The Wealth Effects of Commercial Bank Securities Issuances Announcement

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Abstract

Banks are often excluded in corporate finance research mainly because of the regulatory concerns. Compares to non-bank firms, banks are heavily regulated due to its special economic role of money and the uncertainty. Heavy regulation on banks could reduce the information asymmetry between the managers and investor by limiting the behaviour of banks at the time of the Seasoned Equity Offering (SEO), and by increasing the incentive for banks to avoid excessive risk-taking. Therefore, the market may be less likely to assume that bank issued securities signal information that the bank is overvalued compared to their non-bank counterparts.

The objective of this thesis is therefore to examine commercial banks issued securities announcement effect. Three interrelated research questions are addressed in this thesis: 1) What is the difference in convertible bond announcement effect between banks and non-banks firm? 2) What is the difference in SEO announcement effect between banks and non-banks? 3) How do the stringency levels of bank regulation impact on the announcement effects of bank issued SEO?

By using the U.S. convertible bond and SEO data from 1982 to 2012, I find that the bank issued a convertible bond and SEO announcement experience higher cumulative abnormal return than non-bank. This is consistent with the view that bank regulation reveals positive information about banks. Since banks are heavily regulated, the market is less likely to assume that the issuance of the convertible bond and SEO by banks signals information that is overvalued. These results are robust after controlling for a number of firm-, issue-, and market-specific characteristics. These results are robust by considering the different categories of non-bank industries by undertaking tests in relation to the differences in the CARS upon convertible bond/ SEO across industries, as well as the unbalanced sample between banks and non-banks by using the matched sample analysis. However, the relation between the stringency level of bank regulation and bank issued securities announcement effect may be nonlinear. As hypothesised, I find that bank regulation has an inverted U-shaped relation with the announcement effect of bank SEO by using the SEO data across 21 countries from 2001 to 2012. Under a less bank regulation environment, the market reacts more positively to the bank SEO announcement for an increase in the level of bank regulation. However, the bank SEO announcement effects become more negative if the bank regulation becomes too stringent. This inverted U-shaped relationship is robust after I use the exogenous cross-country, cross-year variation in the timing of the Basel II adoption as the instrument to assess the causal impact of bank regulation on SEO announcement effects.

However, the stringency of regulation does not have a significant impact on the announcement effects of involuntary bank equity issuance.

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List of acronyms

BHC	Bank Holding Company
BRSS	Bank Regulation and Supervision Survey
CAR	Cumulative Abnormal Return
CRSP	Centre for Research in Security Prices
DJNS	Dow Jones News Service
FDIC	Federal Deposit Insurance Corporation
GDP	Gross Domestic Product
GFC	Global Financial Crisis
KKZ	Kaufmann-Kraay-Zoibo-Lobaton Indicators
OLS	Ordinary Least Squares
SDC	Securities Data Company
SEO	Seasoned Equity Offering
SIC	Standard Industrial Classification
S&P	Standard & Poor's
TBTF	Too-Big-To-Fail

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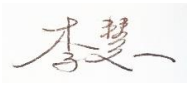
Author's Declaration

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

Signature



Hui Li

Chapter 1 Thesis introduction, background and contribution

1.1 Research background

Companies and financial institutions that attract new capital have several options. The most common sources are external equity and straight debt. Seasoned equity offerings (SEOs) are sales of stock after the initial publis offering. They are a means to raise funds through the sale of stock rather than the issuance of additiona debt. Before the late 1990s, the U.S. equity market was dominated by fully marketed SEOs. From 1982 to 2012, SEO issuance volumn amounted to $577.55 billion in the U.S., and $47.50 billion was issued by banks. [1] However, there is also a third category that is used by a large number of companies, convertible debt. A convertible bond is a type of bond that the holder can convert into a specified number of shares of common stock in the issuing company or cash of equal value. Convertible bonds possess characteristics of both equity and debt: they resemble debt because they pay a fixed coupon interest. They also resemble equity, because part of the price that is paid for them is for the option to exchange the bonds into shares. From 1982 to 2012, convertible bond issuance volume amounted to $286.93 billion in the U.S., and among these $32.11 billion was issued by banks.[2] Duca, Dutordoir, Veld, and Verwijmeren (2010) find that convertible debt issuance comprised approximately ten percent of total securities issuance by U.S. corporations over the last 30 years. According to the *Financial Times* of March 10, 2011 convertible bonds are particularly popular in the current (post financial crisis) financial climate. There are also contingent convertible bonds, which became popular in 2014 to help banks meet Basel III capital requirements. These bonds are slightly different to regular convertible bonds in that the likelihood of the bonds converting to equity is "contingent" on a specified event, such as the stock price of the company exceeding a particular level for a certain period of time. They were the perfect product for undercapitalized banks in markets across the globe, since they come with an embedded option that allows banks to meet capital requirements and limit capital distributions at the same time. Previous research on the convertible bond and seasoned equity offerings find that the announcement effects are generally negative (Dann and Mikkelson, 1984; Mikkelson and Partch, 1986; Lewis et al., 1999, Abhyankar and Dunning, 1999, Burlacu, 2000, Dutordoir and Van de Gucht, 2007, Ammann et al., 2006. Duca et al., 2012). The negative announcement effect generally can be explained by theories from three aspects, information

[1] Source: own calculations, based on data from the Securities Data Company's Global New Issues database.
[2] Source: own calculations, based on data from the Securities Data Company's Global New Issues database.

effects hypothesis (Myers and Majluf, 1984), price pressure hypothesis (Scholes, 1972), and capital structure hypothesis (Modigliani and Miller, 1963).

According to Myers and Majluf's (1984) adverse selection model on security issuance, which is based on asymmetric information between managers and investors, investors will demand a discount on the security price when firms issue risky securities (including convertible bond), because they assume that managers may overvalue the firm and try to maximise the wealth of their existing shareholders by trying to sell overpriced equity. Scholes's (1972) price pressure hypothesis suggests that the demand curve for a firm's shares is downward-sloping and that an increased supply of shares decreases their price. Therefore, issuing new equity induces a decline in a firm's stock price. The capital structure hypothesis suggests that, with the tax benefits of debt, firms that issue equity may reduce their stock price because it reduces firm's debt ratio (Modigliani and Miller, 1963).

Empirical evidence suggests that issuing equity induces a large decrease in abnormal return, which is between -2.5 to -4.5 percent (Mikkelson and Partch, 1986; Asquith and Mullins, 1986) while issuing straight debt only induce slightly negative or non-zero announcement effect (Dann and Mikkelson, 1984 and Eckbo, 1986).

However relevant studies on bank-issued securities are very limited (Wansley and Dhillon, 1989; Polonchek et al., 1989). The Global Financial Crisis has highlighted the importance of adequate bank regulation and supervision. The passage of Dodd-Frank Wall Street Reform and Consumer Protection Act in the United States in 2010 triggered an extensive debate on the effect of tighter bank regulation. Whereas regulators perceive a strengthened bank regulation can promote a more resilient banking sector, practitioners, and others cast doubt that the cost of financial regulation may outweigh the benefits (Furlong and Kwan, 2000). Dutordoir et al. (2014, p.12) suggest that it would be interesting to examine whether the financial firms' choice for convertible securities is merely driven by regulatory concerns since these financial firms are often excluded from convertible bond research samples, as is common in corporate finance research. This study focuses on listed commercial banks because banks are often excluded in corporate finance research because of the regulatory concerns. To my best knowledge, Janjigian (1987) and De Jong et al. (2012) are the only other two studies that report the share price reactions on convertible bond offerings in firms within alternative industries, including banks. However, neither study

focuses on commercial banks nor they provide any explanation of the difference between banks and non-banks

Previous research suggests that, on average, the new equity offerings announced by banks is associated with a less negative market reaction than that announced by non-bank firms[3]. Wansley and Dhillon (1989) and Polonchek et. al. (1989) both find the average announcement effect of bank equity offerings support the regulation hypothesis that stringent bank regulation mitigates the information asymmetry problem and reduces the magnitude of the negative announcement effect associated with bank issued common stock. However, these two studies only compare the difference between equity announcement effect of bank and non-bank firms by looking at the summary statistics, but not considering any differences of the characteristics between banks and non-banks. The relatively small sample of Polonchek et al. (1989) also suggests that their findings are not conclusive. For example, there are merely 41 equity event announcements in Polonchek et al. (1989), and the researchers themselves admit that "the sample sizes involved in this study are necessarily small" (p.449). Moreover, both studies' findings are based solely on the comparison of the mean values of the cumulated abnormal return (CAR) over the SEO announcement window and ignore the differences in other characteristics between banks and non-banks. These characteristics are important in determining the differences in CARs between banks and non-banks if any.

1.2 Research questions

Since prior study on security announcement effect only focuses on non-bank firms and excludes banks because they face a different regulatory environment, the objective of this thesis is thus to examine the difference of security (equity and convertible bond) announcement effects between banks[4] and its counterpart non-bank firms. The first research question is what is the difference in convertible bond announcement effect between banks and non-banks firm? The second question is what is the difference in Seasoned Equity Offering (SEO) announcement effect between banks and non-banks? Chapter 3 aims to address the first research question by examining convertible bonds, while the second chapter aims to address the second question by examining SEOs.

[3] Non-bank firms are industrial firms, which do not include non-bank financial institutions.
[4] I use commercial bank, bank, bank holding company interchangeably across the whole thesis.

In the third research question, I further study how the stringency level of bank regulation impact on the stock price reaction of bank issued SEO. Chapter 5 addresses the third research question, which explores the consequences of this ambiguous relation between bank equity value and borrowing cost.

1.3 Hypotheses

The difference between bank and non-bank firms can be documented by three theories. Bank regulation hypothesis, different role of bank capital, and the too-big-to-fail (TBTF) hypothesis. First, Keeley (1989) argues that bank regulation policy reduces the information content that otherwise would be revealed by a security issuance (in general negative), and consequently stock announcement effects might be smaller in absolute value for bank SEOs than those of non-banks. The regulation also limits the freedom and flexibility of bank managers to set the quantity of capital, to choose the type of capital, and to time security offerings to take advantage of differential information between the managers and the public. Booth et al (2002) find that regulations (of banks and utility firms) reduce the impact of managerial decisions on shareholder wealth, and hence help to address the agency conflicts. This means bank SEO is less likely to be assumed as overvalued by the market and has less information asymmetry problem between managers and investors than a non-bank SEO (Polonchek et al., 1989).

Second, Polonchek et al. (1989) suggest that, unlike non-banks, banks are monitored by both the market and a regulator, and bank capital structure decisions are constrained by regulation. Regulators impose minimum capital ratios and restrictions on the types of securities that qualify for inclusion in these ratios. The capital requirement forces nks to have more of their own capital at risk and may thus have less incentive to invest in high return but with the high-risk level project (Hellmann et al., 2001). Furlong and Keeley (1989) analyses the theoretical relationships between capital regulation and bank asset risk. They find that a higher bank capital ratio does not lead value-maximising banks to increase asset risk. On the contrary, more stringent capital requirements reduce the gains to a bank from increasing the risk of its asset portfolio. Koehn and Santomero (1980) and Kim and Santomero (1988) also argue that the bank cannot diversify its risk completely because it is owned and managed by the same agent. The capital requirement restricts the bank's risk-return frontier and forces it

to reduce leverage and to reconfigure the composition of its portfolio of risky assets. With less bank asset risk under capital regulation, investors are more inclined to build up the confidence of bank SEO than a non-bank SEO.

Finally, banks are perceived to benefit from the government's implicit too-big-to-fail (TBTF) policy. According to the TBTF theory, banks may receive a capital injection when in distress or bailouts by the government when deemed "too-big-to-fail" (TBTF) (O'Hara and Shaw, 1990; Acharya and Yorulmazer, 2007; Brown and Dinc, 2011), which increases investors' confidence and demand less discount on the security issued by banks. In principle, the government can always close a failing bank as soon as the bank becomes insolvent. In practice, the number of options available to regulators for handling the bank insolvency problem decreases with the severity of the problem (Hoggarth et al., 2004; Barth et al., 2006). Investors may hence require fewer discounts to the SEOs by banks than non-banks given the perception of TBTF.

Hence, I have the following hypotheses, which are tested in chapters 3 and 4 respectively:

H1: The announcement effect of convertible bond issuance is less negative for commercial banks than non-banks.

H2: The announcement effect of SEOs is less negative for commercial banks than non-banks.

The aftermath of the Global Financial Crisis (GFC) has led to an increased interest in bank regulation. There are two opposing views in the discussion on whether bank regulation needs to become more stringent. The first view is that limited liability and flat deposit insurance premiums lead to moral hazard in the form of excessive risk-taking behavior by banks due to higher bailout expectations.[5] According to this view, prudential capital regulation forces banks to hold more capital at risk and hence reduces this moral hazard by internalizing the inefficiency of gambling (*capital at risk effect*). The alternative view, proposed by Hellman, Murdock, and Stiglitz (2000), argues that bank profits are reduced under capital regulation.[6] These reduced profits imply lower franchise values, which in turn lower incentives for making good loans, thereby increasing the moral hazard problem (*franchise value effect*). Both theoretical and empirical evidence on the relationship between

[5] See, for example, Gorton and Huang (2004) and Dam and Koetter (2012).
[6] The reduction in profits is partly caused by increased competition, as argued by Hellman et al. (2000). It may also be caused by banks' "underinvesting" in loans with positive net present values (Stanton, 1998).

bank regulation and moral hazard as well as its consequence on bank risk-taking behavior are ambiguous.[7]

Banks with opaque assets have private information unknown to outside investors and regulators (Haggard and Howe, 2012; Jones et al., 2012). Capital regulation and other types of regulation that directly monitor bank behavior, such as activity restrictions, entry barriers, and depositor protection, may induce truthful revelation by banks (Baron and Besanko, 1984). This revelation of private information by banks has a potentially important implication for the announcement effects of SEOs because, in general, the market perceives that SEO announcements signal firm overvaluation (Myers and Majluf, 1984). However, on one hand, under a mild bank regulation environment, the market perceives that more regulation helps reduce moral hazard and risk-taking by banks. Hence, the market will react more positively to an SEO announcement by a bank compared to a less regulated market. On the other hand, if bank regulation becomes too stringent and increases beyond a certain level, investors may be concerned that the too stringent regulation reduces the franchise value of the bank and hence induces more risk-taking. Given the increased moral hazard problem, the market may react more negatively to the bank SEO announcement in more regulated markets.

The previous literature has also highlighted that stringent bank regulation can have ambiguous effects on bank performance and risk taking and that it, therefore, may not be optimal for all banks. Blum (1999) suggests that over-regulation has two effects on banks. First, it lowers bank profits, and the banks have less to lose in the event of a bankruptcy. Therefore, banks are likely to increase risks. Second, under a binding regulation environment, equity is more valuable to the bank. However, because equity issuance is expensive or even impossible for some banks, the only way for a bank to increase equity is to increase risk today. Using a comprehensive database on bank regulation and supervision across 107 countries, Barth et al., (2004) find a negative relationship between various regulation and supervision measures, bank development, performance, and stability. Their findings raise a red flag with regard to extensive bank regulation and supervisory practices that involve direct government oversight of and restrictions on banks. These findings are consistent with the "tollbooth hypothesis" of Djankov et al., (2002), which states that regulation is pursued the benefit of politicians and bureaucrats. In addition, the cross-country differences in banking

[7] See, for example, Furlong and Keeley (1989), Flannery (1989), Repullo and Suarez (2004), and Boot and Marinc (2006) for conflicting arguments on the relationship between capital requirements, bank monitoring, and risk taking incentives.

regulations encourage the flow of bank capital from highly regulated banking markets to those less regulated, a phenomenon also referred to as the "race to the bottom" (Barth et al., 2006; Houston et al., 2012). Hence, the existence of regulation differences across countries may limit the banks in more highly regulated banking markets to explore their economic opportunities. This evidence is consistent with the notion that a stringent regulation only positively impacts bank performance if the benefits of higher standards exceed the costs, including both the direct compliance costs and the indirect negative costs due to increased risk taking or regulation arbitrage. Thus, if investors view the existing regulation to be too stringent and beyond the optimal level, thereby inducing a net moral hazard problem, then we expect the market reaction to the SEO announcement to be more pronounced for banks operating in these highly regulated countries than for those in less regulated countries. Therefore, I try to explore the difference in convertible bond and SEO announcement effect between banks and non-banks firm. Furthermore, I also try to explore the consequences of this ambiguous relationship on bank equity value and its borrowing cost. In particular, I aim to investigate whether and to what extent the market would react differently when banks in countries with different levels of bank regulation announce seasoned equity offerings (SEOs).

H3: there is an inverted U-shaped relation between the stringency of bank regulation and bank SEO announcement effects.

1.4 Research approach

U.S. convertible bond data are used in the first empirical analysis of the thesis (Chapter 3), which seeks to address the first research question. Cumulative Abnormal Return (CAR) is used to derive the dependent variable which measures the announcement effect associated with the convertible bond. I measure the announcement effect following a standard event study methodology. A selection of issue-, firm-, and market-specific variables are included in the analysis to control the differences in other characteristics between banks and non-banks. These characteristics are important in determining the differences in CARs between banks and nonbanks. The first research question is then addressed through a series of statistical tests and multivariate regression analysis. To test the robustness of the results, whether banks experience less negative announcement return in relation to individual industries across non-bank firms are also tested. The sample between banks and non-banks

are not balanced, which may cause bias in the results. Matching sample analysis is used to address the problem of the imbalanced sample between banks and non-banks.

Chapter 4 is seeking to address the second research question to explore the difference in SEO announcement effect between banks and non-banks. The sample of banks and non-banks SEO data in the U.S. are used in this chapter. The research methodology is the same as used in Chapter 3.

The third research question is then addressed through a series of statistical tests and multivariate regression analysis by using the SEO data across 21 countries. Four aspects or measures of bank regulation are included in the analysis, which are activity restrictions, initial capital stringency, depositor protection, and prompt corrective action. To test the overall relationship between the stringency level of bank regulation and the bank SEO announcement effect, I collapse these four regulation measures into a single measure of bank regulation: total regulation. I match the bank-level information with the bank regulation measures to explore the link between bank regulation and the wealth effects associated with bank-issued SEOs.

The endogeneity between bank regulation stringency and SEO announcement effects are also considered. There may be simultaneity existed in this test. For example, the observed inverted U-shaped relation between the bank regulation measures and the SEO announcement effects may be driven by some unknown factors that have an impact on both bank regulation and bank SEO announcement effects, which are not controlled in the regression model. Bank regulation tends to be strengthened from various aspects after the adoption of Basel II that varies across country and time. Therefore, I use the exogenous cross-country, cross-year variation in the timing of the Basel II adoption as the instrument to bank regulation stringency in order to assess the causal impact of bank regulation on SEO announcement effects.

To test the robustness of the results, I also consider the impact of involuntary equity issuance on the relation between the bank SEO announcement effect and the stringency level to bank regulation. Previous research suggests that moral hazard exists mainly in under-capitalised banks that take excessive risks to exploit risk-shifting benefits of deposit insurance. Well-capitalised banks take more risks because they are remote from insolvency (Calem and Rob, 1999) or because of factors exogenous to the portfolio decisions, such as managerial incompetence or a lack of lending opportunities (Gorton and Rosen, 1996).

Hence, the relation between bank capital regulation and bank SEO announcement effects may be different between under- (involuntary) and well-capitalised (voluntary) bank issuance (Gorton and Rosen, 1996). I include an indicator for involuntary issues and the interaction of this indicator with both the linear and the quadratic terms of initial capital stringency.

1.5 Contribution

The findings in this study provide evidence that the bank issued a convertible bond and SEO are associated with higher announcement effect than non-bank firms issued. Dutordoir et al. (2014, p.12) suggest that it would be interesting to examine whether the financial firms' choice for convertible securities is merely driven by regulatory concerns since these financial firms are often excluded from convertible bond research samples, as is common in corporate finance research. To my best knowledge, Janjigian (1987) and De Jong et al. (2012) are the only other two studies that report the share price reactions on convertible bond offerings in firms within alternative industries, including banks. However, neither study focuses on commercial banks nor they provide any explanation of the difference between banks and non-banks. This study intends to fill this gap and contribute to the literature by exploring whether the share price reaction to convertible bond offerings made by U.S. commercial banks is significantly different from that of non-bank firms.

This study also contributes to the debate on bank regulation regarding whether carefully designed regulation/supervision/monitoring boosts investor confidence and significantly reduces firm equity issuing costs in terms of announcement effects. These results confirm the fact discussed in Slovin et al. (1991) that banks are frequent equity issuers, and one of the reasons for this frequency may be the lower issuing costs. These results are also consistent with the previous literature, which documents significantly higher announcement effects of SEOs by another highly regulated utility industry (Smith, 1986).

This study contributes to the literature by extending Polonchek et al. (1989), who find that the mean abnormal returns of bank SEO announcements are higher than those of non-bank counterparts. The limitations of Polonchek et al. (1989), however, are that it covers the period (1975-1984) before the adoption of Basel I in 1988 and the Federal Deposit Insurance Corporation Improvement Act (FDICIA) in 1991. These important regulation changes

should have a significant effect on the stock market behaviour of bank SEOs. The 2007-09 financial crisis may also change the investors' perception of firm/bank SEO announcement. Their relatively small sample also suggests that their findings are not conclusive. For example, there are merely 41 equity event announcements in Polonchek et al. (1989), and the researchers themselves admit that "the sample sizes involved in this study are necessarily small" (p.449). Another recent study on U.K. rights issues between 1988 and 1998 by Iqbal (2008) finds less negative stock market reactions in the rights offerings by financial firms compared with industrial firms. However, both studies' findings are based solely on the comparison of the mean values of the cumulated abnormal return (CAR) over the SEO announcement window and ignore the differences in other characteristics between banks and non-banks. These characteristics are important in determining the differences in CARs between banks and non-banks if any. For example, banks that issue SEOs are generally larger than non-banks, and the different stock market reactions to the announcement of SEOs may simply be caused by the differences in size between banks and non-banks.

