.	Compustat
Tangibility	Ratio of net plants, property and equipment (*item 8 PPENT*) to total assets (*item 6 AT*) prior to issue date for issue choice study.	Compustat
Growth		
1) Market-to-book ratio (MB)	Ratio of market assets (total assets (*item 6 AT*) + market value of equity (item 25 CSHO* item 199 PRCC) - book value of equity (*item 216 SEQ*)) to total assets (*item 6 AT*) prior to issue date for issue choice study.	Compustat

Appendix B (Chapter 3)

Variable Definitions

Variables	Definition	Sources
2) *Capital structure to asset ratio*	Ratio of capital structure (*item 128 CAPX*) to sales (*item 12 SALE*) prior to issue date for issue choice study.	Compustat
Probability of bankrupt		
1) *Altman's Z-score*	(3.3×earnings before interests and tax (*item 18 IB+ item 15 XINT+ item 16 TXT*) + sales (*item 12 SALE*) + 1.4×retained earnings (*item 36 RE*) + 1.2×(current assets (*item 4 ACT*) - current liabilities(*item 5 LCT*)))/total assets (*item 6 AT*) prior to issue date for issue choice study.	Compustat
2) *Altman's Z-score<1.81*	A dummy variable equals 1 if Altman's Z-score is less than 1.81, otherwise 0	Compustat
3) *Financing deficit*	The sum of dividends paid (*item 127 DV*), investment (*item 113 IVCH– item109 SIV+ item 128 CAPX–item107 SPPE+item129 AQC-item310 IVACO*), change in net working capital (*item 274 CHECH -item 302 RECCH–item 303 INVCH –item 304 APALCH – item 305 TXACH –item 307 AOLOCH –item 301 DLCCH-item 312 FIAO*) less operating cash flows after interest and taxes (*item123 IBC+ item 125 DPC + item 124 XIDOC+ item 126 TXDC+ item 106 ESUBC+ item 213 SPPIV+ item 217 FOPO+ item 314EXRE*) prior to issue date for issue choice study.	Compustat
Leverage decisions		
1) *Book leverage*	Ratio of total debt (debt in current liabilities (*item 34 DLC*) + long-term debt (*item 9 DLTT*)) to total assets (*item 6 AT*) prior to issue date for issue choice study.	Compustat
2) *Market leverage*	Ratio of total debt (debt in current liabilities (*item 34 DLC*) + long-term debt (*item 9 DLTT*)) to market value of assets (total assets (item 6 AT) + market value of equity (*item 25 CSHO * item 199 PRCC*) - book value of equity (*item 216 SEQ*)) prior to issue date for issue choice study.	Compustat
Cash flow volatility	The standard deviation of annual operating income before depreciation (*item 13 OIBDP*) over the past five years, it requires at least three consecutive observations	Compustat
Tax		
1) *Net operating loss carry forward*	Ratio of net operating loss carry forward (*item 52 TLCF*) to total assets (*item 6 AT*) prior to issue date for issue choice study.	Compustat

Appendix B (Chapter 3)

Variable Definitions

Variables	Definition	Sources
2) *Depreciation to assets ratio*	Ratio of depreciation expense (*item 125 DPC*) to total assets (*item 6 AT*) prior to issue date for issue choice study.	Compustat
3) *Effective tax rate*	Ratio of total tax (*item 16 TXT*) to total taxable income (*item 170 PI*) prior to issue date for issue choice study.	Compustat
Market/industry condition		
1) *Term structure of interest rates*	Annualized difference between the yields on long-term government bonds and three-month Treasury bills, with one period lag, and matched with fiscal year-end prior to issue date for issue choice study. The difference between the ten-year interest series and the one-year interest series prior to issue date for issue choice study.	FederalReserve
2) *Deviation from target leverage*	The deviation of a firm's book/market leverage minus its target leverage; target leverage is the median of total debt to book assets or market value of assets by SIC code and by year prior to issue date for issue choice study. Industry is defined at the four-digit SIC code level (*item 324 SICH*).	Compustat
3) *Median industry leverage*	Median value of total debt to book value of assets (*item 6 AT*) or market value of assets (total assets (item 6 AT) + market value of equity (*item 25 CSHO * item 199 PRCC*) - book value of equity (*item 216 SEQ*)) by SIC code and by year prior to issue date for issue choice study. Industry is defined at the four-digit SIC code	Compustat
Macroeconomic conditions		
1) *GDP growth*	Annual GDP growth rate.	WorldBank
2) *Recession dummy*	It takes 1 if there is more than one month in a year designated as recession (March 2001 – November 2001; December 2007 – June 2009) by the NBER, i.e., 2001, 2008, 2009 will be assigned a value of one.	NBER