This study also complements to the strand of literature that studies the determinants of the announcement effects of bank SEOs. For example, Wansley and Dhillon (1989) find negative announcement effects from the issuance of common stock, the magnitude of which is similar to that found in the previous literature for utilities and smaller than that of industrial firms. Keeley (1989) documents a more negative announcement effect for involuntary bank stock issues than voluntary ones during the period 1975-1986, whereas Cornett and Tehranian (1994), on the contrary, find that involuntary equity issuance does not convey any signal of the firm's future prospects. Krishnan et al. (2010) find that both undercapitalised and well-capitalised banks have a significantly negative mean abnormal return around SEO announcements, indicating that investors do not perceive these two types of banks as economically different.

Finally, the findings suggest that there is an inverted U-shaped non-linear relationship between the stringency of bank regulation and bank issued SEO announcement effect. In this study, I consider the impact of the extent of the stringency of bank regulation on SEO announcement effect and focus only on banking industry across the world. To my best knowledge, this study is the first empirical analysis of the relationship between bank regulation and the announcement effect associated with bank issued equity.

This study also has timely implications to the current debate over bank regulation. It examines the stock market's reactions to bank SEO announcement across countries with different bank regulation environments and shows that the relation between bank regulation and the SEO announcement effect is more complex than previous literature would suggest. Though the work does not examine the total benefits and costs of bank regulation to the real economy, the results do indicate that over-regulation is harmful to bank's equity issuing cost in terms of SEO announcement effects. Given that reducing firm's financial constraints is important for the whole economy, countries with highly stringent regulation should rethink and redesign their regulatory systems.

1.6 Overall structure of the thesis

The thesis contains 6 chapters in total. Chapter 2 reviews existing literature on the security announcement effect, including the theories of the convertible bond, which discussing why firms issue convertible bonds, convertible bond announcement effects, SEOs announcement effect, and bank security announcement effect, and also presents and discusses the developed hypotheses of the thesis. Empirical results are shown in Chapters 3, 4, and 5. These three empirical chapters have a similar structure. The chapter begins by presenting descriptive statistics of the dependent and independent variables used in this study, followed by tests of pre-stated hypotheses and related discussion. Robustness tests conducted are also discussed. Chapter 6 concludes the thesis, providing a summary of the research, the contribution, and the limitations of the research.

Chapter 2 Literature Review and Hypothesis Development

2.1 Chapter Introduction

This section provides the literature review of previous studies in the research objective and the hypothesis development of this study. It reviews the theoretical background on convertible bonds and SEO the announcement effects, such as the why firms issue convertible bond and theories on the announcement effect of securities announcement effect. It also reviews the empirical evidence on the stock market reaction on convertible bond and SEO announcement. This chapter also develops and discusses testable hypotheses in relation to the previously stated research objective (section 1.3). Since bank regulation can reduce the information asymmetry between banks and investors and banks are perceived to benefit from the government's implicit too-big-to-fail (TBTF) policy. I have the following hypotheses, which are tested in chapter 3 and 4, respectively:

H1: The announcement effect of convertible bond issuance is less negative for commercial banks than non-banks.

H2: The announcement effect of SEOs is less negative for commercial banks than non-banks.

I also hypothesize that the impact of the stringency of bank regulation and bank SEO announcement effects is not linear. If the stringency of bank regulation exceeds a certain level, it may cause excessive risk taking by banks, which leads to more negative SEO announcement effects. Hence, I have the third hypothesis:

H3: There is an inverted U-shaped relation between the stringency of bank regulation and bank SEO announcement effects.

This section is structured as follows. Section 2.2 reviews the relevant literature. Section 2.3 provides the hypotheses development. Section 2.4 summarises the chapter.

2.2 Relevant literature

2.2.1 Theories on convertible bonds: why firms issue convertible bonds?

Companies can attract finance from different sources, such as issuing equity or debt. Convertible bonds gain popularity as an alternative source of financing other than equity and debt in recent years. A convertible bond is a hybrid security with debt- and equity-like features. It is a type of bond that can be exchanged by the bondholders at an agreed-upon price for shares of common stock in the issuing company or cash of equal value within a predetermined time period. It traditionally appeals to long-only investors looking for diversification benefits and indirect participation in equities (Lummer and Riepe, 1993).

Theoretical studies on convertible debt predict that a convertible bond, as an indirect mechanism for implementing equity financing, is able to mitigate the adverse selection costs associated with attracting common equity financing (Green, 1984; Brennan and Schwartz, 1988; Stein, 1992). There are three major theories on why firms issue convertible bonds, the 'back-door' theory (Stein, 1992), the 'risk-shifting' theory (Green, 1984), and 'sequential-financing' theory (Mayers, 1998).

Back-door theory

According to the back-door theory, Stein (1992) argues that firms find convertible bonds an attractive middle ground between the negative informational consequences associated with an equity issue and the potential for costly financial distress associated with a debt issue. The primary motivation for issuing convertible bonds is to obtain common equity financing at a better price than the issue date stock market price. Stein (1992) provides a formal model and gives a suggestion of the motivation for firm issuing convertible bonds. Firms facing significant information asymmetries are most likely to use convertible bonds as an indirect method for implementing equity financing. Firms may use it to get equity into their capital structures 'through the backdoor' in situations where informational asymmetries make conventional equity issues unattractive. This is because if the market is information asymmetric, there will be a lemons problem (Akerlof, 1970). Managers run firms in their

own interests rather than maximising stockholders' wealth. Investors do not know whether the firm is willing to invest in a good project or not and consequently, ask for discounts on the stock price to compensate the information asymmetry. Therefore, firms with good investment opportunity (safer but lower return) may feel it is not worth to issue the equity given the heavy discounts.

The convertible bond provides a financing alternative to the firm that mitigates the adverse selection costs of an immediate sale of common equity. It is typically callable after the expiration of a call protection period. The backdoor theory focuses on this call provisions of the convertible bonds. The firms issuing convertible bonds could force investors to exercise their conversion option early, thereby inducing them to swap their bonds for shares of stock. In this case, convertible bonds serve as an indirect mechanism for implementing equity financing with less adverse price impact than an offering of common stock. Straight debt seems to be a financing solution for firms facing information asymmetric problem, but Stein (1992) argues that the excessive debt can lead to costs of financial distress. With costly distress, a company that is already substantially leveraged will choose convertible financing only if it is relatively optimistic about the prospects for its stock price. Because if the stock price falls, the firm will be unable to force conversion and left with an even larger debt. Stein's model suggests that convertible bonds would be especially valuable for firms (including banks) with the significant information asymmetric problem and high financial distress costs. For these firms, common equity is an unattractive financing source because its value is very sensitive to the subsequent disclosure of the firm's private information. Convertible bonds allow them to obtain financing immediately through a delayed equity offer.

Risk-shifting theory

According to the risk-shifting theory, Green (1984) suggests that investment incentive problems associated with debt financing. The wealth transfers from creditors to shareholders by the substitution of 'risky' for 'less risky' operating. Straight debt may be an incentive of firms to overinvest in risky but high return project in order to maximise the wealth transfers from creditors. If the wealth transfer is large enough, shareholders may even support the adoption of negative net present value projects to increase the shareholder's wealth to the detriment of bondholders. Bondholders get the limited coupon but bearing unlimited risk, consequently the investors are reluctant to invest in the straight bonds. Therefore, Green

(1984) addresses the financing and incentive problems simultaneously and proposes a 'risk-shifting' theory that convertible bonds, unlike straight debt, can reduce the agency costs that are caused by bondholders and stockholders conflicts of interest. Bondholders have the right to convert the debt into common share, which forces the existing shareholders to share any wealth expropriated from bondholders. The conversion features impose a payoff structure on the shareholders' residual claim that reduces the incentive to overinvest in risky projects. Since by issuing convertible debt the firm has committed itself to choosing the less risky asset, the convertible bonds may be a solution to control distortionary incentives. Therefore, firms (including banks) facing significant risk in their investment project and having incentive problem are most likely to issue convertible bonds.

Sequential financing theory

Mayers (1998) proposes a reason of firms issuing convertible bonds from a different perspective. He proposes that firms can use convertible bonds to solve sequential-financing problems. He assumes a sequential financing problem involves an investment option with a future maturity date and it is costly to issue securities. He examines 289 calls of convertible bonds from 1971 through 1990 in the U.S market. Consider a firm at the beginning of the first period in a two-period world. The firm requires financing not only for a profitable investment project to undertake immediately but also for an investment option that will mature at the beginning of the second period.

Two key factors in making financing decisions are issue costs and overinvestment costs. The convertible bond economises on issue costs because conversion leaves funds in the firm and reduces leverage when the investment option is valuable. Managers prefer profitable projects and get perquisites from firm size. If there is cash available they always invest, even when the investment option turns out to be unprofitable. Thus, managers have control over funds unless the funds are required by contract to be paid out. This causes the overinvestment problem. Issuing a convertible bond that matures at the end of the first period could be a good solution for this problem because of it both economies on the second-period issue costs and controls the overinvestment problem. The firm could get the fund immediately when the bond is constructed if the net present value of the investment option is revealed to be positive. If the second-period project turns out to be profitable enough, the bondholders prefer to convert at the bond maturity date, leaving the funds in the firm. These funds can be used to finance the second-period project, thus economising on the second-period issue costs. The

bondholders can choose not to exercise the conversion option and redeem the convertible bond and get the fund back if the project turns out to be not sufficiently profitable. This helps to control the overinvestment problem. When the maturity date of the investment option is uncertain, the call provision allows the firm to force the conversion. Therefore, the firm could proceed with its financing plan when the investment option is valuable.

Chang et al. (2004) provide an empirical evidence of the sequential-financing hypothesis advanced by Mayers (1998). They examine the wealth effect of the announcement of convertible bonds from Taiwanese-listed firms within 1990-1999. The hypothesis suggests that firms may design their convertibles so that there are sufficient internal funds for future investment expenditures so as to avoid the costs of accessing capital markets. They find that the issuing firms' net new financing is not significantly different from zero over the life of the convertible bond. Thus, their results provide further support for the sequential-financing hypothesis that convertible bond financing is motivated by a desire to minimise security issue costs and agency costs of overinvestment for firms with promising growth opportunities to finance a sequence of potential investment options.

In sum, theoretically, firms (including banks) issue convertible bonds mainly because it has less informational consequences than equity and less potential for financial distress than debt, and it also can reduce the agency costs that are caused by bondholder and stockholder conflicts of interest, and help to control the overinvestment problem. There is also extensive literature focusing on wealth effect of convertible bond theoretically and empirically. I review this literature in the next section.

2.2.2 Theories on the security issuance announcement effect

Theoretical studies on security issuances announcement effect have different predictions. The negative announcement effect hypothesis comes from three aspects, information effects (Myers and Majluf, 1984), price pressure hypotheses (Scholes, 1972), and capital structure hypotheses (Modigliani and Miller, 1963).

Information effect hypothesis

Myers and Majluf (1984) develop an adverse selection model on security issuance that

is based on asymmetric information between shareholders and managers. Since managers have more information than shareholders, a company issuing securities for investment opportunities sends a negative signal to the market. Therefore when a company issues equity, investors demand a discount on the security price, because they assume that managers may overvalue the firm and try to maximise the wealth of their existing shareholders by trying to sell overpriced equity. As Ross's (1977) signalling model predicts, a company issuing securities for investment opportunities sends a negative signal to the market. Therefore when a company issues risky securities (including convertible bond), investors will demand a discount on the security price, because they assume that managers may overvalue the firm and try to maximise the wealth of their existing shareholders by trying to sell overpriced equity. According to these models, the announcement of convertible issues is associated with a negative future abnormal return. Miller and Rock (1985) also suggest that changes in outside financing are signals to investors of opposite changes in firm's current earnings. They predict that equity issues have negative stock price reaction since they are perceived as releasing negative information about the firm's cash flows.

Price pressure hypothesis

Scholes's (1972) price pressure hypothesis suggests that the demand curve for a firm's shares is downward-sloping and that an increased supply of shares decreases their price. Therefore issuing new equity induces a decline in a firm's stock price. However some later studies (Loderer and Zimmermann, 1988; and Loderer et al., 1991) point out that if the demand functions for different stocks are not identical and firms do not face the same initial price-quantity combinations, downward-sloping demand curves can generate almost any cross-sectional relation between changes in stock price and the number of shares outstanding.

Capital structure hypothesis

Capital structure hypothesis is based on redistribution of firm value among classes of security holders, tax effects, and leverage-related information effects (Modigliani and Miller, 1963; DeAngelo and Masulis, 1980; and Masulis, 1980a, 1980b, 1983). With the tax benefits of debt, firms that issue equity may reduce their stock price since it reduces the firm's debt ratio. Moreover, Galai and Masulis (1976) argue that an unanticipated reduction in financial leverage will make debt less risky, resulting in a transfer of wealth from shareholders to bondholders. The choice of a firm's capital structure may convey management's expectations about the firm's prospects (Ross, 1977). Therefore a higher debt ratio is to

convey a positive signal to the market and shows an optimistic management expectation concerning future cash flows, but more equity issues send a negative signal to the market and may reduce a firm's stock price.

2.2.3 Theories on positive security issuance announcement effect

Other literature, however, suggests that the equity announcement could have positive wealth effect if there is favourable information associated with the investment. Trueman (1986) predicts that capital expenditure increases will be associated with a positive stock price reaction. In contrast to the negative information effect, equity issues can also be interpreted as favourable news about the firm's investment opportunities. Since the additional capital must be committed by the existing shareholders, equity issues attest to the shareholders' confidence in their own firm's future. Hence, equity issues can be seen as a signal that the firm has new projects with positive net-present-value (NPV), causing a positive re-evaluation of the firm's shares. The larger the issue size, the larger the NPV, and the higher stock price reaction. McConnell and Muscarella (1985) assume that managers are motivated to maximise current shareholder wealth through the acceptance of positive net present value. Therefore, investors adjust its market value upwards if there is any unexpected increase of capital expenditure of the firm is announced and vice versa. They find that on average stock price rise approximately one percent with capital expenditure increases and fall approximately one percent with capital expenditure decreases.

2.2.4 Empirical evidence on convertible bond announcement effects

There is an extensive literature on stock market reactions to the announcement of convertible bond issues. Empirical studies generally find negative abnormal stock returns associated with the announcement of convertible bond issues. For example, this evidence has been found in the U.S. (Dann and Mikkelson, 1984; Mikkelson and Partch, 1986; Lewis et al., 1999; Duca et al., 2012), Australia and the U.K. (Abhyankar and Dunning, 1999), France (Burlacu, 2000), Western European markets (Dutordoir and Van de Gucht, 2007), Germany and Switzerland (Ammann et al., 2006).

In particular, Dann and Mikkelson (1984) provide evidence on the valuation effect of the issuance of convertible debt. They analyse the average daily common stock prediction errors centre around the announcement date of 132 convertible debts from 124 different U.S. firms over the time period from 1970 through 1979. They argue that the negative common stock valuation effect does not appear to be systematically related to the estimated leverage change induced by the added convertible debt, the extent to which the proceeds are used for new investment or to refinance existing debt, or possible under-pricing of the new offerings.

Mikkelson and Partch (1986) examine the stock price effects of security offerings of 360 U.S. firms from 1972 to 1982 and find that the type of security is the only significant determinant of the price. Their result shows that the announcement of convertible bonds offering gives a statistically significant negative valuation effect on stock price, supporting Myers and Majuf's (1984) argument that offerings of common stock and convertible debt are met with a less favourable price response than are offerings of straight debt. In Myers and Majuf (1984) model, the type of security conveys information about the values of the firm's investment opportunities and assets in place. Mikkelson and Partch (1986) also suggest that market participants tend to infer that the market price is too high whenever an offering of common stock or convertible debt is announced.

Duca et al., (2012) find that the average abnormal stock returns of convertible bonds announced between 1984 and 1999 is -1.69%, the announcement effects of convertible bonds over the period 2000-2008 are more than twice as negative (-4.59%). They suggest that evolution is attributable to a shift in the convertible bond investor base from long-long investors towards convertible arbitrage funds. These funds buy convertibles and short the underlying stocks, causing downward price pressure. They also find the average announcement effects of convertible bonds issued during the Global Financial Crisis are even more negative (-9.12%), because of a combination of short-selling price pressure and issuer, issue, and macroeconomic characteristics associated with these offerings.

Zeidler et al., (2012) find U.S. convertible bonds issued during 1980-2002 have negative announcement effect (-1.7%). They suggest that convertible bond issuers experience a sharp increase in their systematic risk prior to issuance, and a sharp decrease after issuance. Henderson and Zhao (2014) find the announcement effect of U.S issued convertible bond are generally negative. They also find that the announcement returns are 2.5% higher when convertible bond issuers simultaneously repurchase shares or purchase call options. Announcement effects are 1.7% lower when issuers simultaneously sell SEO.

The literature on convertible bond announcement effect in European markets also find negative wealth effect. Lewis et al. (1999) examine the excess returns for 203 convertible bonds issues from European countries over the period from 1977 through 1984 by using the security choice model and show that the announcement of convertible bonds has negative wealth effect on common stock excess return. Burlacu (2000) find during January 1981 and February 1998, France issued convertible bonds generally have a negative announcement effect (-0.34%). Ammann et al, (2006) find a negative announcement effect (-1.61%) of convertible bonds issued by Germany and Switzerland from January 1996 to May 2003. They both argue that stock returns around convertible bond announcements are negatively affected by the offering's equity component size. Dutordoir and Van de Gucht (2007) find the abnormal stock returns around Western European convertible bond announcements between January 1990 and December 2002 on average is -1.35%. They suggest that stock returns around convertible bond announcements are more positive during hot convertible markets. During hot convertible bonds, convertible bond announcement returns are less affected by firm-specific and issue-specific characteristics.

Using a sample of 4,148 convertible bonds issued over 1990-2009 by companies listed in 35 countries, de Jong et al., (2012) find the average abnormal return around the announcement date of convertible bonds is -0.55%. They suggest that stock returns around convertible bond announcements are less negative for convertibles issued in short-sale constrained countries and time periods.

Other literature finds that there is less negative abnormal stock return or even positive, in some countries, such as Japan, the Netherlands, Australia and Taiwan. Christensen et al (1996) find that convertible bond offerings the Japanese capital market received neutral stock price responses. Their sample consists a total of 139 events of security issuance from 1984-1991, and there are 36 convertible bond announcements among them. By using mean-adjusted returns model in the event study, they detect no significant results of the stock price in offering convertible bonds. For the Dutch financial market, De Roon and Veld (1998) use a standard event study methodology to analyse 47 convertible bonds announcement from January 1976 to December 1996. They measure the abnormal return using the Ordinary Least Squares market model regression and find that the average abnormal stock returns are positive but insignificant around the announcement day. Suchard (2007) find Australia issued convertible bonds during 1980-2002 on average have a positive announcement effect (0.84%). Chang et al. (2004) find the abnormal stock return and the announcement of

convertible bonds are positively related by examining 109 from 86 Taiwanese-listed firms within 1990-1999.

Lee and Loughran (1998), and Spiess and Affleck-Graves (1999) both find generally the U.S. convertible bonds have a negative announcement effect in the long run. They suggest that convertible bond issuers significantly underperform their stock benchmarks in the long run. Lee and Loughran (1998) also suggest that these is a decline in the operation performance of convertible bond issuers in the years following the offering.Janjigian (1987) includes 1393 convertible bonds issued between 1968 and 1983 issued by the U.S. firms in his study and documents significantly negative abnormal returns in association with announcements of convertible bonds issued by financial firms. But this study does not provide any explanation of the difference between banks and non-banks.

In chapter 3, I explore the difference in convertible bond announcement effect between banks and non-banks. The results are consistent with previous studies that both banks and non-banks issued convertible bonds have negative announcement effect. I also find banks issued convertible bond has less negative announcement effects than non-banks issued.

2.2.5 Empirical evidence on SEO announcement effects

Previous empirical studies that have investigated the announcement effect of SEOs generally find that it has experienced a negative announcement effect on equity issue announcement. For US firms, the share price reaction to both firm-commitments underwritten offers and rights offers have almost invariably been negative (Mikkelson and Partch, 1986; Barclay and Litzenberger, 1988; Hansen, 1989; Eckbo and Masulis, 1992).

Literature focusing on public offers of SEO announcement effects generally finds negative stock price reaction to the public SEO announcement. For example, relying on U.S. data, Scholes (1972) examines the sample of equity issued from January 1947 to December 1965 and finds evidence of a permanent price reduction of approximately 2% after the announcement of equity issues. He concludes that the demand curve for shares is essentially horizontal and finds the price reduction is not associated with the size of the distribution. The assumption for this hypothesis is that price pressure should be a temporary phenomenon.

The stock prices did not recover within several weeks after the issue date. Therefore, he concludes that the price reduction reflects a permanent revaluation of the firm's shares and rejects the price pressure hypothesis, and also argues that the decline is due to a discrete information effect.

Kraus and Stoll (1972) use the sample of block trades over 10,000 shares carried out on the New York Stock Exchange (NYSE) from July 1, 1968, to September 30, 1969, and they have the similar results as Scholes (1972). They also find a small, temporary intra-day price decline will substantially be reversed by the end of the day. They suggest that the price declines are significantly related to the value of the distribution, but they cannot determine whether this relation was due to price pressure or information asymmetry. Dann et al. (1977) also use the sample of 2130 block trades of 50,000 shares traded on the NYSE during the same sample period as Kraus and Stoll (1972) to investigate this intra-day price decline. They find that abnormal trading profits are possible if investors react within 15 minutes of the news.

Jung et al., (1996) examine 192 U.S. equity offerings from 1997 to 1984 and find the average abnormal return is -2.70%. They suggest that firms without valuable investment opportunities have more negative announcement returns than firms with substantial growth opportunities, approximated by high market-to-book ratios. Choe et al., (1993) show that SEO announcement effects are negative (-2.42%) by using the common stock issued in the U.S. during 1971-1991. They suggest that offer announcement effects are less negative in expansionary periods these periods are characterized by the existence of more promising investment opportunities and are subject to less moral hazard risk. Lee and Masulis (2009) also show that the announcement effects of SEO issued between 1990-2002 are negative (-2.67%). They suggest that poor accounting information quality is associated with larger negative SEO announcement effects. Henry and Koski (2010) examine the U.S. SEO issued during January 1, 2005, and December 31, 2006, and find the mean announcement abnormal return is -2.3%. Their results show that around SEO issue dates, higher levels of pre-issue short selling are significantly related to larger issue discounts for non-shelf-registered offerings, which is consistent with manipulative trading. They suggest that SEO Rule 105 constrains some but not all manipulative trading Moreover, Smith (1986) concludes that stock price reaction on average is -3.14% for industrials (-0.75% for utilities) surrounding the announcement of a public offering of new equity. Barclay and Litzenberger (1988) examine the within-day pattern of common stock returns surrounding the announcements of

new issues of equity. Their study uses 218 new issues of common equity offered between January 1981 and December 1983 by industrial firms listed on the New York or American Stock Exchange. They find that there is a large number of transaction, high volume of the equity issues in the first fifteen minutes following the equity announcement, and the average return is -1.3%. They also find that there is a small, but statistically significant negative average returns one hour preceding the announcement of common equity. They conclude that the size of the offering, the purpose of the issue and the estimated profitability of new investments do not have a significant impact on the stock return. Corwin (2003) finds empirical evidence that after seasoned equity offerings announcement, the stock continues to experience a negative abnormal return until the offer. He examines the sample between 1980 and 1998 in the U.S. market and finds significant under-pricing for seasoned equity offers

Early literature focuses on primary issues of seasoned equity in the U.S. market and generally find a small stock price reduction associated with the equity issues (Smith, 1977; Logue and Jarrow, 1978; Hess and Frost, 1982; Masulis and Korwar, 1986). Hess and Frost (1982) focus on the issue date rather than the date that the offering is announced. They suggest that the price decline is not associated with the size of the issue. They collect data on 152 new issues of common stock by utilities which are listed on the NYSE from January 1, 1975, to March 1, 1977. But they do not examine the possibility that the price decline would be anticipated by investors at the announcement date. Masulis and Korwar (1986) examine the stock price adjustments of the equity offerings surrounding the announcement date and find the effect is negative. They find that industrial firms issued equity has more negative announcement effect than public utilities issued. Similarly, Denis (1994) by studying a sample of U.S. industrial firms finds that equity issue announcement effects are significantly negative for low-growth firms, but insignificantly negative for high-growth firms. Cline, Garner and Yore (2014) examine the U.S. firms issued SEOs announcement effects by using the sample between the year 1979 to the year 2011. They find that value-destroying conglomerates witness SEO announcement returns that are, on average, 1% more negative than firms operating more efficient internal capital markets. and Zhao (2014) also using the U.S. firms issued SEO data, and find the announcement returns on average is -7.85%. They suggest that average equity market announcement effects differ when issuers conduct concurrent transactions. Consistent with models of adverse selection, concurrent transactions that increase the dilutive impact on earnings, thereby making the design more equity like, are associated with more negative announcement effects. Gokkaya and Highfield

(2014) investigate the information content of registered insider sales in the SEO process from 1997 to 2009. They find that initial market reactions and long-run post-issue stock performance are negatively related to C-level executive insider sales, but unrelated to participation by non-executive insiders. They also find significantly lower post-issue abnormal returns (-2.62%) surprises for SEOs with C-level executive sales.

Banks are often excluded in corporate finance research mainly because of the regulatory concerns. Therefore, previous empirical studies on banks issued SEO are very limit. Wansley and Dhillon (1989) and Polonchek et. al. (1989) both find the average announcement effect of bank equity offerings support the regulation hypothesis that stringent bank regulation mitigates the information asymmetry problem and reduces the magnitude of the negative announcement effect associated with bank issued common stock. However, these two studies only compare the difference between equity announcement effect of the bank and non-financial firms by looking at the summary statistics. Krishnan et al. (2010) use public offers of SEO made by commercial banks in the U.S. over the period 1983 through 2005, to understand how opacity and capital regulation interact to determine the timing of bank SEOs and their market valuation. They argue that well-capitalised banks' offers should elicit a negative market reaction, but undercapitalised banks' offers should not. Because SEOs in general signal poor future prospects (Cornett and Tehranian, 1994), undercapitalised banks' offers, in contrast, are characterised as non-informative-and are arguably less opaque-because issuing banks are under regulatory duress and have little choice. However, they find a negative announcement effect on stock prices. They argue that the negative abnormal returns are due to investor reaction to the opportunistic timing of these equity issuances, and find banks wait for an attractive stock price before announcing an equity offering.

However, other literature finds positive SEO announcement effect in other countries. Kato and Schallheim (1993) They investigate Japanese equity issue announcements and find that the two-day market model prediction errors for 63 Japanese public equity issue announcements during the 1970s are, on average, negative. However, for the 113 announcements during the 1980s, the average market reaction is positive. The mean abnormal return for the entire sample is zero. They suggest that one of the major factors that distinguish Japanese firms that issued new equity during these two time periods is their relatively high market-to-book-value ratios (means 5.87% and 2.72% respectively, and statistically different at the 0.01 level). Chen et al., (2001) find that on average the announcements of SEO are associated with positive stock market reactions in Taiwan. They

suggest that this positive announcement effect may be caused by the growth potential of SEO issuers in Taiwan.

Other literature finds positive announcement effect for private equity offerings. Wruck (1989) provides empirical evidence by using the U.S. market data from July 1, 1979, to December 1, 1985, that private sale of equity's announcement increases shareholder wealth by 4.5% on average. They suggest that even though the type of security being issued is the same, private and public sales of equity send opposite signals to the market about firm value. Private issues are likely to result in a more concentrated ownership structure, the potential benefits of which can explain the positive announcement effect. Hertzel and Smith (1993) also find significant positive relationship between equity issue announcement and stock price reaction. Their results are consistent with the role of private placements as a solution to the Myers and Majluf underinvestment problem and with the use of private placements to signal undervaluation.

In chapter 4, I explore the difference in SEO announcement effects between banks and non-banks. The results are consistent with previous studies that both banks and non-banks issued SEOs have negative announcement effect. I also find banks issued SEOs have less negative announcement effects than non-banks issued.

2.3 Hypotheses development

Compared to non-banks, banks are heavily regulated due to their special economic role of money and the uncertainty (Dow, 1996). The heavy regulation on banks could reduce the information asymmetry between the managers and investors (Polonchek et al., 1989; Chu, 1999; and Santos, 2001). The government uses regulation to reduce financial firms' opaqueness by monitoring banks to provide a report with detailed financial information to public investors and checking the accuracy of the report (Flannery et al., 2004).

Different from industrial firms, banks are monitored by both the market and the regulator and are constrained in terms of the timing and choice of financing (Polonchek et al., 1989). The security issuance process by commercial banks is also frequently mandated by bank regulators. The regulatory environment under which banks operate may mitigate much of the informational asymmetry between management and investors for securities issuance (Wansley and Dhillon, 1989). The reduction in informational asymmetry may be the result

of increased disclosure requirements and/or monitoring by regulators, as well as a reduction in the adverse selection problem discussed by Myers and Majluf (1985). They examine the stock market response to public security offerings during the year 1978 to 1985 and find that common issue by banks also has negative market reactions, but the magnitude of is reaction is smaller than that found for industrial firms

Banks face stringent government regulation, which limits managers' ability to take advantage of the information asymmetry between the issuers and investors (Polonchek et al., 1989; Chu, 1999; Santos, 2001). First, the disclosure requirement, in general, tends to mitigate banks' opaqueness (Flannery et al., 2004). The government monitor banks to provide detailed financial information reported to public investors and check the accuracy of the report. Formal enforcement actions for the publication of the financial report directed at individual banks have been publicly available since 1989. Investors should be able to receive more information on bank financial conditions and quickly impound this information into the bank's stock and bond prices for an effective market discipline (Flannery et al., 2004).

The regulation of bank capital plays an important role in banks' soundness, risk-taking incentives, and the corporate governance of banks (Santos, 2001). The Basel Committee on Banking Supervision has also made efforts to improve transparency in banking and to promote more effective market discipline over large financial firms. In Basel II, market discipline becomes one of three pillars on which the future banking supervision should be based. The recent global financial crisis calls for stringent bank regulation to encounter the problems when the market conditions worsened abruptly. Basel III requires banks to hold 4.5% of common equity (an increase from 2% in Basel II) and 6% of Tier I capital (an increase from 4% in Basel II) of risk-weighted assets. The minimum capital as a percentage of risk-adjusted assets prevents banks from excessive risk taking (Berger et al., 1995). The capital requirement forces banks to have more of their own capital at risk so that they internalise the inefficiency of gambling (Hellmann et al., 2001). Banks may thus have less incentive to invest in high return but with the high-risk level project, because they do not want to put their own money at risk.

Literature suggests that a higher bank capital ratio does not lead value-maximising banks to increase asset risk. On the contrary, more stringent capital requirements reduce the gains to a bank from increasing the risk of its asset portfolio (Furlong and Keeley, 1989).

With less bank asset risk, investors are easier to build up the confidence of banks issued securities. Koehn and Santomero (1980) and Kim and Santomero (1988) also argue that the bank cannot diversify its risk completely because it is owned and managed by the same agent. The capital requirement restricts the bank's risk-return frontier and forces it to reduce leverage and to reconfigure the composition of its portfolio of risky assets. Rochet (1992) also argues that the bank may dominate risk aversion when the liability is limited and bank capital is exogenously set at a certain level. The capital requirements induce banks to take more prudent portfolio or at least the investors perceive banks to do so. The demand of sufficient information investors about the issuers and the security may be reduced if investors are aware that the firm shareholders have a substantial stake in the firm. The regulation also limits the freedom and flexibility of bank managers to set the quantity of capital, to choose the type of capital, and to time security offerings to take advantage of differential information between the managers and the public. This means the securities issued by banks is less likely to be assumed as overvalued by the market and has less information asymmetry problem between managers and investors (Polonchek et al., 1989). Therefore, the capital regulation gives investors more confidence of the issuers by reducing the possibility of banks to take advantage of differential information between the issuers and investors.

Unlike non-bank firms, banks are monitored by both the market and a regulator, and bank capital structure decisions are constrained by regulation (Polonchek et la., 1989). Capital restrictions are established by regulators in the U.S. (the Federal Reserve, the Comptroller of the Currency and the FDIC) who have access to considerable inside information about the banks they regulate. Regulators impose minimum capital ratios and restrictions on the types of securities that qualify for inclusion in these ratios. The capital requirement forces banks to have more of their own capital at risk so that they internalise the inefficiency of gambling (Hellmann et al., 2001). Banks may thus have less incentive to invest in high return but with the high-risk level project, because they do not want to put their own money at risk. Furlong and Keeley (1989) analyse the theoretical relationships between capital regulation and bank asset risk. They find that a higher bank capital ratio does not lead value-maximising banks to increase asset risk. On the contrary, more stringent capital requirements reduce the gains to a bank from increasing the risk of its asset portfolio. With less bank asset risk, investors are easier to build up the confidence of banks issued securities. Koehn and Santomero (1980) and Kim and Santomero (1988) also argue that the bank cannot diversify its risk completely because it is owned and managed by the same agent. The capital requirement restricts the bank's risk-return frontier and forces it to reduce

leverage and to reconfigure the composition of its portfolio of risky assets.

The regulation also limits the freedom and flexibility of bank managers to set the quantity of capital, to choose the type of capital, and to time security offerings to take advantage of differential information between the managers and the public. This means the securities issued by banks is less likely to be assumed as overvalued by the market and has less information asymmetry problem between managers and investors (Polonchek et al., 1989). Regulators also have disclosure requirements on banks, which in general tends to mitigate banks' opaqueness. Investors should be able to receive more information on bank financial conditions and quickly impound this information into the bank's stock and bond prices for an effective market discipline (Flannery et al., 2004). They may have more confidence on equity issued by banks.

The second explanation for the difference between announcement effect of securities issued by banks and that issued by non-banks is that banks, particularly large banks, are subject to the government's implicit too-big-to-fail (TBTF) policy. Banking is a very important part of a free-market economy. In principle, the government can always close a failing bank as soon as the bank becomes insolvent. In practice, the number of options available for regulators to handle the bank insolvency problem decreases with the severity of the problem (Hoggarth et al., 2004; Barth et al., 2006). Banks may receive a capital injection when in distress or bailouts by the government when deemed "too-big-to-fail" (TBTF) (O'Hara and Shaw, 1990; Acharya and Yorulmazer, 2007; Brown and Dinc, 2011), which increases investors' confidence on the security issued by banks. By removing any deposit insurance coverage limit, the TBTF policy removes any possibility of bankruptcy. Bank's cost of funds no longer tied to its riskiness, and banks may thus have incentives to increase the risk of their operations, which, in turn, should also be associated with higher expected returns. In September 1984 the Comptroller of the Currency testified before congress that some banks were 'too-big-to-fail' and that for those banks total deposit insurance would be provided. Non-bank institutions that do not offer deposit services can be allowed to fail, as their failure does not endanger the payments system and the conduits through which the government carries out monetary policy (Corregan, 1987). All except ten of the over 9,000 banks that failed during the Great Depression were single office banks, more of which were located in small towns.

Larger banks may have better investment and diversification opportunities. Moreover, banks will be bailed out by the public government in the case of financial distress, due to the TBTF policy (Stolz and Wedow, 2011). While controlling for quality and probability of failure, the effect of bank size on the price of uninsured funds can be calculated for evidence on the existence and magnitude of the TBTF doctrine, which suggest that regulators are more apt to bail out large creditors and equity holders of large failed banks than those of small failed banks, and that bank investors take this into account. Thus, all else equal, the risk premium on deposits at large banks should be smaller than at small banks if uninsured depositors perceive that regulators implement a TBTF doctrine (Hughes and Mester, 1993). Lang and Stulz (1992), and Slovin et al. (1999) suggest that there might be a regulatory concern that a failing bank potentially reveals information about the whole banking system and that this information might cause runs on other banks. Such fears of contagion may delay regulatory intervention (Brown and Dinc, 2011).

Evidence on the significant positive wealth effects accruing to the TBTF banks with corresponding negative effects accruing to the non-included banks has been provided by O'Hara and Shaw (1990) by using the event study method.

If the TBTF theory holds, investors may perceive banks to be more stable than non-bank firms. Therefore, they may have more confidence in banks issued securities, which may be associated with less negative announcement effects upon equity issuance by banks than non-bank institutions.

Based on the literature and these two theories I develop the first two hypotheses as follow:

H1: The announcement effect of convertible bond issuance is less negative for commercial banks than non-banks.

H2: The announcement effect of SEOs is less negative for commercial banks than non-banks

There is a strand of literature that suggests that bank regulation could have a negative impact on the stock price reactions associated with bank issued SEOs. Therefore, the relationship between the stringency of bank regulation and bank issued SEO announcement effect could be not simply linear.

Calem and Rob (1999) suggest a U-shaped relationship between bank capital and risk taking, whereby undercapitalised banks first take less risk when bank capital increases and then take more risk when bank capital continues to increase beyond a certain threshold. Their findings reconcile the two opposite strands of literature that find that on one hand bank risk-taking declines with the capital increase and on the other hand that rises with a capital increase. Their results also imply that capital-based regulation has a U-shaped influence on the risk-taking behavior of banks.

Besides the literature that bank regulation has a positive impact on bank-issued securities announcement effect, there is also a stream of literature that has highlighted that stringent bank regulation can have ambiguous effects on bank performance and risk taking and that it, therefore, may not be optimal for all banks. Blum (1999) suggests that over-regulation has two effects on banks. First, it lowers bank profits and the banks have less to lose in the event of a bankruptcy. Therefore, banks are likely to increase risks. Also by knowing that in a banking system with more stringent regulation the banks may have more potential to issue equities in the future to meet the regulation requirements, investors may demand higher discount for the current stock issuance to compensate for the potential loss in the sequential SEOs (Gale and Stiglitz, 1989; Solvin et al., 1992). Second, under a binding regulation environment equity is more valuable to the bank. However because that equity issuance is expensive or even impossible for some banks, the only way for a bank to increase equity today is to increase risk today. Using a comprehensive database on bank regulation and supervision across 107 countries, Barth, Caprio and Levine (2004) find a negative relation between various regulation and supervision measures, bank development, performance, and stability. Their findings raise a flag on extensive bank regulation and supervisory practices that involve direct government oversight of and restrictions on banks. These findings are consistent with the "tollbooth hypothesis" of Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2002) that regulation has pursued the benefit of politicians and bureaucrats. In addition, the cross-country differences in banking regulations encourage the flow of bank capital from highly regulated banking markets to those less regulated, a phenomenon also referred to as "race to the bottom" (Barth, Caprio, and Levine, 2006; Houston, Lin, and Ma, 2012). Hence, the existence of regulation differences across countries may limit the banks in more highly regulated banking markets to explore their economic opportunities. This evidence is consistent with the notion that a stringent regulation only positively impacts bank performance if the benefits of higher standards exceed the costs, including both the direct compliance costs and the indirect negative costs due to increased

risk taking or regulation arbitrage. Thus, if investors view the existing regulation to be too stringent and beyond the optimal level, thereby inducing a net moral hazard problem, I expect the market reaction to the SEO announcement to be more pronounced for banks operating in these highly regulated countries than those in less regulated countries.

Therefore, I develop the third hypothesis:

H3: there is an inverted U-shaped relation between the stringency of bank regulation and bank SEO announcement effects.

2.4 Chapter summary

This chapter provides the relevant literature review and the development of hypotheses used to address the research questions of this study. The theories on the reason for firms issuing convertible bond and theories on the securities announcement effect are discussed. This review shows the importance of convertible bond and the reasons that securities announcement effect would be negative. Theories on securities announcement effect demonstrate the reason that convertible bond and SEO announcement effect should be negative. Empirical studies of the stock market reaction of the convertible bond and SEO announcement effects are also reviewed in this chapter. It is clear that results of previous studies suggest that convertible bond and SEO announcements effect should be negative. Added to this, to date, no significant work has considered bank issued convertible bond announcement effect. Based on these reviews, I further develop the research hypotheses that bank issued securities associated with less announcement effect than non-bank issued, and there is a non-linear relationship between bank regulation stringency level and bank issued SEO announcement effect. The next three empirical chapters test these three hypotheses, respectively.

Chapter 3 Empirical analysis: Difference in the convertible bond announcement effect between banks and non-banks

3.1 Chapter introduction

This chapter presents the empirical findings of the first hypothesis by comparing the convertible bond announcement effect between banks and non-banks. Because convertible bond can be structured to mitigate several different combinations of debt- and equity-related costs of external finance, an empirical examination of average valuation effects for the full issuer universe is likely to be uninformative. Dann and Mikkelson (1984), Eckbo (1986) and Mikkelson and Partch (1986) document that investor reactions to the announcement of convertible bond offerings are negative on average, however, these studies ignore the heterogeneity between industries, and in particular, they exclude banks from their samples due to the special regulation status of financial institutions. This thesis is also motivated by the suggestion made in Dutordoir et al.'s (2014, p.12) survey that "another limitation is that empirical studies tend to focus on convertibles issued by non-financial corporations. Financial firms are often excluded from research samples, as is common in corporate finance research. Financials account for a substantial portion of US hybrid securities issuance…It would be interesting to examine whether these firms' choice for convertible securities is merely driven by regulatory concerns…". This chapter intends to fill this gap and contribute to the literature by exploring the research question whether the share price reaction to convertible bond offerings made by banks is significantly different from that of non-banks.

In this chapter, a sample of convertible bond issuance data between January 1982 and December 2011 are used to compare the share price reaction of convertible bond issuance for U.S. banks and counterpart U.S. non-banks. OLS regression technique is employed to test the hypothesis. The findings support the hypothesis that the cumulated abnormal returns (CAR) for banks is less negative than the counterpart non-banks. The cumulative abnormal return over the three day period (-1, 1) around the issuance for banks is -1.31 percent, that is 1.42 percentage points higher than non-bank firms and the difference is statistically significant at the 1 percent level. The results are robust after controlling for firm-, issue-, and market-specific variables. Consistent with Arshanapalli et al. (2005); Duca et al. (2012); Loncarski et al. (2009); and De Jong et al. (2011), I also find that arbitrageurs' activity of buying convertible bonds and short selling equities induce significant downward pressure on stock price, however, this effect cannot explain the full difference in CARs between banks

and non-banks.

Various statistical tests are carried out to test the robustness of the main results. I attempt to explore whether banks experience less negative announcement returns in relation to individual industries across non-bank firms. I use eight industry classifications, a rather wide definition, to have a reasonable amount of observations available per industry. The results offer further credence that banks experience less negative announcement returns on convertible bonds announcements in comparison to counterpart non-banks.

Finally, I consider the bias in the results which may be caused by the un-balanced sample between banks and non-banks (88 vs. 2,045). Following Faulkender et al. (2012), the matching sample method is used to address this problem. I compare the CARs of banks and non-bank firms issued convertible bond by matching each sample banks with a controlled non-bank firm on the basis of important characteristics as a robustness test. The results are still robust with this alternative methodology, showing that bank issued convertible bond is associated with a higher abnormal return than non-banks issued.

The remainder of this chapter is organised as follows. At first, section 3.2 outlines the process of quantitative data collection and analysis, including the data sources and the sample selection. Section 3.3 presents the research methodology used in this chapter. Section 3.4 discusses the control variables used in this chapter, including the measure of firm opacity and hedge fund arbitrage induced shot-selling (arbitrage demand), which are both related to the hypotheses. Section 3.5 outlines the descriptive statistics of depend on, independent, and control variables used in the regression models. After that, the estimated OLS results and some robustness test results are discussed step by step in section 3.6. Section 3.7 discussed the results of the robustness tests. Finally, section 3.8 provides the overall discussions and conclusions.

3.2 Data sources and data selection

I gather the information necessary for constructing the explanatory variables for the empirical tests from the following sources. My initial sample on announcement dates and other features consists of all the convertible bond issuances on the US market from January 1982 to December 2011, which is obtained from the Securities Data Company (SDC

Platinum) global new issues database. The starting year 1982 was constrained by data availability from SDC. The issuing firm's stock price data (eg. share price, stock market index etc.) and bank account data (eg. total assets, stock run-up etc.) are collected from DataStream.