Appendix C (Chapter 3)

Credit Rating Conversions

S&P ratings	Moody's ratings	Conversional number
AAA	Aaa	22
AA+	Aa1	21
AA	Aa2	20
AA-	Aa3	19
A+	A1	18
A	A2	17
A-	A3	16
BBB+	Baa1	15
BBB	Baa2	14
BBB-	Baa3	13
BB+	Ba1	12
BB	Ba2	11
BB-	Ba3	10
B+	B1	9
B	B2	8
B-	B3	7
CCC+	Caa1	6
CCC	Caa2	5
CCC-	Caa3	4
CC	Ca	3
C	C	2
D	D	1

Appendix D (Chapter 4)

Variable Definitions

Variable	Definition
Cash	The ratio of cash and short-term investment (item 1 *CHE*) to total assets (item 6 *AT*).
Δ*Cash*	The difference between cash (t) and cash (t-n). Cash(t) is cash and short-term investment at the year-end of t and cash(t-n) at the beginning of year t-n.
Equity	The ratio of sale of common and preferred stock (item 108 *SSTK*) to lagged total assets (item 6 *AT*).
Debt	The ratio of sale of long-term debt issuance (item 111 *DLTIS*) to lagged total assets (item 6 *AT*)
External	The ratio of a sum of sale of common and preferred stock (item 108 *SSTK*) and sale of long-term debt issuance (item 111 *DLTIS*) to lagged total assets (item 6 *AT*)
Cash flow	The ratio of net income (item 172 *NI*) plus depreciation and amortization (item 14 *DP*) to lagged total assets (item 6 *AT*); net cash flow from operating activities (*item 308 OANCF*) which includes the effect of working capital is available from 1987.
Other	The ratio of the sum of (sale of property, plan, and equipment (item 107 *SPPE*) and sale of investments (item 109 *SIV*) + sources of funds-others (item 218 *FSRCO*)) to lagged total assets (item 6 *AT*). If an item of *SSPE*, *SIV*, or *FRSCO* is missing, we set the value as zero.
R&D	The ratio of research and development expense (item 46 *XRD*) to lagged total assets (item 6 *AT*)
Volatility	Log of average variance of industry (first two-digit of SIC) cash flow (item 172 *NI* plus item 14 *DP*) scaled by total assets (item 6 *AT*) over the past 10 years, with a minimum of 5 observations.
Dividend	Ratio of cash dividend (item 127 *DV*) to lagged total assets (item 6 *AT*)
PREC	The first principal component of *R&D*, *volatility*, and *dividend*.

ΔEquity	Book value of equity (item 60 *CEQ*) at the end of fiscal year minus book value of equity at the beginning of fiscal year.
ΔDebt	Total debt (current debt item 34 *DLC* plus long-term debt item 9 *DLTT*) at the end of fiscal year minus total debt at the beginning of fiscal year.
Debt repayment	The ratio of current debt to total assets.
Cost of equity issues	Three measures are collected from Joel Hasbrouck's Liquid Estimates: *Amuhid*, *Amivest*, and *Gibbs*. One macroeconomic variables *contraction:* takes one if six or more of the previous 12 months had declining economy, otherwise zero[109].
Cost of debt issues	The aggregate bond yield from the Barclays Capital Aggregate Bond Index (formerly, the Lehman Brothers Aggregate Bond Index).
Cost of security issues	The weighted average of a firm's cost of equity issues and cost of debt issues.
MB	Market-to-book represents growth opportunities, which takes the log of the ratio of the firm's market value of equity (item 25 *CSHO* * item 199 *PRCC*) to its book value of equity (item 60 *CEQ*)
Book leverage	Book leverage, the ratio of total debt (current debt item 34 *DLC* plus long-term debt item 9 *DLTT*) to total assets.
Tangibility	The ratio of PPE (item 8 *PPENT*) to total assets (item 6 *AT*).
Assets	The log of total assets (item 6 AT)

[109] Data is collected from http://www.nber.org/cycles/cyclesmain.html.