The SDC global new issues database reports 4614 convertible bond issuances over the period from 1982 to 2011. I apply the following criteria to select offerings for inclusion in the final sample:

- In line with Duca et al. (2012) to simplify the exposition and in order to make the results consistent, I only include plain vanilla convertible bond issuance observations (e.g. no exchangeable bonds, contingent convertible or mandatory convertible bonds, etc.). For a plain vanilla convertible bond, neither the issuer is permitted to redeem the bond early nor can the bondholder retract the bond prior to maturity. This step further reduces the sample size to be 3016 observations.
- Then I narrow the sample by excluding the issuers from the regulated utility industry, whose capital structure arrangements and market reactions are found to be different from other industries [8] and banks. The issuers' industries are identified by their Standard Industry Classification codes (SIC codes). The utility industry's SIC codes are from 4900 to 4999. Banks' SIC codes are from 6000-6199, insurance companies are from 6300-6499.
- The issuing firm's daily stock price data for the full calendar year preceding the announcement date must be available on Datastream;
- The offering announcement date must be available on SDC[9];
- The issuing firm's balance sheet and income statement data for the fiscal year-end immediately prior to the announcement date must be available on Datastream.

I consolidate multiple issues of convertible bonds by the same firm on the same date into one offering. The proceeds are added up to arrive at the total proceeds for that day.

[8] Other industries are referred as non-banks in the study, which include manufacturing, wholesale retail, services, transportation, telecommunication, and construction.
[9] Following Duca et al. (2012), I use the filing date as announcement date where possible, and issue date when filing date is not available. Some of the announcements are time-stamped after the closure of the stock market, which is why I also include day +1 in the analysis of convertible bond announcement returns.

Then I obtain a data set of 2,133 convertible issues during the sample period. There are 88 convertible bonds issued by banks and 2,045 convertible bonds issued by non-bank firms.

3.3 Methodology

I empirically document the convertible bond announcement effect by comparing the cumulated abnormal returns (CARs) of banks with those of non-bank firms. The CARs are generally measured by standard event study methodology as described in Brown and Warner (1985). They measure abnormal returns using the market model. At time t, the market model for the i-th security issuer is

$$AR_{i,t} = R_{i,t} - \alpha_i - \beta_i R_{m,t} + \varepsilon_{i,t} \quad (1)$$

Where $R_{i,t}$ is the return for the i–th security issuance on time t and $R_{m,t}$ is the return of the market on time t. $\varepsilon_{i,t}$ is the disturbance term. The parameters α_i and β_i can be estimated over the estimation period by running an Ordinary Least Square (OLS) regression of the stock returns on a constant and the return on the market index. The market return is the rate of return on S&P 500, a market-weighted index of the top 500 stocks trading on either of the New York Stock Exchange and the NASDAQ.

Following Duca et al. (2012), I use the 3-day event window (day -1 to day +1)[10]. The announcement day reported by SDC is denoted as day 0, one day before this date is denoted as day -1, while one day after is day +1. A 240-day (day -250 to day -10) period for each firm is used for the estimation for the abnormal returns by using the market model. The cumulative abnormal returns (CAR) over the 3-days event window are then calculated. CAR indicates the extent to which the market adjusts the firm's value in response to the new information signal obtained through the firm-related announcement. Equity offerings have inherent signalling potential regarding the quality of the issuing firm. When an equity offering is announced, these quality-related phenomena will have implications or the magnitude of the price reaction around the announcement period. As Ross's (1977) signalling model predicts, a company issuing securities for investment opportunities sends a

[10] I also examine the cumulative abnormal return using the alternative event window (-1, 0), (-2, +2), (-5, +5). The main results of the study stay the same.

negative signal to the market because of the information asymmetry problem between the investors and the managers. When a company issues risky securities (including convertible bond), investors will demand a discount on the security price, because they assume that manager may overvalue the firm and try to maximise the wealth of their existing shareholders. Other literature suggests that the equity announcement could have positive stock market reaction if there is favourable information associated with investment, since the equity issues can be seen as a signal that the firm has new projects with positive net present value (Trueman, 1986). Therefore, CARs are expected to be positive or negative depending on whether investors overall believe that the event will result in incremental positive or negative future cash flows.

I include firm-, issue-, and market-specific variables in the analysis of convertible bond announcement stock returns respectively. The regression model is as follows:

$$CAR_{b,c} = \alpha * X_{b,c} + \beta * Y_{b,c} + \gamma * Z_c + u_{b,c} \quad (2)$$

Where $CAR_{b,c}$ is the CAR of bank b in country c; $X_{b,c}$ is a matrix of firm level control variables; $Y_{b,c}$ is a matrix of issue specific variables; Z_c is a matrix of country level control variables; $u_{b,c}$ is the error term; α, β, and γ are vectors of coefficient estimates.

3.4 Control variables

I include issue-specific, firm-specific, and market-specific variables in the analysis of convertible issues announcement stock returns. Appendix 1 provides the detailed definition of each of the variables. All issuer characteristics included in the regression analyses are measured at the fiscal year-end preceding the convertible issues announcement date, unless otherwise indicated.

Firm opacity. Theories suggest that banks are more opaque than non-bank firms (Morgan, 2002; Iannotta, 2006; Haggard and Howe, 2012), hence banks may have more information asymmetry than their non-bank counterparts. Jin and Myers (2006) define firm opacity as reduced firm information available to outside investors. Banks deal with money, and the risks taken in the process of intermediation are difficult to observe from outside. The inherent complexity of banks and the nature of the underlying assets make them opaque

(Jones et al., 2012). Slovin et al. (1992) suggest that although there is disclosure requirement, banks are not required to disclose information about individual loans. Bank managers have the flexibility to adjust the accounting measures of loan portfolio quality to disclose to the public. Banks also reports the percentage breakdown of asset portfolios by type of loans (eg. Commercial and industrial, highly-leveraged transaction, and cross-border loans), but these data do not necessarily convey information about asset quality. Bank managers also have ability to adjust the classification of a non-performing loan. They can lend a borrower addition funds to ensure sufficient payments to keep a loan from reaching non-performing status. These characteristics of the information structure of bank operations limit the market's access to information needed to assess individual bank value and risk, which make banks more opaque.

Theories also maintain that bank loans are opaque because bank managers may possess valuable private information about the credit condition of borrowers or the bank's monitoring efforts. This informational opacity increases the difficulty to evaluate bank loan quality for rating agencies (Berlin and Loeys, 1988, Diamond, 1991; Kwan and Carleton, 2010). Campbell and Kracaw (1980) posit that bank lends informational opaque loans, because when borrowers have confidential information that they do not wish to disclose to the public may choose bank loans. By using Jin and Myers' (2006) model, which defines the opaqueness as reduced firm information available to outside investors, Haggard and Howe (2007) examine the relative opacity of banks and find similar results that banks are generally more opaque than non-bank firms.

The opacity exposes banks and the entire financial system to runs and contagion and makes the outsiders unable to distinguish between sound institutions and unsound ones. Opacity can result when a firm chooses to withhold information from investors, which increases information asymmetry between bank managers and outside investors (Jones et al., 2012). Jin and Myers (2006) argue that opacity reduces firm-specific information available to outside investors and affects the division of risk bearing between firm insiders and outside investors. Managers have the ability to rapidly transform liquid bank assets, increasing the uncertainty about the underlying profitability and risks of the firm (Myers and Rajan, 1998). Since the banks are more opaque, investors may feel they are not sufficiently informed or even do not believe the information disclosed. When banks issue convertibles, investors may want more discounts on it. Therefore, the announcement of banks issued convertible bond may have more negative impact on the abnormal return than non-bank firms.

Morgan (2002) provide evidence of bank opaqueness by investigating the relative opacity of banks using disagreement between the Moody's and S&P's bond-ratings as a proxy for uncertainty associated with asymmetric information. He examines the ratings of new bonds issued by banks and industrial firms. If a firm is completely transparent, then the two major rating agencies should give the same rating regarding the risk of any given bond issued by the firm. If bank risk is harder to observe, the ratings given by these two bond-rating agencies may disagree more often over bank bond issues than non-bank ones. He finds that Moody's and S&P split more often over financial intermediaries, and the splits are more lopsided. He finds that banks and insurance firms are inherently more opaque than other types of firms. Iannotta (2006) arrives at the same conclusion by using the same analysis method, with the sample from European banking industry from 1993 to 2003.

However, there are contradictory evidence regarding bank opacity. For example, Flannery et al., (2004) examine analyst and microstructure data and find that banks are not more opaque than industrial firms. Musumeci and Sinkey (1990) examine the 1987 Brazilian debt moratorium and show that "the market reacted rationally and penalised banks in direct proportion to their exposure to Brazilian debt." Calomiris and Mason (1997) examine the 1932 Chicago banking panic and show that although depositors were temporarily confused about bank asset quality, they finally make the right decision. The panic did not produce significant social costs in terms of failures among solvent banks. Flannery et al. (2004) find that there is no difference between market microstructure characteristics of banks and those of industrial firms. They evaluate the market microstructure properties of U.S. banking firms' equity, to determine whether or not their assets are more opaque than similar-sized nonbanking firms. The results indicate that both large and small bank holding companies have very similar trading properties to their matched non-bank firms. Moreover, analysts' forecasts of earnings appear to be more accurate for banks, suggesting that banks are perhaps less opaque. But the improved accuracy of analyst forecasts may simply indicate the ability of banks to manage earnings (Beatty et al., 2002). In Flannery et al. (2013), a dramatic shift in market microstructure characteristics coincided with increased bank opacity in the 2007 financial crisis.

Following by Morgan (2002) and Livingston et al., (2007), I consider the difference between Moody's and Standard and Poor's (S&P) ratings as a proxy for uncertainty, which is used to measure firm's opacity. If the firm is opaque then its risk is hard to observe, and the rating agencies may disagree in ratings over this firm's issues. Hence, I expect the

difference between the ratings given by these two major rating agencies is negatively related with the convertible bond announcement return. I control for the issue's credit rating by applying a numerical credit rating transformation similar to Chan and Chen (2007). I assign a credit rating value of one to S&P AAA ratings and add a value of one to each subsequent rating. Since risk uncertainty should be higher for the lower rated convertible bond issue, I assign a value of 1 for the highest rated issue (S&P rating of AAA) and 21 for the lowest rated issue in the sample (S&P rating of C). 'Ratingdiff' is used to measure this difference. This is a dummy variable which equals to 1 if the ratings from two rating agencies are different and 0 otherwise.

De Jong et al. (2012) assign a credit rating value of one to S&P AAA ratings and add a value of one to each subsequent rating. They assign a value of 19 for the convertible issue that is not rated by either credit agency. Loncarski et al. (2009) and De Jong et al. (2011) assign a BBB rating to unrated bonds. Bord and Santos (2012) use the lowest rating and median rating for the unrated asset-backed commercial paper. Since the SDC database does not report both S&P and Moody's rating scores for the majority of the convertible bond issues in the sample (i.e, there are only 181 out of 2118 issues which have both S&P and Moody's rating scores), I estimate firm opacity by following a two-step approach[11]. This method gives us more accurate result by using the relative possibility of rating difference rather than set the missing rating score as a certain number. First, I employ logit model to estimate "ratingdiff' dummy variable on a selective firm and issue specific variables (i.e., lnTA and proceeds/ total assets) for the convertible bond issues where I have both S&P and Moody's rating scores. Second, I apply the estimated coefficients of this regression to those convertible bond issues which have either single or no rating agency scores (i.e., the fitted values of the regression in the second step).

Arbitrage-related short selling. Research suggests that hedge fund arbitrage has negative impact on convertible bonds' abnormal return. Convertible arbitrage opportunities arise either when convertibles are under-priced or when arbitrageurs can exploit superior technology in managing convertible risk (Agarwal et al., 2007). To exploit under-priced convertible bond issues, convertible arbitrageurs buy convertible bonds and short the underlying common stock. The short selling creates downward pressure on the stock price

[11] Goddard et al (2011) use similar method to estimate beta for non-listed banks in the EU area.

of the convertible bond issuer (Arshanapalli et al., 2005; Loncarski et al., 2008, Duca et al., 2012).

The convertible bonds trading demand tends to move in the opposite direction of the convertible bond arbitrage activities. A typical convertible bond arbitrage strategy is that convertible arbitrage takes a long position in, or purchases, convertible securities, and simultaneously takes a short position in, or sells the same company's common stock. If the company's stock price falls, the hedge fund will benefit from its short position. On the other hand, if the stock price rises, the hedge fund can convert its convertible bonds into stock and sell that stock at market value, thereby benefiting from its long position, and ideally compensate for any losses on its short position (Choi, et al., 2009). Hence, short selling induced by hedging activities explains part of the stock price decline following convertible bond issues. Therefore, more hedge fund arbitrage trading on convertible bond induces more negative abnormal return. De Jong et al (2012) also provide evidence that a substantial part of the announcement date stock price effects associated with recent convertible debt issues can be attributed to hedging- induced price pressure. They exploit worldwide differences in short-sale constraints, and find positive impact on issue-date abnormal stock returns. The effect is stronger in years with higher hedge fund involvement, as well as for offerings expected to induce more arbitrage short selling. Henderson (2005) studies the under-pricing of convertible bonds at issue, as well as the risk and returns of the convertible bond arbitrage strategy. He finds that new issues of convertible bonds are under priced at issuance but that excess returns occur soon after issuance (mainly in the first six months). This can decrease the presence of convertible bond arbitrageurs over longer horizons.

While on the other hand, De Long et al (1990) argue that opacity limits informed arbitrage, the absence of which creates space for noise trading. If banks are more opaque than non-bank firms, arbitrageurs may have to bear a greater risk when hedging the security issued by them. To the extent that arbitrageurs are risk averse, the high risk and potential ruin from the accumulation of short-term losses reduce their willingness to hedge the convertible bond issued by banks (Jones et al., 2012). Therefore, the negative impact of hedge fund arbitrage may be significantly less for banks. Consequently, banks issued convertible bonds may have less negative abnormal return than non-bank firms. Therefore, I expect that banks issued convertible bonds are associated with lower negative abnormal return than non-bank firms since less arbitrageurs are willing to buy convertibles issued by banks

Although I do not have direct data on convertible bond arbitrage activity in individual issues, I am able to identify firms and dates on which I know that initial arbitrage positions are taken: convertible bond issuance dates. [12] Following Duca et al., (2012), I construct a measure of the amount of arbitrage-related short selling associated with each convertible bond offering, to test the arbitrage explanation for differences in convertible bond announcement returns of bank and non-bank industries. Firstly, I download short interest data from the Securities Monthly file of the CRSP-Compustat merged database during the sample period from January 1982 to December 2011. Then I scale the change in monthly short interest (ΔSI) by the number of shares outstanding (SO) measured on trading day -20 relative to the announcement date.

As argued by Choi et al. (2009), part of the observed increase in short interest around convertible bond offerings may be attributable to the short-selling actions of fundamental traders. Hence, in the second step, I isolate the portion of the ΔSI/SO measure that can effectively be attributed to short selling by convertible arbitrageurs by regressing ΔSI/SO on potential determinants of convertible arbitrageurs' interest in that particular convertible offering. I take the predicted value of this regression for each convertible bond issue as a measure of the change in short interest caused by arbitrage-related short selling for that convertible bond, namely, CBarbitrage.

I expect convertible arbitrageurs to be more interested in issuers with more liquid shares (since high liquidity makes it easier for them to obtain their hedging positions), with no dividend pay-outs (since dividends represent a cash outflow for short sellers), and with more volatile stock returns (since volatility positively affects the option value of the convertible, thus allowing a higher potential profit). I, therefore, consider the Amihud's (2002) measure of illiquidity, a dummy variable equal to one for convertible bond issuers that paid out a dividend in the previous fiscal year, and the issuer's stock return volatility as potential issuer-specific determinants of the arbitrage demand for convertible bond offerings.

Moreover, I expect arbitrageurs' interest in a convertible bond issue to be affected by the characteristics of the offering itself. I predict a larger increase in arbitrage-related short interest around offerings for which arbitrageurs need to short-sell a larger number of shares to hedge their positions. I, therefore, include the ratio of DeltaNeutral to shares

[12] Huang and Ramirez (2010) and De Jong et al (2011) document that announcement and issue dates coincide for the majority of U.S. convertible debt offerings. This finding can be attributed to the very fast placement of recent convertible bonds (Mitchell et al., 2007; Huang and Ramirez, 2010).

outstanding (SO), with DeltaNeutral representing the expected number of shares shorted by arbitrageurs following a delta-neutral hedging strategy. The typical convertible bond arbitrage strategy employs delta-neutral hedging and consists of two parts. The arbitrageur initially buys the convertible bond and sells short the underlying equity at the current delta. Next, if the price of the stock increases, the arbitrageur adds to the short position because the delta has increased. Similarly, when the stock price declines, the arbitrageur buys stock due to the decrease in the delta. [13]

According to Choi et al. (2009), using the change in short interest caused by arbitrage-related short selling for that convertible bond as a proxy for arbitrage activity has several advantages over using hedge fund databases to estimate convertible bond arbitrage activity. First, this provides a measure of positions taken by arbitrageurs in individual securities. Fund flows data in hedge fund databases are self-reported and therefore provide an incomplete measure of convertible bond arbitrage activity. The databases only partially represent the hedge fund universe, with many large funds choosing not to participate. Second, there can be style misclassification and funds reporting multiple strategies to hedge fund databases. Third, even if I measured the assets of the funds perfectly, the positions would still be unobservable due to the use of leverage.

lnTA is the natural logarithm of total assets, which measures the size of the firm. Previous studies (Kang and Stulz, 1996; Abhyankar and Dunning, 1999; Lewis et al., 1999) suggest that larger firms are likely to have a lower level of information asymmetry since larger firms are more likely to have greater analyst coverage and to undergo greater scrutiny by institutional investors. Information asymmetry tends to decrease with firm size (Vermaelen, 1981). Large firms may face less information asymmetry because they tend to be more mature firms, have established and time-tested disclosure policies and practices, and receive more attention from the market and regulators (Diamond and Verrecchia, 1991). Lewis et al. (2003), however, suggest that smaller firm face higher equity-related financing costs and the security issue follows a substantial increase in the firm's stock price. Richardson (2000) also suggests larger firm has higher level information asymmetry because that larger firm has more incentive for managing earnings to reduce political costs. Therefore, I do not have a clear expectation for the relationship between firm size and stock abnormal return.

[13] The calculation of delta is discussed in Appendix 2

Proceeds/Total assets are the relative size of the convertible bond offering, calculated as the offering proceeds divided by total assets. Miller and Rock (1985) theoretically link issue size with the strength of a security's signal to the market. Dutordoir and Van de Gucht (2007) suggest that all else equal, larger size offering may induce higher external financing costs, hence has more negative announcement impact on abnormal return. Mikkelson and Partch (1986), Jen et al. (1997) and Lewis et al. (1999) provide empirical evidence that the issue size is negatively related to stock abnormal return. Hence I expect a negative relationship between proceeds and stock abnormal return.

Equity/TA, calculated as total equity divided by total assets, is the measure of firm's equity level. Firms with lower equity level are considered as riskier, and facing higher expected costs of financial distress. Stein (1992) suggests that firms may issue convertible securities as an indirect method to increase the equity in their capital structures thereby reducing the adverse selection costs associated with pure equity issues. Therefore, firms with lower equity level benefit more from convertible issues. Therefore, I expect a negative relationship between the announcement period abnormal returns and equity level.

Maturity is the time between the issue date and the date on which the issue first can be converted to the shares of common stock in the issuing company or cash of equal value, at the agreed-upon price. Lewis et al. (2003) suggest that the conversion option of a bond with a longer maturity is assumed to be more equity-like. Since equity volatility is proportional to the square root of the time to maturity when stock prices follow a geometric Brownian motion process, an increase in maturity effectively increases the volatility of the conversion option, and hence the option value Following Myers and Majluf's (1984) adverse selection assumption, I expect more equity-like convertible bonds announcement to have more negative impact on the stock abnormal return. In Myers (1977) underinvestment problem, a longer term debt involves greater risk of a shift in corporate investment policies and aggravates the underinvestment problem. One approach to controlling this investment incentive problem is to shorten the effective maturity of the debt. Krasker (1986) also predicts that relatively larger equity-linked security issues should induce more negative announcement effect on stock returns. The debt maturity choice models used in Flannery (1986) and Kale and Noe (1990) suggest that firms that issue debt with longer maturities have better qualities. Easterbrook (1984) obtain at a similar conclusion high-quality firms reduce their agency costs of monitoring by issuing shorter maturity debt. Overall, research suggests that firms with a better performance issue convertible bond with longer maturity,

because they do not want convertible bondholders to convert their bond to common stock and share the profits with them. Datta et al. (2000) also provide empirical evidence that debt maturity could have a positive relationship with stock price. Thus, the length of maturity could also positively affect the stock abnormal return. Overall, I do not have clear expected sign for maturity.

Stock return volatility is the annualized bank stock return volatility, measures firm's riskiness, calculated from daily returns over the window (-250,-10) relative to the convertible bond announcement date. Since firms with high operational risk are expected to have a large expected cost of financial distress (Chang et al., 2004), I expect that firm's volatility is negatively related to abnormal return associated with convertible bond announcements. Duca et al., (2012), Dutordoir and Van de Gucht (2007) provide the empirical evidence in split-sample abnormal return regressions that the volatility of stock return is significant negatively related to the abnormal return in both hot and non-hot convertible debt markets, where hot convertible bond market means the periods with high convertible debt issuance volumes.

Stock run-up is a proxy for the level of equity-related financing costs faced by the convertible bond issuers. It is measured as the continuously-compounded non-market-adjusted daily stock return over trading days -60 to -2 (Duca et al., 2012). Dutordoir and Van de Gucht (2007) suggest that a firm with high stock run-up is more likely to be seen as overvalued by stockholders. Lewis et al. (2003) also find that firms with the high pre-issue stock run-up and high-risk firms are more likely to issue equity-like convertibles to reduce equity-related financing costs. Therefore, I expect the relationship between pre-issue stock run-up and convertible bonds announcement abnormal return is negative.

Market run-up is a measure of the overall market and economic conditions, as well as the growth expectations, during the period leading up to the security offer (see, for example, Korajczyk and Levy, 2003; Lowry, 2003). For equity issues, Choe et al. (1993) argue that the investor reactions are typically less negative in good economic conditions because of the lower costs of external equity financing during market expansions. From their observations, one can also expect risk uncertainty, asset substitution, and adverse selection costs will decrease during the economic blooming time. The empirical studies of Lewis et al. (2003) found no significant influence of market run-up on convertible bond abnormal return in the U.S. market, while Ammann et al. (2006) find a positive and negative impact, respectively.

Market volatility is the annualised market stock return volatility, or the market risk, which is calculated from daily returns on the S&P 500 index. Volatile stock market indicates macroeconomic deterioration, which may have a negative impact on convertible bond abnormal return. In addition, research suggests a strong positive correlation between market volatility and information asymmetry. Duca et al. (2012) provide empirical evidence that the volatility of market return is significant negatively related to the abnormal return of convertible bond issues. Hence, I expect market volatility has a negative impact on convertible bond abnormal return.

Rule 144A is a dummy variable used to control the effect of the Rule 144A private placement of convertible bonds. It equals to one for convertible bonds issued in 144A market, zero otherwise. Rule 144A was issued in 1990 in the U.S. to improve the liquidity and efficiency of private placement market by giving more freedom to institutional investors to trade securities. Securities under Rule 144A do not require registration with SEC (Securities and Exchange Commission) but can be traded without restriction in the secondary market among qualified institutional buyers (i.e. institutions own over $100 million in assets). Livingston and Zhou (2002) suggest that investors in 144A market have lower liquidity, information uncertainty, and weaker legal protection. Chaplinsky and Ramchand (2004) also suggest that high-quality firms issue in both markets but face higher yield spreads in the 144A market and low-quality firms that issue only in the 144A market. Therefore, I expect that convertible bonds issued in 144A market have negative announcement effect. Carayannopoulos and Nayak (2013) provide empirical evidence that issuers of convertible bonds under Rule 144A experience a negative stock reaction around the announcement day.

3.5 Summary statistics

Before proceeding to the regression analysis, Table 3.1 reports the summary descriptive statistics of CAR and firm-, issue- and market-specific characteristics of the whole sample over the sample period. The mean, median, minimum and maximum of proxies for market conditions and other issue and firm characteristics for the convertible bond samples are shown in the table. The detailed definitions of variables are provided in Appendix 1.

There are in total 2,133 issues, and in general, convertible bond issues have a negative cumulative abnormal return (-2.55%). The mean value of the CAR for the whole sample is

significantly different from 0 at 1% level. The highest and the lowest 2% of each variable have been eliminated from the sample to mitigate the potential distortions that may be resulted from the extreme outliers. I find that the value of total assets ranges from 4.43 million to 19.64 million, with a mean of 13.04 million US dollars. It shows a quite large variation in the size of firms which issued convertible bonds. However, the size of issues (Proceeds/Total assets) remains relatively low at on average 0.04%. The equity level of the firms (Equity/Total assets) has a wide range from 0 to 91.55%, which indicates that the variation of sample firm's level of capital risk is large. The average length of maturity is 16.82 years, while the range of maturity is from 0.08 to 99.99 years indicating a large variation in the length of maturity. In line with Ducat et al., (2012), the average market run-up is 4.22%, while the average market volatility is 17.08%. The mean value of Opacity is 0.76, which suggests that the sample firms have on average 76% probability to have rating scores different from the two rating agencies. For CBaribitrage I only have available data for 713 sample issues, and the mean value is 0.01. I find an average value of 0.015 for the ratio of monthly short interest by the number of shares outstanding measured on the trading day -20 relatives to the announcement date. This figure is similar to values recorded by Duca et al, (2012), Choi et al (2009), and De Jong et al. (2011).

Table 3.1 Summary statistics for the whole sample

Variable	obs	mean	stddev	median	min	max
CAR	2133	-2.55	6.68	-2.17	-23.22	27.46
Total assets	2133	13.04	2.13	13.14	4.43	19.64
Proceeds/Total assets	2133	0.04	0.04	0.02	0.00	0.22
Equity/Total Assets	2133	43.99	25.38	44.96	0.00	91.55
Maturity	2133	16.82	20.79	10.12	0.08	99.99
Stock run-up	2133	18.43	47.82	13.03	-136.85	538.68
Market run-up	2133	4.22	7.25	4.63	-43.89	29.99
Stock return volatility	2133	64.69	55.65	50.25	8.11	633.58
Market volatility	2133	17.08	8.30	14.49	7.25	49.35
Opacity	2133	0.76	0.17	0.79	0.00	1.00
CBarbitrage	713	0.01	0.02	0.01	-0.21	0.03

Notes: This table provides descriptive statistics for issuer-specific, firm-specific, and macroeconomic variables for the whole sample over the period from January 1982 to December 2011. The cumulative abnormal stock return (CAR) is calculated using standard event study methodology and measured over the window (-1, 1) relative to the announcement date, using market model methodology with time window (-250, -10). All the ratios are in percentages, while Total assets are in million US dollars.

Panel A of Table 3.2 provides the t-test results for pairwise differences in the means between the bank and non-bank firm. The convertible bond offerings for non-banks have significantly negative CAR at -2.62% in the day interval between -1 and +1, which is consistent with Dutordoir and Van De Gucht (2004). In line with the hypothesis, I find the abnormal return associated with bank issued convertible bond is less negative than non-bank firm issued (-0.8 % versus -2.62%), and the difference is significant at 1% level.

The table further shows the statistics of the control variables. On average, banks have a higher level of log total assets than non-bank firms (15.02 versus 12.95). This is not a surprising finding given that banks tend to be large organisations. However, compare to non-bank firms, banks have significantly lower proceeds/total assets ratio (0.01% versus 0.04%), and lower equity level (18.02% equity/total assets ratio versus 45.11%). On average, banks also have lower stock run-up (6.19% versus 18.96%), and lower stock return volatility than non-bank firms (61.44% compares to 64.83%). The market run-up difference is significant, but at a marginal level (5.31% versus 4.18%). In line with Morgan (2002) and Iannotta (2006), banks are generally found to be more opaque than non-bank firms. On average there is 84% probability that the two rating agencies would give different ratings for bank issued convertible bonds, while this probability for non-bank firms is 76%, where the difference is also significant at 1% level. However, the difference between arbitrage demands for banks issued convertible bonds and non-bank firms issued is small and insignificant.

Panel B of Table 3.2 shows the number of convertible bond announcements for banks and non-bank firms. Banks do not have of convertible bonds in the year 1988, 1989, 1990, 1993, 1994, 1997 and 2011. The numbers of observations for both institutions increase after the year 2000. Bank issued convertible bonds increase over years. The number of issues reaches the highest point 2009.

Table 3.2 Summary statistics

Panel A: Overall statistics

	Panel 1: Banks						Panel 2: Non-banks							
Variable	obs	mean	stddev	median	min	max	obs	mean	stddev	median	min	max	mean of Panel 1 vs mean of Panel 2	median of Panel 1 vs median of Panel 2
CAR	88	-0.8	7.46	-0.63	-27.44	31.79	2045	-2.62	7.94	-2.71	-27.44	31.79	1.82***	2.08
lnTA	88	15.02	18.90	4.32	0.06	52.70	2045	12.95	5.53	0.02	0.02	52.70	2.07***	4.30
Proceeds/Total assets	88	0.01	0.02	0.00	2.35E-05	0.10	2045	0.04	0.14	2.22	0.00	5.35	-0.03***	-2.22
Equity/Total assets	88	18.02	18.85	9.29	1.37	73.22	2045	45.11	24.82	45.96	0.00	91.55	-27.09***	-36.67
Maturity	88	17.11	13.93	20.29	1.01	99.90	2045	16.8	20.42	10.12	0.08	99.99	0.31	10.17
Stock run-up	88	6.19	24.27	6.53	-64.68	118.11	2045	18.96	41.70	13.03	-136.85	538.68	-12.77***	-6.50
Stock return volatility	88	5.31	6.54	3.93	-13.59	27.30	2045	4.18	7.17	4.55	-43.89	29.99	1.13	-0.62
Rule 144a	88	61.44	39.40	35.00	8.11	161.48	2045	64.83	46.62	49.67	11.95	633.58	-3.39	-14.67
Market run-up	88	18.38	8.64	12.36	7.35	49.09	2045	17.02	8.02	14.49	7.25	49.35	1.36	-2.13
Opacity	88	0.84	0.13	0.86	0.00	1.00	2045	0.76	0.17	0.79	0.00	1.00	0.08***	0.07
Cbarbitrage	77	0.01	0.18	-0.09	-0.83	0.54	686	0.01	0.74	-0.09	-0.83	5.96	0.00	0.00

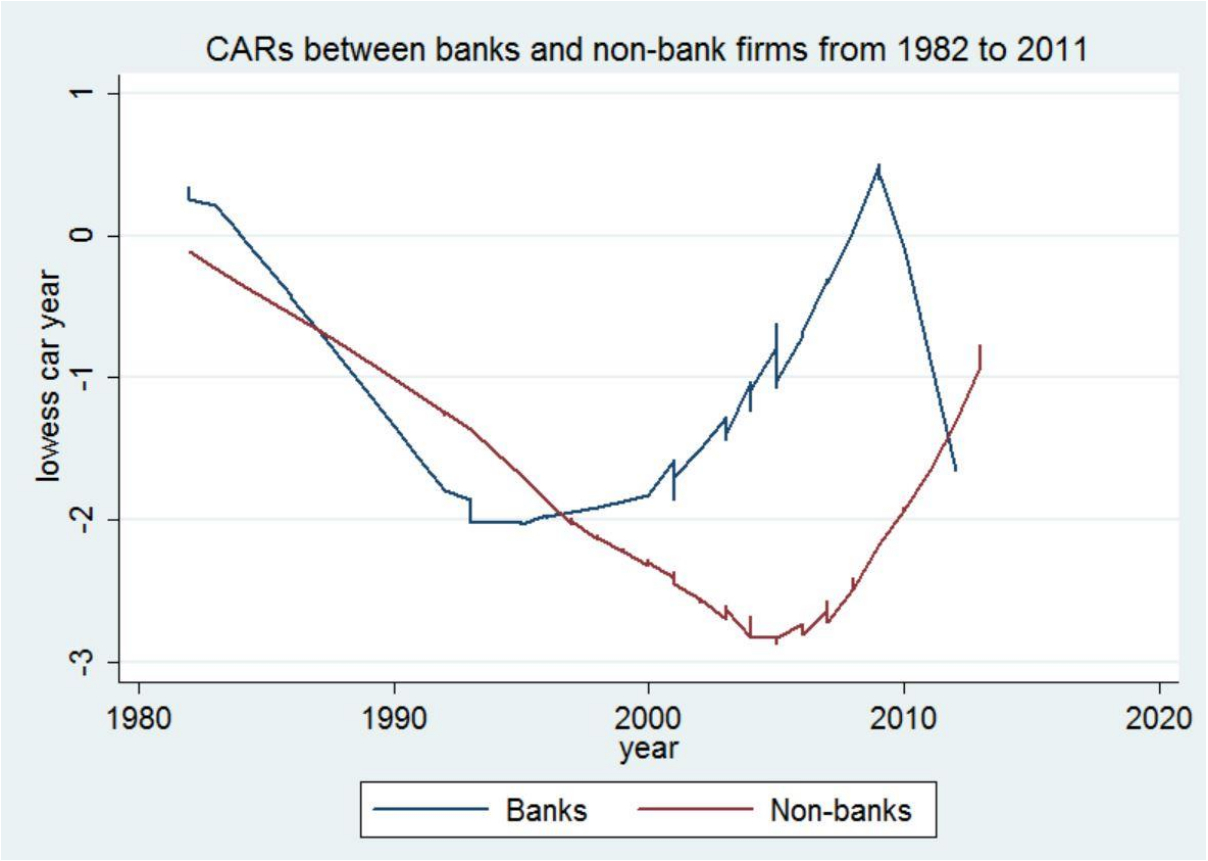
Panel B: Number of observations (Yearly)

Year	Banks	Non-banks	Year	Banks	Non-banks
1982	2	24	1998	1	51
1983	1	33	1999	1	37
1984	4	21	2000	1	95
1985	5	62	2001	5	163
1986	3	77	2002	1	103
1987	2	75	2003	4	221
1988	0	28	2004	8	155
1989	0	24	2005	10	94
1990	0	21	2006	3	124
1991	1	36	2007	6	135
1992	1	52	2008	4	75
1993	0	53	2009	18	92
1994	0	16	2010	1	66
1995	2	29	2011	0	59
1996	4	94			
1997	0	127	Total	88	2045

Notes: Panel A of this table provides the summary statistics and t-test for the cumulative abnormal return (CAR) and firm-specific, issue-specific and macroeconomic variables of banks and non-bank firms over the sample period January 1982 to December 2011. Variables are defined as outlined in Appendix 1. CAR is calculated using standard event study methodology. I use student t-test to examine the differences the mean value of CAR and each firm-, issue-, and market-specific characteristic between banks and non-bank firms. Total assets are in million US dollar. Obs denotes the number of observations. *, **, *** represent significance at the 10%, 5% and 1% significance level, respectively. Panel B of this table reports the number of observations for both bank and non-bank institutions each year across the sample period.

Overall, the summary statistics are consistent with the first hypothesis that bank issued convertible bond has less negative abnormal return upon issue announcement than non-bank firms. I also find that on average, banks have a larger size, but smaller relative size convertible bond issuance, lower equity level, less firm riskiness and lower equity-related financing cost. The market and economic condition and growth expectation for banks and non-bank firms are similar. Banks generally are more opaque than non-bank firms. However, banks issued convertible bond has the similar arbitrage demand as non-bank firms issued.

Figure 3.1 further depicts annual abnormal returns for banks and non-banks separately. I find that banks tend to experience higher abnormal returns over the duration of the sample period with only a few exceptions. The trend analysis shows that this difference is not driven by any particular time period, for example, the early 2000s dot.com bubble, and the 2007-09 global financial crisis.



3.6 Multivariate analysis

The regression analysis described in this section evaluates the difference between the abnormal return of banks and non-bank firms while controlling for exogenous factors. Firms' cumulative abnormal return is used as the dependent variable to test whether banks have less negative abnormal return than non-bank firms.

Table 3.3 presents the results of the cross-sectional regression specifications with the cumulative abnormal return over the window (-1, 1) relative to the convertible bond announcement date as the dependent variable. Specification 1 only regresses on bank dummy, while specification 2 includes bank- and issue-specific variables. In Specification 3, I further control for the market conditions. A year crisis dummy is included in specification 4, which equals to 1 for convertible bonds issued between the year 2007 and year 2009, and 0 otherwise. In specification 5 and 6, Opacity and CBarbitrage are included respectively, one at a time, to investigate whether the differences between a bank and non-bank firm's abnormal return, if any, is influenced by the firm level of opacity and arbitragers induced convertible bond arbitrage.

The bank dummy variable enters the regression positively and significantly at 1% significant level in all specifications, which indicates that banks have higher cumulative abnormal return upon convertible bond announcements than non-bank firms. The difference is also economically significant. The parameter coefficient equals to 2.889 after controlling for a number of variables (specification 5), which indicates that bank's announcement returns for convertible bond offerings are 2.889% higher than the counterpart returns experienced by non-bank firms. This result supports the hypothesis that less negative stock abnormal return upon convertible bond offerings should be found for banks than non-bank firms.

Control variables in the regressions tend to have the expected signs. Larger firms in size (lnTA) tend to have a negative impact on the abnormal stock return upon convertible bond announcements, indicating that larger firms tend to be more complex and have more incentives to manipulate earnings account, and hence have a higher level of information asymmetry, which is consistent with Richardson's (2000) theory.

The coefficient on the relative size (Proceeds/Total assets) of the convertible bond issue is negatively related to abnormal returns at 10% level. The Larger issue size is associated with a higher external financing cost, and therefore brings the negative impact. This result is consistent with Dutordoir and Van de Gucht (2007). In line with Chang et al. (2004), the equity level of the firm is found to have a significant negative impact on convertible bond abnormal return. A firm with lower equity level are considered as riskier, and facing higher expected costs of financial distress, which would benefit more from convertible bond issues. Consistent with Brennan and Kraus (1987) and Brennan and Schwartz (1988), I find a longer maturity is related to a more positive stock price reaction. Maturity enters all regressions positively and significantly. Better perform firm tends to issue convertible bonds with longer maturity because they do not want bondholders to convert the bond to shares. On average 1-year longer of maturity is associated with a 0.03% increase in the cumulative abnormal return. As expected, the stock price reacts more negatively to the announcement of convertible bond issuance by a firm with a higher stock run-up. According to Lewis et al (2003), firms with the high pre-issue stock run-up and high-risk firms are more likely to issue equity-like convertibles to reduce equity-related financing costs. These equity-like convertibles are often seen as overvalued by investors, therefore there will be a downward pressure on the stock price, which may be associated with a decrease in the abnormal return. Consistent with Lewis et al., (1999, 2003), Chang et al. (2004), Dutordoir and Van de Gucht (2007), and Lee

et al. (2009), I do not find a significant impact of firm risk (measured as stock return volatility) on abnormal returns. In line with Livingston and Zhou (2002) and Duca et al. (2012), the results also show that issuers of convertible bonds under Rule 144A experience a negative stock price reaction to the offering because investors in 144A market have lower liquidity, information uncertainty, and weaker legal protection.

To assess the contribution of the market conditions to the announcement effect of convertible bonds, I control for market volatility and market run-up. These two variables are all positively related with the cumulative abnormal return but not significant. Therefore, these results indicate that stock price reaction to convertible bond announcements is not influenced by the market conditions, such as growth expectations and market risk. These results are also consistent with Lewis et al. (2003) and Duca et al. (2012).

As the expectation, the result shows that the Global Financial Crisis has a negative impact on the announcement effect of equity offerings since the coefficient of year crisis is significantly negative.

The "opacity" enters the regression significantly and negatively, indicating a higher probability of disagreement of the two rating agencies is associated with the lower abnormal return. The impact is also economically important. A disagreement between two rating agencies will reduce the CAR by 1.573% points than those which have the same ratings. This result is consistent with the expectation that the level of firm opacity increases information asymmetry, and hence more negative abnormal return.

The results show that arbitrage activity (CBarbitrage) have significant negative impact on convertible bond abnormal return at 1% significant level. This result indicates that more arbitrage activities for convertible issues induce less abnormal return associated with the convertible bond announcement. Arbitrageurs' investment behaviour of buying convertible bonds and short selling equities simultaneously makes stock price react negatively and reduces the convertible bond abnormal return (Brown et al., 2012).

The overall results from the univariate analysis hold even after adjusting from firm-, market-, and issue- characteristic. The results from multivariate analysis suggest that banks issued convertible bond's cumulative abnormal return is generally significantly larger than that of non-bank institutions issued. This result is robust even after I control for other bank-,

issue-specific and stock market conditions, particularly the level of firm opacity, and the arbitrage demand by convertible bond arbitragers.

Table 3.3 Regression analysis of convertible bond announcement effects

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Bank	2.608***	2.886***	2.904***	1.452***	2.889***	2.373**
	(0.001)	(0.001)	(0.001)	(4.203)	(0.001)	(0.026)
lnTA		-0.368***	-0.375***	-0.185**	-0.309**	-0.393
		(0.003)	(0.003)	(2.298)	(0.016)	(0.122)
Proceeds/Total assets		-1.436	-1.46	-1.313	-1.758*	-5.918
		(0.174)	(0.163)	(1.416)	(0.063)	(0.459)
Equity/Total assets		-0.015*	-0.015*	-0.007	-0.015*	-0.027*
		(0.079)	(0.075)	(1.167)	(0.076)	(0.058)
Maturity		0.032***	0.033***	0.020**	0.033***	0.014
		(0.004)	(0.004)	(2.532)	(0.004)	(0.421)
Stock run-up		-0.017**	-0.018**	-0.014***	-0.018**	-0.017
		(0.03)	(0.023)	(2.824)	(0.022)	(0.23)
Stock return volatility		0.006	0.006	0.006	0.007	-0.046**
		(0.461)	(0.433)	(1.309)	(0.422)	(0.021)
Rule 144a		-0.575	-0.575	-0.717**	-0.56	-0.76
		(0.181)	(0.181)	(-2.259)	(0.193)	(0.306)
Market run-up			0.039	0.024	0.039	0.094
			(0.335)	(0.447)	(0.331)	(0.127)
Market volatility			0.026	0.058**	0.027	-0.052
			(0.765)	(2.192)	(0.753)	(0.666)
Year crisis				-3.489*		
				(1.884)		
Opacity					-1.573**	-1.940*
					(0.036)	(0.078)
Cbarbitrage						-86.740***
						(0.000)
Constant	1.146	3.76	2.849	0.524	3.138	9.749**
	(0.717)	(0.119)	(0.352)	(0.346)	(0.304)	(0.027)
N	2133	2133	2133	2133	2133	713
adj. R-sq	0.017	0.04	0.04	0.050	0.041	0.035

Notes: This table presents the results of a regression analysis of announcement-period cumulative abnormal stock returns of convertible bond on a number of potential determinants. The dependent variable is the cumulative abnormal return measured over the window (-1, 1) relative to the announcement date, calculated using standard event study methodology. N denotes the number of observations. Detailed definitions of variables can be found in Appendix 1. *, **, *** represent significance at the 10%, 5%, and 1% significance level, respectively.

3.7 Robustness tests

3.7.1 Differences in CARs across different industries

A further robustness test is undertaken in relation to the differences across industries. In Table 3.4 I explore whether banks experience less negative announcement returns in relation to individual industries across non-bank firms: manufacturing, wholesale retail, services, transportation, telecommunication, construction, mining and utilities. I use eight industry classifications, a rather wide definition, to have a reasonable amount of observations available per industry. I only include those industries with more than 15 observations across the whole sample period.

Different from non-bank firms, banks are monitored by both the market and the regulator and are constrained in terms of the timing and choice of financing (Poloncheck et al., 1989). The security issuance process by banks is also frequently mandated by bank regulators. Through chartering, proposals for new banks are screened to prevent undesirable people from controlling banks, therefore reduce the adverse selection problem. The regulation also limits the freedom and flexibility of bank managers to set the quantity of capital, to choose the type of capital, and to time security offerings to take advantage of differential information between the managers and the public (Poloncheck et al., 1989).

The results show that the parameter coefficients across other industries are negative and mostly statistically significant. These results offer further support that banks experience less negative announcement returns on convertible bonds announcements in comparison to counterpart non-banks. I observe, however, that the differences in CARs between telecommunications industry and banks are not statistically significant. Telecommunications industry has traditionally been subject to a complex federal and state regulation in the U.S., since telecommunications services are based on an increasingly sophisticated and complex network of services that differ in distance, quality, amount and nature of data, etc. (Economides, 2008), and the regulation is even strengthened after the Telecommunications Act of 1996.

Table 3.4 Industry estimations

Bank	(1)
lnTA	-0.371***
	(-2.956)
Proceeds/Total assets	-7.748
	(-1.263)
Equity/Total assets	-0.003
	(-0.314)
Maturity	0.016*
	(1.817)
Stock run-up	-0.008
	(-1.197)
Stock return volatility	-0.003
	(-0.378)
Rule 144a	-1.091***
	(-2.791)
Market run-up	-0.052
	(-0.744)
Market volatility	0.027
	(0.830)
Manufacturing	-2.499***
	(-3.432)
Wholesaleretail	-2.428***
	(-3.175)
Services	-2.515***
	(-3.313)
Transportation	-3.345***
	(-3.221)
Inforcommunication	-1.496
	(-1.551)
Construction	-4.852***
	(-3.774)
Mining	-1.478*
	(-1.697)
Utility	-1.922**
	(-2.183)
constant	6.908***
	(3.164)
N	1835
adj. R-sq	0.053

Notes: This table presents the comparison analysis of the cumulative abnormal stock returns upon convertible bond offerings across different industries. The default is banks. The dependent variable is the cumulative abnormal return measured over the window (-1, 1) relative to the issue date.

3.7.2 Matched sample methodology

I also concerned with the robustness of the methodology used in this study so far. One may argue that the sample between banks and non-banks are not balanced (88 vs. 2,045), and this imbalance may cause bias in the resultsFollowing Faulkender et al. (2012), I use the Mahalanobis matching method to compare the CARs of banks issued and non-bank firms issued convertible bonds by matching each sample bank with a controlled non-bank firm on the basis of important characteristics as a robustness test. The Mahalanobis distance is a measure of the distance between a point P and a distribution D (Mahalanobis, 1936). It is a multi-dimensional generalization of the idea of measuring how many standard deviations away P is from the mean of D. This distance is zero if P is at the mean of D, and grows as P moves away from the mean: along each principal component axis, it measures the number of standard deviations from P to the mean of D. I select the firm whose size, and relative size of proceeds/total assets ratio is closest to the bank as the non-bank control firm. These matches are nevertheless imperfect, so I control for these differences in the regression.

$$\Delta \mathrm{CAR}_i = \delta_0 + \delta_1 \left(\Delta \frac{\mathrm{Equity}}{\mathrm{Totalasset}_i}\right) + \delta_2 (\Delta \text{ stock runup}_i) + \delta_3 (\Delta \text{ stock return volatility}_i) + \delta_4 (\Delta \text{ market volatility}_i) + \delta_5 (\Delta \text{ market runup}_i) + \delta_6 (\Delta \text{ maturity}_i) + \mu_i \quad (4)$$

Where $\Delta \mathrm{CAR}_i$ denotes the i^{th} bank's CAR less that of its control firms estimated into a number of bank characteristics.

The estimated value of δ_0 thus measures the mean excess CAR of bank issued convertible bond over its control firm, after controlling for differences in firm-, issue- and market- specific variable between banks and control. The regression results are reported in Table 3.5. The results are robust with this alternative methodology, showing that bank issued convertible bond has higher abnormal return than non-banks, since after controlling for the differences in various characteristics, the constant term (δ_0) is still significantly positive. In particular, the constant term shows that banks have higher abnormal returns by 2.438 percent than non-banks.

Table 3.5 Matched sample test

Variables	Parameter estimate (t-value)
	(1)
ΔEquity/Total assets	-0.002
	(-0.034)
Δstock run-up	-0.053
	(-1.171)
Δstock return volatility	-0.018
	(-0.810)
Δmarket volatility	-0.120**
	(-2.178)
Δmarket runup	0.17
	(1.316)
Δmaturity	-0.058
	(-0.873)
constant	2.438**
	-2.268
N	88
adj. R-sq	0.08

Notes: In this table, I match each bank institution with a non-bank institution based on size and relative size of proceeds/total assets. The dependent variable is the cumulative abnormal return of bank issued convertible bond less that of its matched non-bank institution issued convertible, which is measured over the window (-1, 1) relative to the announcement date. Constant denotes the constant term δ_0. N denotes the number of observations. *, **, and *** represent significance levels of 10%, 5% and 1%, respectively.

3.8 Conclusions

Convertible bonds are attractive middle ground between equity and straight debt, which has become more popular since the financial crisis. Previous literature focused on non-banks and generally found significantly negative stock price effects associated with convertible bond offerings. This study focuses on the wealth effect of US banks. Banks differ significantly from non-banks especially in the aspect of the level of regulation that reduces the level of asymmetric information. I, therefore, hypothesise less negative share price reaction for banks that issue a convertible bond.

This chapter examines the announcement effect of convertible bond issued by banks by using the U.S. firms' data from January 1982 to December 2011. The abnormal returns are measured by using the Ordinary Least Squares (OLS) regression and calculate the cumulative abnormal return (CAR) by using market model and event study methodology. I find that banks issued convertible bond is generally 2.889% significantly larger than that of non-bank institutions. These regulation changes increased bank capital requirement and encouraged voluntary disclosure, and thus reduced the level of information asymmetry between managers and investors, to more favourable stock abnormal return upon convertible bond offerings for banks than non-banks. The results hold strong after adjusting for a number of firm-, issue-, and market-specific characteristics. I also find that arbitrageurs' activity of buying convertible bonds and short selling equities induce significant downward pressure on stock price, however, this effect cannot explain the full difference in CARs between banks and non-banks.

Chapter 4 Empirical analysis: Difference in Seasoned Equity Offerings announcement effect between banks and non-banks

4.1 Chapter introduction

Consistent with the signalling model of Myers and Majluf (1984), which argues that SEO announcement signals firm overvaluation, literature on the announcement effects of SEOs by non-banks finds that SEO announcement induces negative abnormal stock returns (Smith, 1986; Mikkelson and Partch, 1986; Barclay and Litzenberger, 1988; Hansen, 1898; Eckbo and Masulis, 1992; Corwin, 2003). However, banks raising new equity give the market a conflicting signal. On one hand, it gives the market a signal that banks are willing to engage with capital regulation and to increase the bank's safety (Keeley, 1989). On the other hand, it may reveal private information that the bank is in financial trouble and have to raise new equity capital to survive the adverse conditions (Krishnan et al., 2010). This chapter attempts to examine the difference in the announcement effects between banks' and nonbanks SEOs.

The hypothesis is that the cumulated abnormal return (CAR) of bank SEO announcement is less negative than that of non-bank. First, Keeley (1989) argues that bank regulation reduces the information content that otherwise would be revealed by a security issuance (in general negative), and consequently stock announcement effects might be higher for bank SEOs than those of non-banks. The regulation also limits the freedom and flexibility of bank managers to set the quantity of capital, to choose the type of capital, and to time security offerings to take advantage of differential information between the managers and the public. Booth et al (2002) find that regulations (of banks and utility firms) reduce the impact of managerial decisions on shareholder wealth, and hence help to address the agency conflicts. This means bank SEO is less likely to be assumed as overvalued by the market and has less information asymmetry problem between managers and investors than a non-bank SEO (Polonchek et al., 1989).

Second, Polonchek et al. (1989) suggest that, unlike non-banks, banks are monitored by both the market and a regulator, and bank capital structure decisions are constrained by regulation. Regulators impose minimum capital ratios and restrictions on the types of securities that qualify for inclusion in these ratios. The capital requirement forces banks to have more of their own capital at risk and may thus have less incentive to invest in high return but with high-risk level project (Hellmann et al., 2001). Furlong and Keeley (1989)

analyses the theoretical relationships between capital regulation and bank asset risk. They find that a higher bank capital ratio does not lead value-maximising banks to increase asset risk. On the contrary, more stringent capital requirements reduce the gains to a bank from increasing the risk of its asset portfolio. Koehn and Santomero (1980) and Kim and Santomero (1988) also argue that the bank cannot diversify its risk completely because it is owned and managed by the same agent. The capital requirement restricts the bank's risk-return frontier and forces it to reduce leverage and to reconfigure the composition of its portfolio of risky assets. With less bank asset risk under capital regulation, investors are more inclined to build up the confidence of bank SEO than a non-bank SEO.

Finally, banks are perceived to benefit from the government's implicit too-big-to-fail (TBTF) policy. In principle, the government can always close a failing bank as soon as the bank becomes insolvent. In practice, the number of options available to regulators for handling the bank insolvency problem decreases with the severity of the problem (Hoggarth et al., 2004; Barth et al., 2006). Investors may hence require fewer discounts to the SEOs by banks than non-banks given the perception of TBTF.

In this chapter, I examine 375 SEO announcements of U.S. banks and compare their announcement returns in relation to those of counterpart non-banks from 1982 to 2012. The baseline results support the hypothesis that the announcement effect of banks is less negative than that of non-banks. The cumulative abnormal returns over the three-day period (-1, 1) around the announcement date for banks is -0.96 percent, which is 0.61 percentage points higher than that of non-banks. These results hold even after controlling for various firm-, issue-, and market-specific variables.

The remainder of this chapter is organized as follows. At first, section 4.2 outlines the process of quantitative data collection and analysis, including the data sources and the sample selection. Section 4.3 presents the research methodology used in this chapter. Section 4.4 discusses the control variables used in this chapter, including the measure of firm opacity and hedge fund arbitrage induced shot-selling (arbitrage demand), which are both related to the hypotheses. Section 4.5 outlines the descriptive statistics of depending, independent, and control variables used in the regression models. After that, the estimated OLS results and some robustness test results are discussed step by step in section 4.6. Section 4.7 discussed the results of the robustness tests. Finally, section 4.8 provides the overall discussions and conclusions.

4.2 Data sources and data selection

I collect the full sample of U.S. common stock offerings from SDC database during the sample period January 1, 1982, to December 31, 2012. I only include the offers issued by a firm listed on either the NYSE or Nasdaq. I identify the sample using the database of the Centre for Research in Security Price (CRSP). The criteria for selecting offerings for inclusion in the final sample are as follow:

- The firm's account data must be reported in Compustat;
- The offering announcement date must be available on SDC;
- The comparison of issuances is between commercial banks (SIC codes 6000 to 6199) and non-bank companies. From the latter group, I exclude issues from other industries which may face regulation restrictions, i.e., utilities (SIC codes 4900 to 4999), and non-bank firms (SIC codes 6300-6499, 6200-6299 and 6500-6999). Non-bank firms include insurance carriers, security and commodity brokers, dealers, exchanges, and services, and real estate.

Lease et al. (1991) note that stated offer dates are often inappropriate for analysing price effects due to the fact that some offers take place after the close of trading. They examine time stamps from the Dow Jones News Service (DJNS) and find that 25% of offers from 1981 through 1983 take place after the close. Similarly, Eckbo and Masulis (1992) identify offer dates using both the DJNS and the closing price listed in the final prospectus and find that 20% of offers from 1963 through 1981 take place after the close. Safieddine and Wilhelm (1996) note that even time stamps from the DJNS may not identify the true time of the offer. They apply a volume-based correction and find that 18.4% of offers from 1980 through 1991 require an offer-date correction. Following Safieddine and Wilhelm (1996), I apply a volume-based correction. Specifically, if the trading volume on the day following the offer date is more than twice the trading volume on the SDC offer date or more than twice the average daily volume over the previous 250 trading days, then the day following the SDC offer date is designated as the offer date. The dataset consists of 3,710 equity issues out of which 366 are issued by banks and the remaining 3,344 by non-bank firms.

4.3 Methodology

This chapter is using the same research method as the chapter as mentioned in section 4.3. The CARs are also generally measured by standard event study methodology as described in Brown and Warner (1985).

3-day event window from the day -1 to day +1[14] is used in this chapter. A 240-day (day -250 to day -10) period for each firm is used for the estimation for the abnormal returns by using the market model. The CAR over the 3 days event window is then calculated.

I also include firm-, issue-, and market-specific variables in the analysis of SEO announcement stock returns respectively.

4.4 Control variables

The detailed definitions of the variables used in the study are provided in Appendix 1. All firm- and macroeconomics-specific characteristics included in the regression analysis are measured at the fiscal year-end preceding the equity announcement date. I control for the following firm-, issue- and market-characteristics:

Secondary shares are offerings in which all of the shares are being sold by existing shareholders (Gao and Ritter, 2010). Issuers of equity issuances with secondary offers are more frequently older and have a larger book value of assets, sales, cash flow margins, and proportions of tangible assets (Brav and Gompers, 2003), which are associated with the lower asymmetric information. Secondary shares reduce primary share being issued in equity of a given size, and underwriters tend to accept secondary offers only for high-quality issues, which reduces the adverse selection associated with the issuance of primary shares as noted by Ljungqvist and Wilhelm (2003). They assume that an agency problem between the issuer and underwriter in the spirit of Baron (1982) and Biais et al. (2002) gives rise to under-pricing. Other things equal, then, insiders should bargain for more aggressive positive revisions when their stakes are larger and more concentrated and when they are selling more

[14] I also examine the alternative event window (-1, 0), (-2, +2), and (-5, 5). The main results stay the same.

secondary shares. This leads me to expect a positive relation between secondary shares and equity offering effect.

Equity ratio, calculated as total equity divided by total assets, is the measure of firm's equity level. Firms with lower equity level are considered as riskier, and facing higher expected costs of financial distress. Bah and Dumontier (2001) and O'Brien (2003) also show that companies with higher research and development and advertising expenses have higher levels of equity. Therefore, I expect a positive relationship between the equity level and the stock price reaction of the equity offering.

The issue size is defined as the number of new shares offered divided by the number of existing shares outstanding prior to the offering. It is used test the information effect. The amount of new equity may represent an unanticipated deficit in internal cash flow and thus negative offering effect as predicted by Myer and Majluf (1984). Miller and Rock (1985) also posit that external equity issues indicate a shortfall of cash flow relative to expectations and a need for external financing, implying an unfavourable share price effect. Therefore, the larger the issue size, the more negative the price reaction to the offering. On the other hand, Tan et al. (2002) document that the larger an equity issue, the more favourable the news about the earnings prospects and investment opportunities of the firm, and the more positive the price reaction to the offering. Earlier studies also find conflicting evidence, as Mikkelson and Partch (1986) find that the issue size is not a significant variable while Asquith and Mullins (1986) find the same variable to be statistically significant in a multiple regression including the preannouncement return as a second explanatory variable. Masulis and Korwar (1986) find that the issue size is statistically significant in two or three multiple regressions. Therefore my expectations on the relationship between issue size and the equity offering announcement effect are mixed.

Firm Size is used to test the price pressure effects. It is measured as the natural logarithm of total assets. Followed by Loderer et al. (1991), larger expected return is required if investors have already tied up a substantial portion of their wealth to hold the stock of a large firm. Corwin (2003) also argues that small firms are more uncertainty. When they issue new equity, there should be more information asymmetry problem between issuers and investors. Therefore, I expect a positive relationship between firm size and the stock price reaction of equity issues.

Rule 415 shelf is a dummy variable equals to 1 for the issuer under shelf registration rules who can decide to make an SEO any time within a two-year window, choosing from a large list of potential underwriters. Under this rule, issuers (including both banks and non-bank firms) can make the decision to go to the market and then sell an issue within minutes, and offering dates can be timed to take advantage of favourable market conditions, which could increase the price reaction. Before Rule 415, for select companies, SEC regulations required a minimum delay of 48 hours between the decision to make the offering and the actual sale. For some companies, the delay could be several weeks to several months. This rule also increases the competition among underwriters, which potentially lowering underwriting fees. The issuers may find it cost-effective to make many small offerings through various underwriters. But on the other hand, there may be a 'market overhang' problem, that stock price may fall since putting the shares on the shelf increase their potential supply without any offsetting increase in demand. Some investment bankers argue that the traditional offerings provide better services than shelf offerings which include the marketing and stabilisation activities of the underwriters. These services may result in a higher offering price than shelf offerings. Lee and Masulis (2009) also argue in a shelf offering, underwriters may not be able to discharge adequately their traditional due-diligence responsibilities due to the uncertainty surrounding the timing of the shelf offering and the speed with which a shelf offering can be made. The intensification of the competition among underwriters also creates further eroded due diligence and increases adverse selection risk. Therefore, this rule may raise underwriting fees. Autore et al. (2008) report that shelf registered SEOs have lower underwriting fees, consistent with the underwriter's competition effect. Therefore, my expectations on the relationship between Rule 415 and the equity offering announcement effect are mixed.

Share turnover is the trading volume divided by the number of shares outstanding (Gao and Ritter, 2010). This variable is used to measure the level of information asymmetry. Theories suggest that banks are more opaque than non-bank firms (Morgan, 2002; Iannotta, 2006; Haggard and Howe, 2012), hence banks may have more information asymmetry than their non-bank counterparts. The inherent complexity of banks and the nature of the underlying assets make them opaque (Jones et al., 2012). Slovin et al. (1992) suggest that although there is disclosure requirement, banks are not required to disclose information about individual loans. Bank managers have the flexibility to adjust the accounting measures of loan portfolio quality to disclose to the public. Banks also reports the percentage breakdown of asset portfolios by type of loan (eg. Commercial and industrial, highly-

leveraged transaction, and cross-border loans), but these data do not necessarily convey information about asset quality. Bank managers also have the ability to adjust the classification of a non-performing loan. They can lend a borrower additional funds to ensure sufficient payments to keep a loan from reaching non-performing status. These characteristics of the information structure of bank operations limit the market's access to information needed to assess individual bank value and risk, which make banks more opaque. Opacity can result when a firm chooses to withhold information from investors, which increases information asymmetry between bank managers and outside investors (Jones et al., 2012). Jin and Myers (2006) argue that opacity reduces firm-specific information available to outside investors and affects the division of risk bearing between firm insiders and outside investors. Since the banks are more opaque, investors may feel they are not sufficiently informed or even do not believe the information disclosed. When banks issue equity, investors may want more discounts on it.

Investors may trade more frequently with one another because they disagree about the impact of news on a firm's value (Karpoff, 1986; Harris and Raviv, 1993; Bailey et al., 2003). However, share turnover could also decrease in the presence of information asymmetry. Firms with high information asymmetry may have lower share turnover if uninformed investors are less likely to trade in these shares for fear that they could lose to informed traders (Gorton and Pennacchi, 1990; Leuz and Verecchia, 2000). Therefore, I do not have a clear expectation of the relation between 'Share turnover' and abnormal return associated with equity issues.

Inverse elasticity is the natural log transformation of the absolute value of the daily raw return divided by the daily turnover, averaged over 250 trading days before the announcement date (Gao and Ritter, 2010). In Gao and Ritter's (2010) model, the demand elasticity for a stock is determined by an order flow inverse demand elasticity. The daily order flow inverse price elasticity on day t is defined as the ratio between the absolute value of the stock's raw return and its share turnover. If the stock is listed on Nasdaq, I apply various adjustments to the trading volume. On February 1, 2001, a 'riskless principal' rule went into effect, according to the director of research of Nasdaq and Frank Hathaway, the chief economist of Nasdaq, that resulted in a reduction of approximately 10% in reported volume. Thus, for February 1, 2001, to December 31, 2001, I divide Nasdaq volume by 1.8. During 2002, securities firms began to charge institutional investors commissions on Nasdaq trades, rather than the prior practice of merely marking up or down the net price, resulting

in a further reduction in reported volume of approximately 10%. Thus for 2002 and 2003, I divide Nasdaq volume by 1.6. For 2004 and later years, in which much of the volume for Nasdaq (and NYSE) stocks has been occurring on crossing networks and other venues, I use a divisor of 1.0, reflecting the fact that there are no longer important differences in the reporting of Nasdaq and NYSE volume. To reduce the influence of extreme values, I use a natural log transformation. The quantity for elasticity is in the numerator rather than the denominator. A large inverse elasticity reflects a large change in price if there is a demand or supply shock, which implies an inelastic demand curve. Gao and Ritter (2010) also find the comparable result of inverse elasticity. If a firm issue new equity, more inelastic of the demand is associated with a more reduction in the stock price. Therefore, I expect a negative relation between stock inverse elasticity and the stock reaction of the equity offering.

Stock run-up is the stock return over the window (-60,-2) relative to the offering date. Lucas and McDonald (1990) argue that if the firm is undervalued, managers are more likely to delay issuing new equity to fund an investment project until good news about the firm is released. On the contrary, overvalued firms have incentives to issue immediately. If new investment projects arrive in an unbiased manner and unrelated to the firm's prior share price, equity issues will occur after a period of positive abnormal returns to the firm and signal overvaluation. Therefore, the announcement of an equity issued by firm with high abnormal returns prior to the announcement is likely to have a more negative price reaction.

Stock return volatility is the annualised stock return volatility measuring firm's riskiness calculated from daily returns over the day interval from -250 to -10 relative to the equity issue date. Since firms with high operational risk are expected to have a large expected cost of financial distress (Chang et al., 2004), I expect that a firm's volatility is negatively related to abnormal return associated with equity offerings.

Market run-up is a measure of the overall market and economic condition and is measured as the continuously-compounded non-market-adjusted daily market index (S&P 500) return over trading days between -60 and -2. Following Lewis et al. (2003), I use this pre-issue run-up in the market as a measure of the overall market and economic conditions during the period leading up to the security offer. They also suggest that investor reactions are typically less negative following increases in stock market prices. The reason for this less negative reaction may be the lower costs of external equity finance during market

expansions (Choe et al., 1993). I would expect a positive relation between market run-up and equity announcement effect.

Market volatility is the annualised market stock return volatility, or the market risk, which is calculated from daily returns on the S&P 500 index. Volatile stock market indicates macroeconomic deterioration, which may have a negative impact on the market reaction to equity issues. In addition, market volatility acts as a proxy for the level of debt-related financing costs in the economy as a whole (Choe et al., 1993; Korajczyk and Levy, 2003; Krishnaswami and Yaman, 2008), I, therefore, expect that the market volatility is negatively related the equity announcement effect.

Table 4.1 shows the expected signs of determinants of SEO announcement effects.

Table 4.1 Expected signs of the determinants of SEO announcement effects

Determinants	Expected signs
Secondary shares	positive
Rule 415 shelf	mixed
Share turnover	mixed
Firm size	positive
Proceeds/total assets	mixed
Equity/total assets	positive
Stock run-up	negative
Stock return volatility	positive
Market volatility	negative
Firm commitment	positive
Capital expenditure	positive
Inverse elasticity	negative
Arbitrage risk	positive
Bid-ask-spread	negative

Note: This table presents the expected signs of the determinants of SEO announcement effects. All the variables are defined as outlined in Appendix 1.

4.5 Summary statistics

Table 4.2 provides the summary statistics of the key variables used in this study for banks and non-bank firms. The sample consists 375 equity issued by banks and 3,388 equity issued by non-bank firms. The results show that on average the equity offerings' CAR over the window (-1, 1) for U.S. banks is -0.98 percent, which is 0.61 percent higher than that of non-bank firms, and the difference is statistically significant at 1% level. This result is consistent with Poloncheck et al. (1989) and Wansley and Dhillon (1989) that bank issued equity have less negative announcement effect than that of non-bank firms. This result is possible due to capital theory, TBTF theory, and regulation theory. Since capital theory suggest that investors would have more confidence on equity issued by banks with higher capital level since bank capital absorb negative shocks to earnings, which increase banks' safety and stability (Von Thadden, 2004 and Repullo, 2004). Therefore, equity issued by banks should be associated with better announcement effect than that issued by non-bank firms since issuing new equity increases bank's capital. TBTF suggests that equity issued by banks should have better performance on stock price reaction than that issued by non-bank firms, since banks may receive government's support when in distress when deemed "too-big-to-fail" (O'Hara and Wayne, 1990; Acharya and Yorulmazer, 2007; Brown and Dinc, 2011), which increases investors' confidence on the security issued by banks. Regulation theory suggests that bank issued equity may be associated with the higher abnormal return because bank regulators monitoring and disclosure requirement lower the information asymmetry level between bank managers and investors, therefore reduce the adverse selection problem and give investors more confidence (Wansely and Dillion, 1989 and Polonchek et al., 1989).

Table 4.2 further shows the statistics of the control variables. All the variables are winsorized at 2% and 98% level. Panel A of Table 4.2 provides the t-test results for pairwise differences in the means between banks and non-bank firms. The secondary shares issued by banks are significantly larger than those issued by non-banks. The trading frequency of bank-issued equity is less than that of non-bank-issued equity; the share turnover is significantly lower. The results show that banks are significantly larger than non-banks, the average total assets being $33,133 million and $2,157 million, respectively. This difference is not surprising given that most commercial banks in our sample are listed at the Bank Holding Company (BHC) level and tend to be large in size. The proceeds to assets ratio of banks, however, is significantly lower than that of non-banks: 3.07% and 26.39%, respectively. The smaller proceeds ratio may to some extent reflect the significantly larger

size of banks. I also observe a significantly lower equity/assets ratio for banks, 11.85%, than for non-banks, 55.39%. Nevertheless, the 11.85% equity ratio is significantly higher than the government-required level, and it may indicate the safe conditions of banks that issued equity during the sample period. I further notice that the stock run-up of banks (9.39%) is significantly lower than that of non-banks (14.08%). Banks may face fewer financial constraints than their non-bank counterparts, and hence, bank managers may tend to issue equity when they need it, whereas managers of non-banks may have to consider the timing of the issuance to reduce the issue cost. The results also show that banks have less operational risk than non-banks because banks' stock return volatility is significantly lower. The market volatility of banks is higher than that of non-banks, indicating that banks face a higher level of debt-related financing costs. The market run-up for banks is also significantly higher. Finally, compared with non-banks, banks that issued equity have fewer substitutes, and the demand is more inelastic.

Panel B of Table 4.2 shows the number of yearly equity announcements for banks and non-banks. These results show that banks had no announcement of equity issuance in 1989. The number of observations for banks and non-banks tended to increase significantly after 2000, and the number of issues reached the highest point in 2009-2010.

In summary, the sample banks have significantly lower proceeds/total assets ratio, equity level, stock run-up, stock return volatility, share turnover, and demand elasticity, but a higher level of total assets, market volatility, and market run-up than their non-bank counterparts. The CAR of banks issued equity is significantly 0.61% higher than that issued by non-bank firms.

Table 4.2 Summary statistics

Panel A: Overall statistics

	Panel 1: Banks						Panel 2: Non-banks							
Variable	obs	mean	stddev	median	min	max	obs	mean	stddev	median	min	max	mean of Panel 1 vs mean of Panel 2	median of Panel 1 vs median of Panel 2
CAR	375	-0.98	4.45	-0.71	-12.77	9.67	3388	-1.59	4.86	-1.62	-13.35	9.71	0.61***	0.90
Secondary	375	0.30	0.46	0.00	0.00	1.00	3388	0.51	0.50	1.00	0.00	1.00	-0.21***	-1.00
Rule 415 shelf	375	0.31	0.46	0.00	0.00	1.00	3388	0.36	0.48	0.00	0.00	1.00	-0.06**	0.00
Share turnover	375	4.90	8.95	1.40	0.00	50.19	3388	6.62	10.74	2.06	0.00	50.19	-1.73***	-0.65
Total assets	375	32.58	142.04	3.47	0.02	1309.64	3388	2.16	19.76	0.26	0.00	797.77	30.42***	3.21
Proceeds/Total assets	375	3.07	7.82	1.18	0.10	93.08	3388	26.39	32.26	15.31	0.10	173.20	-23.32***	-14.13
Equity/Total assets	375	11.78	9.65	9.61	-2.16	73.48	3388	55.39	25.31	56.66	-35.11	93.96	-43.61***	-47.05
Stock run-up	375	9.39	22.33	6.74	-41.23	92.17	3388	14.08	26.42	11.45	-41.23	92.17	-4.69***	-4.71
Stock volatility	375	52.08	34.41	40.45	15.95	164.60	3388	58.05	28.75	52.20	15.95	164.60	-5.97***	-11.75
Market volatility	375	19.01	9.95	16.78	7.75	45.64	3388	16.04	7.43	13.88	7.75	45.64	2.97***	2.90
Market run-up	375	4.15	6.91	4.63	-12.72	16.64	3388	3.48	6.30	3.74	-12.72	16.64	0.67**	0.89
year crisis	375	0.22	0.41	0.00	0.00	1.00	3388	0.10	0.30	0.00	0.00	1.00	0.12***	0.00
Firm commitment	375	0.57	0.50	1.00	0.00	1.00	3388	0.52	0.50	1.00	0.00	1.00	0.05***	0.00
Capital expenditure	375	0.22	0.42	0.00	0.00	1.00	3388	0.14	0.35	0.00	0.00	1.00	0.08***	0.00
Inverse elasticity	375	1.33	1.53	1.16	-1.65	5.44	3387	1.18	1.71	1.00	-1.65	5.44	0.16***	0.16
Arbitrage risk	373	11.00	1.06	10.85	8.99	13.87	3334	11.44	0.95	11.46	8.99	13.87	-0.44***	-0.61
bid-ask-spread	347	1.80	2.10	1.17	0.06	9.59	3123	2.00	2.15	1.29	0.06	9.59	-0.19*	-0.12

Panel B: Number of observations (Yearly)

Year	Banks	Non-banks	Year	Banks	Non-banks
1982	3	61	1998	16	80
1983	3	150	1999	4	84
1984	3	28	2000	6	87
1985	3	37	2001	17	228
1986	4	53	2002	12	211
1987	4	52	2003	21	231
1988	2	30	2004	20	275
1989	0	32	2005	16	189
1990	1	36	2006	15	176
1991	9	109	2007	10	121
1992	8	68	2008	13	71
1993	14	121	2009	59	138
1994	2	99	2010	45	85
1995	10	134	2011	25	61
1996	12	145	2012	10	65
1997	8	131	Total	375	3388

Notes: This table shows the summary statistics. Panel A provides the descriptive statistics and t-test for the cumulative abnormal return (CAR) and firm-specific, issue-specific and macroeconomic variables of banks and non-bank firms over the sample period January 1980 to December 2012. Variables are defined as outlined in Appendix 1. CAR is calculated using standard event study methodology. I use student t-test to examine the differences in the mean value of CAR and each firm-, issue-, and market-specific characteristic between banks and non-bank firms. Panel B reports the number of observations for both bank and non-bank each year across the sample period. Total assets are in billion US dollar. Obs denotes the number of observations. *, **,*** represent 10%, 5%, and 1% significant levels respectively

4.6 Multivariate analysis

In this section, I focus on the test of whether the less negative share price reaction on bank equity offerings than non-banks can be explained by the firm-, market- and issue-specific characteristics. The explanatory variable is CAR over the day interval between -1 and +1. Table 4.3 presents the estimated coefficients from the regressions of the bank dummy variable and other firm- and issue-specific, and market-specific variables. The regression is Ordinary Least Squares model with White-corrected standard errors (White, 1980). Year dummies controlling for technology changes have been included in these regressions but not reported to save space.

The results show that the bank dummy is significantly positive at the 5% significant level. Its estimated coefficient is 0.731 with a p-value of 0.017. These indicate that banks' abnormal stock returns upon equity offerings are 0.617 percent higher than non-banks'. This result is consistent with the hypothesis H2 and the result in Table 4.2 that bank issued equity has a better performance in stock price reaction than that of its counterpart non-bank firms. This difference may be explained by the TBTF theory and/or regulation theory. Banks may receive a capital injection when in distress or bailouts by the government when deemed "too-big-to-fail" (O'Hara and Shaw, 1990; Acharya and Yorulmazer, 2007; Brown and Dic, 2011), which increases investors' confidence on the security issued by banks. Non-bank firms that do not offer deposit services can be allowed to fail, as their failure does not endanger the payments system and the conduits through which the government carries out monetary policy (Corregan, 1987). Therefore, bank issued equity announcement will have better stock market reactions. The regulation theory also suggest that the heavy regulation on bans could reduce the information asymmetry between the managers and investors (Polonchek et al., 1989; Chu, 1999; and Santos, 2001). Government uses regulation to reduce financial firm's opaqueness by monitoring banks to provide report with detailed financial information to public investors, and checking the accuracy of the report (Flannery et al., 2004). Investors should be able to receive more information on bank financial conditions and quickly impound this information into the bank's stock prices for an effective market discipline (Flannery et al., 2004). Investors may have more confidence on equity issued by banks, which makes bank issued SEOs have better stock market reactions than non-bank firms.

Regarding the control variables, signs, and significant levels are to a large degree in line with my expectations. For example, in line with Autore et al. (2008), I find that issuers of

equity under Rule 415 experience a positive stock reaction of the offering, because shelf registered equity have lower underwriting fees, consistent with a dominant underwriter competition effect. I also control for the secondary issuance in the regression. Firms issue primary shares and current shareholders wishing to share existing shares issue secondary shares (Gao and Ritter, 2010). In line with Lee and Masulis (2009), I find that secondary shares have significant positive relation with an equity offering effect because issuers of secondary shares face less information asymmetry and adverse selection problem with investors.

In line with Masulis and Korwar (1986), larger pre-announcement stock price run-ups are associated with larger stock price drops on the offering announcement. Since overvalued firms may have incentives to issue immediately, equity issues will occur after a period of positive abnormal returns to the firm. I also find that stock return volatility has a negative impact on equity announcement effect, which is consistent with Chang et al., (2004). I also observe that market run-up tends to be positively associated with the stock price reaction to equity announcement. This finding is consistent with Lewis et al (2003) that investor reactions are less negative following increases in stock market prices.

I incorporate a series of robustness tests by adding a number of additional variables, to check the validity of the prior findings. After adding these variables, the significance of the main variables remains the same, and the results still robust.

In column (2) of Table 4.3, I add dummy variable ‘year crisis’ which equals to 1 if the equity issued during the year 2007 to the year 2009, and zero otherwise. As the expectation, the result shows that the Global Financial Crisis has a negative impact on the announcement effect of equity offerings.

In the third specification, I include the dummy variable “Firm commitment” equals to one for equity issued as a firm commitment (the entire issue is sold directly to the underwriter), and zero otherwise (eg. best efforts). Previous research suggests that to issue equity by using firm commitment has lower direct issue costs (underpricing and investment bank compensation) than the use of best efforts offering methods. In a firm commitment underwriting, the issuing firm is assured of the dollar value of the proceeds of the offerings. If the share price of the issuing firm drops unexpectedly, the new shares cannot be issued at their issue price (which was set without knowledge of this unexpected price drop). The underwriter bears an unexpected loss from his compensation.

In the fourth specification in Table 4.3, I include a dummy variable "Capital expenditure", which equals to one if the intended use the proceeds is for capital expenditure, and zero otherwise. McConnel and Muscarella (1985) argue that if managers follow the market value maximisation rule, an announcement of an unexpected increase in capital expenditures should have a positive impact on the market value of the firm and vice versa. The positive revaluation associated with unexpected capital expenditure increases because the market immediately capitalises the incremental positive NPV associated with the unexpected projects to be undertaken by the firm. I find that the main results hold with banks having 0.736 percent higher abnormal returns after controlling for capital expenditure, though I do not find that the use of proceeds has a significant relation with equity offering effect.

In the fifth specification, I add "inverse elasticity" to the main regression. The result shows that the coefficient of inverse elasticity is found to be significant and negative, which is consistent with Gao and Ritter (2010). An issue with higher inverse elasticity indicates that there are fewer substitutions for it in the market and more stock price reduction associated with the issuance.

In the sixth specification, I add "Arbitrage risk" instead of Inverse elasticity to measure the price pressure. Arbitrage risk is the variance of the market model OLS regression residuals estimated over the 250 trading days (Wurgler and Zhuravskaya, 2002). In Wurgler and Zhuravskaya's (2002) model, the demand elasticity for a stock is determined by the arbitrage risk. Arbitrageurs keep the demand curve flat if the asset has perfect substitutes and the arbitrage risk is zero. On the other hand, if the asset does not have perfect substitutes, the demand curve is downward sloping because the arbitrage risk is nonzero and arbitrageurs are risk averse. The larger the arbitrage risk, the more inelastic the demand curve is. Wurgler and Zhuaravskaya's (2002) show that there is a positive relation between arbitrage risk and returns on the announcement day of S&P 500 additions, which suggests that stocks with greater arbitrage risk have less elastic demand. Gao and Ritter (2010) also find the comparable result of arbitrage risk. If a firm issue new equity, more inelastic of the demand leads a more reduction in the stock price. Therefore, I expect a negative relation between stock arbitrage risk and the stock reaction of the equity offering. However, I do not find the significant result for this variable either.

I consider using "bid-ask-spread" as an alternative measure of information asymmetry instead of share turnover in column (7). But there is no significant relation found between

this variable and the announcement effect of equity offerings. Previous literature raises that in practice using bid-ask-spread as a proxy for information asymmetry suffers from three deficiencies. First, the spread is associated with order processing costs and inventory holding costs faced by the specialist (Stoll, 1989). This errors-in-variable problem biases statistical tests toward the null and is not easily overcome. Second, the observable bid-ask spread has institutionally imposed discreteness. Since large firms often report spreads of just one tick, the percentage spread (in term of stock price) is primarily a function of the level of the stock price. Third, the previous studies have shown that bid-ask spreads are not very sensitive to changes in the information environment (Morse and Ushman, 1983).

Table 4.3 Regression analysis of SEO announcement effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bank	0.617**	0.643**	0.612**	0.647**	0.703**	0.647**	0.560*
	(0.034)	(0.027)	(0.036)	(0.026)	(0.019)	(0.027)	(0.066)
Secondary	0.918***	0.862***	0.885***	0.816***	0.842***	0.850***	0.785***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rule 415 shelf	0.602***	0.660***	0.962***	0.671***	0.738***	0.667***	0.646***
	(0.002)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)
Share turnover	0.020**	0.020**	0.019**	0.020**	0.020**	0.021**	
	(0.021)	(0.021)	(0.030)	(0.023)	(0.026)	(0.019)	
Firm size	0.123**	0.128**	0.139**	0.129**	0.104	0.113*	0.164***
	(0.033)	(0.026)	(0.017)	(0.025)	(0.101)	(0.086)	(0.009)
Proceeds/total assets	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.003
	(0.202)	(0.205)	(0.202)	(0.229)	(0.191)	(0.195)	(0.279)
Equity/total assets	0.007*	0.007*	0.007*	0.007**	0.007*	0.007**	0.008**
	(0.051)	(0.050)	(0.056)	(0.048)	(0.063)	(0.050)	(0.035)
Stock run-up	-0.016***	-0.016***	-0.016***	-0.016***	-0.016***	-0.016***	-0.017***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Stock return volatility	-0.013***	-0.013***	-0.012***	-0.013***	-0.013***	-0.009	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.248)	(0.002)
Market volatility	-0.011	-0.001	-0.001	-0.000	0.001	-0.001	-0.001
	(0.401)	(0.952)	(0.953)	(0.988)	(0.960)	(0.918)	(0.970)
Market run-up	0.058***	0.059***	0.058***	0.059***	0.059***	0.058***	0.059***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year crisis		-0.626**	-0.619**	-0.607**	-0.660**	-0.633**	-0.472*
		(0.024)	(0.026)	(0.029)	(0.019)	(0.023)	(0.094)
Firm commitment			0.398				
			(0.110)				
Capital expenditure				-0.146			
				(0.584)			
Inverse elasticity					-0.067		
					(0.218)		
Arbitrage risk						-0.129	
						(0.592)	
Bid-ask spread							-0.019
							(0.622)
Constant	-2.432***	-2.566***	-2.967***	-2.549***	-2.369***	-1.201	-2.668***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.642)	(0.000)
N	3763	3763	3763	3763	3709	3760	3470
Adj. R-squared	0.038	0.039	0.04	0.039	0.041	0.039	0.039

Notes: This table presents the results of the OLS regression analysis of the difference in cumulative abnormal returns (CARs, %) of seasonal equity offerings between banks and non-banks, controlling for firm-specific, issue-specific, and market-specific measures. A 240-day (day -250 to day -10) period for each firm is used for the estimation window for beta. The dependent variable (CAR, %) is measured over the window (-1, 1) relative to the announcement date, calculated using the market model. Bank is a dummy variable for depository institutions. All other explanatory variables are defined as outlined in Appendix 1. The p-value, calculated using White (1980), and heteroskedasticity-robust standard errors are in parentheses. N denotes the number of observations. *, **, *** represent 10%, 5%, and 1% significant levels, respectively.

4.7 Robustness tests

4.7.1 Differences in CARs across different industries

I undertake the robustness tests in relation to the differences across industries. In Table 4.4, I test whether bank issue equity is associated with difference announcement effect than that issued by other industries, such as manufacturing, wholesale retail, services, transportation, telecommunication, construction, mining, and agriculture. A wide definition has been used to have a reasonable amount of observations available for each industry. I only include those industries with more than 15 observations across the whole sample period.

The default of the regression is bank, and I find that the parameter coefficients across other industries are negative and mostly statistically significant. These results indicate that the announcement of banks issued equities is associated with less negative stock price reaction than that issued by the counterpart non-bank firms. The coefficient of real estate is not statistically significant, indicating that the market reaction of equity issued by real estates is not significantly different from that issued by banks. Real estate is a non-bank firm, which is also under a great deal of regulation. These regulations may mitigate the difference between the announcement effect of equity issued by banks and equity issued by real estates.

Table 4.4 Industry estimations

Bank	(1)
Secondary	0.612***
	(2.687)
Rule415 shelf	0.645**
	(2.522)
Firm size	0.176***
	(2.680)
Proceeds/total assets	-0.003
	(-0.678)
Equity/Total assets	0.013***
	(2.960)
Stock run-up	-0.019***
	(-4.282)
Stock return volatility	-0.012**
	(-2.443)
Market volatility	0.022
	(0.754)
Market run-up	0.080***
	(4.551)
Manufacturing	-0.906***
	(-2.703)
Whole sale retail	-0.886**
	(-2.388)
Services	-0.787**
	(-2.113)
Transportation	-1.189**
	(-2.049)
Information communication	-0.932*
	(-1.719)
Real estate	-0.871
	(-1.090)
Construction	-1.953**
	(-2.526)
Mining	-0.961**
	(-2.387)
Agriculture	-3.277***
	(-2.632)
Constant	-1.445
	(-1.522)
N	3139
adj. R-sq	0.039

Notes: This table presents the comparison analysis of the cumulative abnormal stock returns upon equity offerings across different industries. The default is of this regression is bank. The dependent variable is the cumulative abnormal return measured over the window (-1, 1) relative to the issue date. All explanatory variables are defined in Appendix 1.

4.7.2 Matched sample methodology

Since there is great difference between the number of observation of bank and non-bank (375 versus 3,388), I consider another robustness test. Since there is a great difference between the number of observation of bank and non-bank (375 versus 3,388), I consider another robustness test. Following Faulkender et al. (2012), In Table 4.5, I use the Mahalanobis distance matching method to compare the CARs associate with equity announcement issued by banks and non-banks by matching each sample banks with a controlled non-bank firm on the basis of important characteristics. The Mahalanobis distance is a measure of the distance between a point P and a distribution D (Mahalanobis, 1936). It is a multi-dimensional generalization of the idea of measuring how many standard deviations away P is from the mean of D. This distance is zero if P is at the mean of D, and grows as P moves away from the mean: along each principal component axis, it measures the number of standard deviations from P to the mean of D. The firm whose size and proceeds are closest to the bank are chosen to be the non-bank control firms. These matches are nevertheless imperfect, so I control for these differences in the regression.

$$\Delta CAR_i = \delta_0 + \delta_1 \left(\Delta \frac{\text{Equity}}{\text{Totalasset}_i}\right) + \delta_2 \left(\Delta \frac{\text{Proceeds}}{\text{Totalassets}_i}\right) + \delta_3 (\Delta \text{ stock runup}_i) + \delta_4 (\Delta \text{ stock return volatility}_i) + \delta_5 (\Delta \text{ market volatility}_i) + \delta_6 (\Delta \text{ market runup}_i) + \delta_7 (\Delta \text{ shareturnover}_i) + \mu_i \quad (5)$$

Where ΔCAR_i denotes the i^{th} bank's CAR less that of its control firms estimated into a number of bank characteristics.

The estimated value of δ_0 thus measures the mean excess CAR of bank issued equity over its control firm, after controlling for differences in firm-, issue- and market- specific variable between bank and control. I find that the results are robust with this alternative methodology, showing that bank issued equity associated with higher abnormal return than non-banks, since after controlling for the differences in various characteristics, the constant term (δ_0) is still significantly positive. In particular, the constant term shows that banks have higher abnormal returns by 1.026 percent than non-banks.

Table 4.5 Matched sample test

Variable	Parameter estimate (t-value)
	(1)
ΔEquity/total assets	0.018
	(1.225)
ΔProceeds/total assets	-0.010
	(-0.356)
ΔStock run-up	-0.012
	(-0.810)
ΔStock return volatility	-0.010
	(-0.791)
ΔMarket volatility	0.004
	(0.112)
ΔMarket run-up	0.012
	(0.302)
ΔShare turnover	-0.005
	(-0.163)
Constant	1.026**
	(2.081)
N	367
adj. R-sq	-0.008

Notes: In this table I match each bank with a non-bank institution based on the size. The dependent variable is the cumulative abnormal return of bank issued equity less that of its matched non-bank institution issued equity, which is measured over the window (-1, 1) relative to the announcement date. All explanatory variables are defined in Appendix 1. Constant denotes the constant term δ_0. N denotes the number of observations. *, **, and *** represent significance levels of 10%, 5% and 1%, respectively.

4.8 Conclusions

This chapter examines whether the announcement effect of SEOs by commercial banks differs from that of non-banks. The results suggest that banks experience less negative announcement stock returns than non-banks when issuing equity. The difference in the cumulative stock returns associated with equity offered by banks is 0.61 percent higher than that issued by non-banks. The baseline regression and matching sample results are consistent with the hypothesis that bank regulation reveals positive information about banks. First, bank monitoring regulations limit the an of banks at the time of the SEO; second, there is an incentive for banks to avoid excessive risk-taking due to the existence of capital regulation; and third, the market perceives that commercial banks may benefit from the government's implicit too-big-to-fail (TBTF) policy. Therefore, the market is less likely to assume that bank SEOs signal information that the bank is overvalued compared to their non-bank counterparts.

Chapter 5 Empirical analysis: Bank regulation and cross country SEO announcement effect

5.1 Chapter introduction

Results reported in chapters 3 and 4 show that the announcement effect associated with bank-issued securities is less negative than non-bank firms. The explanation may be that banks face more stringent regulation than non-bank firms, and may thus be less able to take advantage of differential information between the managers and the public. Consequently, the market is less likely to assume that the issuance of securities by banks signals information that the bank is overvalued. A natural question one may ask is that does the level of the stringency of bank regulation may thus have a positive impact on the announcement effect upon equity issuance announcement? The answer may not be as simple as a "yes".

The aim of this chapter is to investigate whether and to what extent the market would react differently when banks in countries with different levels of bank regulation announced SEOs. I consider regulatory monitoring in addition to capital regulation because, according to Campbell, Chan, and Marino (1992), direct monitoring will partially substitute for capital requirements in the optimal scheme. I hypothesise an inverted U-shaped relation between the stringency of bank regulation and bank SEO announcement effects. Under a mild bank regulation environment, the market perceives that more regulation helps to reduce moral hazard and risk-taking by banks. Hence, the market will react more positively to an SEO announcement by a bank compared to a less regulated market. However, if bank regulation becomes too stringent and increases beyond a certain level, investors may be concerned that the too stringent regulation reduces the franchise value of the bank and hence induces more risk-taking. Given the increased moral hazard problem, the market may react more negatively to the bank SEO announcement in more regulated markets.

The global data on SEOs by banks are used in this chapter. Following Laeven and Levine (2009) I consider five aspects of bank regulation adopted from Barth et al. (2004). The regression analysis includes both linear and quadratic terms of five bank regulation measures to examine the hypothesised inverted U-shaped relation between bank regulation and the bank SEO announcement effect. The latter is measured by the CAR over the three-day event window around the announcement date. The findings support the hypothesis that there exists an inverted U-shaped relation between the SEO announcement effect and initial capital

stringency, depositor protection, prompt corrective action, and total regulation. These findings are robust after controlling for bank-, market-, and country-specific variables.

I attempt to address the endogeneity between bank regulation stringency and SEO announcement effects. The observed relation between the bank regulation measures and SEO announcement effects may be driven by some factors that are not controlled for in the regression model. Bank regulation tends to be strengthened from various aspects after the adoption of Basel II that varies across country and time. Therefore, I use the exogenous cross-country, cross-year variation in the timing of the Basel II adoption as the instrument to bank regulation stringency in order to assess the causal impact of bank regulation on SEO announcement effects. The main results hold in this two-staged least square regression analysis, indicating that endogeneity is not a major issue for this study. Finally, the impact of involuntary equity issuance on the relation between bank SEO announcement effect and bank regulation stringency is examined. Previous research suggests that moral hazard exists mainly in under-capitalised banks that take excessive risks to exploit risk-shifting benefits of deposit insurance. Well-capitalised banks take more risks because they are remote from insolvency (Calem and Rob, 1999) or because of factors exogenous to the portfolio decisions, such as managerial incompetence or a lack of lending opportunities (Gorton and Rosen, 1996). Hence, the relation between bank capital regulation and bank SEO announcement effects may be different between under- (involuntary) and well-capitalised (voluntary) bank issuance (Gorton and Rosen, 1996). I include an indicator for involuntary issues and the interaction of this indicator with both the linear and the quadratic terms of initial capital stringency. The results show that involuntary banks SEOs are associated with more negative SEO announcement effects than voluntary issues. However, the stringency of the regulation on the source of funds that can be counted as regulatory capital does not have any further impact on the announcement effects of these involuntary issuances. These results are consistent with Cornett and Tehranian's (1994)'s finding that the issuance of equity required to maintain capital standards (involuntary issuance) does not convey any signal of future prospects of the firm.

The remainder of this chapter is organised as follows. Section 6.2 outlines the process of quantitative data collection and analysis, including the data sources and the sample selection. Section 5.3 discusses the control variables used in this chapter, including the measure of bank regulation. Section 5.4 outlines the descriptive statistics of depending, independent, and control variables used in the regression models. After that, the estimated OLS results are

discussed step by step in section 5.5. Section 5.6 provides the robustness test. Finally, section 5.7 provides the overall discussions and conclusions.

5.2 Data sources and data selection

I select data from the Bank Regulation and Supervision Survey (BRSS) (1999, 2003, 2007, 2011) database of the World Bank. These four worldwide surveys on bank regulation are conducted by Barth et al. (2004, 2006, 2008, 2012). The first three surveys capture information as of 1999, 2001, and 2005 respectively. The 2012 survey covers the period of 2008-2010. This comprehensive survey database is compiled from answers provided by official regulatory and supervisory authorities and includes various measures on bank regulation.

I consider four aspects or measures of bank regulation adopted the BRSS. First, activity restriction is an indicator of the degree to which national regulatory authorities allow banks to engage in three fee-based activities, which are securities market activities (e.g., underwriting, brokering, dealing, and all aspects of the mutual fund industry), insurance (e.g., insurance underwriting and selling), and real estate businesses (e.g., real estate investment, development, and management). Second, initial capital stringency measures whether the source of funds that count as regulatory capital can include assets other than cash or government securities, borrowed funds, and whether the regulatory/supervisory authorities verify the sources of capital. Third, depositor protection is an index of deposit insurer power to measure each country's deposit insurance regime and to trace its evolution from 1999 to 2011. It measures the extent to which the regulator has the authority to make the decision to intervene in a bank, take legal action against bank directors or officials, and has ever taken any legal action against bank directors or officers. Fourth, prompt corrective action measures the extent to which the law establishes pre-determined levels of bank solvency deterioration that forces automatic enforcement actions, such as intervention, and the extent to which supervisors have the requisite, suitable powers to do so. Finally, I collapse these four regulation measures into a single measure of bank regulation --- total regulation --- by using factor analysis.

Data on SEOs, the initial sample of announcement dates and other features consists of all the equity issuances on global market from January 2001 to December 2012, is obtained

from the Securities Data Company (SDC Platinum) global new issues database. The issuing firm's stock price data and bank account data are collected from DataStream.

I matched the bank-level information with the bank regulation measures to explore the link between bank regulations, supervision, depositor protection, and bank issued equity announcement effect. Following Barth et al. (2013), the values of regulatory variables for year 2001 is taken from the first survey for 1999; the values of regulatory variables for the period of 2002-2004 are taken from the second survey for 2003; the values of regulatory variables for the period of 2005-2008 are taken from the survey for 2007 and the regulatory measures for the period of 2008-2012 are taken from the fourth survey 2011. I also tried some alternative ways to assign values, such as moving all the thresholds one year before or 1 year later and found the results to be quite robust.

The banks included in the sample are chosen on the basis of data availability: 1) I only include the countries with index price in Datastream; 2) I exclude New Zealand because all its major banks are subsidiaries of Australian banks and these are already included in the sample; 3) I exclude those countries with less than 10 SEOs during the whole sample period to allow for a meaningful sample of banks to represent each country. The sample consists of 1,307 SEOs from 21 countries over the sample period of 2001-2012.

The banks included in the final sample are chosen on the basis of data availability: I only include countries which there is price index in Datastream. New Zealand is excluded because all its major banks are subsidiaries of Australian banks, which are already included in the sample. I only include the countries with more than 10 observations. The final sample consists of 1,307 equity issues from 663 banks in 31 countries over the sample period.

5.3 Control variables

5.3.1 Bank regulation measures

Following Levine and Laeven (2009), I use (from Barth et al., 2004, 2006, 2008, and 2012 database), capital regulatory variables, activity restrictions, official supervisory action variables, and deposit insurance, as the proxies of bank regulation. In a broad survey of rules governing banking systems, Barth et al. (2004, 2006, 2008) document various regulatory restrictions on commercial banks, including various entry and exit restrictions and practices. I choose regulations stressed by the Basel Committee and regulations that theory highlights

as affecting bank behaviour. I classify the survey question used into four groups: regulatory restrictions on bank activities, capital regulations, official supervisory action, and deposit insurance.

Activity restrictions could affect bank issued equity announcement effect through reducing competition and limiting economies of scope. Claessens and Laeven (2004) find that cross-country variations in bank competition can be explained by differences in a lack of activity restrictions, with few restrictions enhancing competition. That means, when faced with fewer restrictions to conducting other fee-based financial activities, banks may make use of the chance to provide customers with more financial products other than traditional interest-based activities. In other words, commercial banks may be able to compete with each other in various kinds of areas apart from taking deposits and making loans. Keeley (1990) suggests that anticompetitive restrictions endow banks with market power and increase the value of the bank's charter, which reduces banks' incentives to take the risk. Goddard et al (2011) also suggest that restrictions on permissible banking services offered might improve the safety and soundness of the banking system, by minimising opportunities for banks to accept the excessive risk, eliminating some conflicts of interest, and simplifying supervision. Investors may thus have more confidence in bank issued equity because of this less risk taking behaviour.

Broad financial activities, however, might intensify moral hazard problems and provide more opportunities for banks to increase risk taking (Boyd et al., 1998). Moreover, broad activities may lead to the formation of extremely large and complex entities that are extraordinarily difficult to monitor and "too big to discipline" (Laeven and Levine, 2007). Thus banks with broad activities are more likely to issue equities with more negative announcement effects since investors may perceive these banks are complex and opaque and have confidence on the equity issued by them.

Barth et al (2004) suggest broad banking power allows the bank to diversify income sources and enhance stability. Restrictions on bank activities limit the banks' diversification and reduce the banking power. Thus, greater activity restrictions may have a negative impact on bank issue equity announcement effect because it reduces banks' stability. Therefore, there may exist a non-linear effect of activity restrictions on the announcement effect associated with bank issued equity.

Activity restrictions is an indicator, as adopted from Barth et al. (2004), of the degree to which national regulatory authorities allow banks to engage in three fee-based activities, which are securities market activities (e.g., underwriting, brokering, dealing and all aspects of the mutual fund industry), insurance (e.g., insurance underwriting and selling) and real estate businesses (e.g., real estate investment, development, and management). Barth et al (2004) define these three fee-based activities as follows:

(1) *Securities activities measure the ability of banks to engage in the business of securities underwriting, brokering, dealing, and all aspects of the mutual fund industry.*
This ability is based on the level of regulatory restrictiveness for bank participation in securities activates.
(2) *Insurance activities: the ability of banks to engage in insurance underwriting and selling.*
This ability is based on the level of regulatory restrictiveness for bank participation in insurance activities.
(3) *Real estate activities: the ability of banks to engage in real estate investment, development, and management. This ability is based on the level of regulatory restrictiveness for bank participation in real estate activities.*

If the answer to these questions is that the full range of activities can be conducted directly in the bank, the level of regulatory restrictiveness can be defined as 'unrestricted' and coded as score 1. If the full range of activities can be conducted, but some or all must be conducted in subsidiaries, it can be defined as 'permitted' and coded as score 2. If less than the full range of activities can be conducted in the bank or subsidiaries, it can be defined as 'restricted' and counted as score 3. If the activity cannot be conducted in either the bank or subsidiaries, it is defined as 'prohibited' and counted as score 4.

A fourth question needed to be considered is the ability of banks to own and control nonfinancial firms. The level of ability is based on the answer to the question:

(4) *Can banks own voting shares in the nonfinancial firm?*

If a bank own 100% of the equity in any non-financial firm can be defined as 'unrestricted', and counted as score 1. If a may own 100% of the equity in a nonfinancial firm but ownership is limited based upon a bank's equity capital is defined as 'permitted' and counted as score 2. If a bank can only acquire less than 100% of the equity in a nonfinancial firm is defined as 'restricted' and counted as score 3. If a bank does not acquire

any equity investment in a nonfinancial firm is defined as ‘prohibited’ and counted as score 4.

The Activity restriction measure is thus the average of the above four indicators, which ranges from 0 to 1, and higher values indicate greater restriction and a higher level of regulation stringency.

Initial capital stringency is considered to affect bank issue equity announcement effect as it specifies the required amount of capital that bank owners must have at risk. If bank owners are required to have more capital at risk, the upside gains that they would enjoy from greater risk taking would be countervailed by the potential downside loss of their capital (Fernandez and Gonzalez, 2005; Barth et al., 2013). Therefore, official capital adequacy regulations are seen as an important role in aligning the incentives of bank owners with depositors and other creditors, which results in more careful lending and better bank performance (Keeley and Furlong, 1990; Kaufman, 1991; Barth et al., 2006). Capital regulation may hence give investors more confidence in the securities issued by banks, leading to a more positive announcement effect of bank issued equity.

Capital provides loanable funds and buffers earning decline for the bank, which imply that better-capitalised banks could be safer. Keeley and Furlong (1990) demonstrated that capital controls do indeed enhance bank safety. They suggest that lower capital, holding asset risk constant, leads to less protection against failure. The lower capital ratio also increases the incentive for banks to increase asset risk.

This positive relationship, however, may not be linear given the existence of the possible regulatory costs in the form of a higher barrier to entry and greater rent extraction by governments that result from higher capital requirements (Barth et al., 2013). Moreover, Mehran and Thakor (2011) suggest that high capital level of bank reduces bank’s market value by giving a protective cushion for the manager who has less willingness to subject himself to capital market discipline. Hellmann et al. (2001) also provide empirical evidence that higher capital requirements may induce the bank to take more prudent portfolio risk on one hand but may also reduce charter values and thereby encourage more gambling behaviour on the other hand.

I use the initial capital stringency as a proxy of the capital regulatory stringency (Barth et al., 2006). Initial capital stringency measures whether the source of funds that count as

regulatory capital can include assets other than cash or government securities, borrowed funds, and whether the regulatory/supervisory authorities verify the sources of capital. This index is based on following question (Yes=1, No=0): *Are the sources of funds to be used as capital verified by the regulatory/supervisory authorities? Can the initial disbursement or subsequent injections of capital be done with assets other than cash or government securities? Can initial disbursement of capital be done with borrowed funds?* Initial capital stringency is calculated by the sum of the answers to these questions divided by 3. Higher values indicate greater stringency.

Public interest view argues that bank supervisors have the incentive and expertise to overcome market failures due to imperfect information (Beck et al., 2006). Strong supervisory control can prevent managers from engaging in the excessive risk-taking behaviour (Klomp and Haan, 2012). Fernandez and Gonzales (2005) also report that in countries with low accounting and auditing requirements more supervisory control appears to reduce risk. Therefore, a powerful supervisory agency that directly monitors and disciplines banks can enhance the corporate governance of banks and boost investors' confidence in banks issued securities. However too stringent supervision could have a negative impact on bank development, performance, and stability (Barth et al., 2004; Djankov et al., 2002), which may perceive equity investors want a discount on the stock price if a bank announces an equity issuance in a highly regulated and supervisory banking market.

Prompt corrective action measures the extent to which the law establishes pre-determined levels of bank solvency deterioration that force automatic enforcement actions, such as intervention, and the extent to which supervisors have the requisite, suitable powers to do so. This variable is based on several questions (Yes=1, No=0):

(1) *Can the supervisory authority force a bank to change its internal organisational structure?*
(2) *Are there any mechanisms of cease and desist type orders, whose infraction leads to the automatic imposition of civil and penal sanctions on the bank's directors and managers?*
(3) *Can the supervisory agency order the bank's directors or management to constitute provisions to cover actual or potential losses?*

(4) *Can the supervisory agency suspend the director's decision to distribute dividends?*
(5) *Can the supervisory agency suspend the director's decision to distribute bonuses?*
(6) *Can the supervisory agency suspend the director's decision to distribute management fees?*

Prompt corrective action is calculated as the sum of the score for each question and divided by 6. A Higher value indicates greater supervisory power.

Depositor protection. According to Demirguc-Kunt and Detragiache (2002), a deposit insurance system influences bank soundness in two opposite ways. On the one hand, bank runs are less likely to occur when deposits are insured. Deposit insurance can rule out bank runs without reducing the ability of banks to transform assets. O'Hara and Shaw (1990) suggest that deposit insurance protects individual financial institutions from instability in the intermediation process, thereby providing stability to the financial system as a whole. Therefore, equity issued by banks with deposit insurance issue gives the market a positive signal and increases investors' confidence.

On the other hand, the deposit protection scheme of banks can create moral hazard problem, which leads to bank's excessive risk-taking behaviour (Cordella and Yeyati, 2003; Gorton and Huang, 2004; Dam and Koetter, 2012). The excessive risk makes banks more complex and less transparent, which intensifies the information asymmetry problem between bank and investors when banks announce SEOs hence reduce the investor's confidence for bank-issued securities. This may put a downward pressure on the bank issued equity's announcement effect. Dam and Koetter (2012) also provide empirical evidence by using all observed capital preservation measures and distressed exists in the German banking industry during 1995-2006, that bank bailouts makes bank taking additional risk. Santos (2001) also get the same conclusion from depositor monitoring aspect, that government bears the risk by offering a guarantee that depositors are not subject to lose. Therefore, depositors reduce the incentive to monitor banks and to demand an interest payment commensurate with the risk of the bank. Barth et al. (2004) and Demirguc-Kunt and Detragiache (2002) provide evidence that an explicit deposit insurance scheme tends to increase the probability of banking crisis. However, Laeven and Levine (2009) suggest that deposit insurance is associated with an increase in risk only when the bank has a large equity holder with sufficient power to act on the additional risk-taking incentives created by deposit insurance.

Therefore, the relationship between deposit protection level and bank issued equity announcement effect may be nonlinear, as deposit insurance may increase investors' confidence on the equity issued by banks, but also may lead to an additional risk-taking behaviour if the deposit insurance level goes too high, which gives a negative signal to the market.

Followed by Barth et al (2008), depositor protection is based on the answer to the following questions (Yes=1, No=0):

(1) Does the deposit insurance authority make the decision to intervene a bank?

(2) Can the deposit insurance agency/fund take legal action for violations against laws, regulations, and bylaws (of the deposit insurance agency) against bank directors or other bank officials?

(3) Has the deposit insurance agency/fund ever taken legal action for violations against laws, regulations, and bylaws (of the deposit insurance agency) against bank directors or other bank officials?

(4) Were any deposits not explicitly covered by deposit insurance at the time of the failure compensated when the bank failed (excluding funds later paid out in liquidation procedures)?

Depositor protection= {[(1)+(2)+(3)]/3 + (4)}/2. This variable ranges from 0 to 1, where higher values indicate greater level of depositor protection.

5.3.2 Control variables

I also include bank-specific, market-specific, and country-specific variables in the analysis of equity issues announcement stock returns. For bank-specific variables, I control for firm size, equity level, risk level, equity-related financing costs level. For market-specific, I include market volatility and the market run-up to control market risk and overall market and economic conditions. Some of the control variables are the same as chapter 5, including (lnTA, Equity/total assets, market run-up, stock run-up, stock return volatility). Besides these variables, I also add one firm-specific variable and four country-specific variables since this is a cross-country study. I use GDP deflator and economics freedom as the country

level variables to control for differences in economics development and institutions across countries. Appendix 1 provides the detailed definition of each of the variables.

Diversification is measured as non-interest income divided by total revenue. Liu et al., (2013) suggest that the diversification of bank can be positively related to bank stability due to the diversification benefits. This may give investors more confidence in the security issued by a bank and lead to less negative announcement effect. However, Stiroh (2004) and Beck et al. (2009) also suggest that more diversified banks experience less stable performance than their less diversified counterparts, which may harm the announcement effect upon bank equity issuance. Therefore, I have no clear expectation on the relationship between bank's diversification and equity announcement effect.

Inflation is expected to have a negative impact on announcement effect of equity offerings issued by banks. High inflation is often associated with high relative price volatility, which may give investors a signal that the operational risk of the bank is high and want a discount on the stock price. Boyd et al. (2001) find a significant, economically important and negative relationship between inflation and banking sector development. This lower development also could reduce investors' confidence in bank issued equity.

KKZ index is an index of institutional development. The KKZ-index is from Kaufmann, Kraay, and Mastruzzi (2008). According to Kaufmann et al. (2008), KKZ is based on six dimensions of governance. Higher KKZ value indicates a more advanced level of development.

Economic freedom is the average value for the period 2001-2012 of an index of economic freedom (freedom from government interference afforded to businesses and individuals). It measures the extent of how much freedom individuals and firms can get from their governments to carry on with their business. This indicator ranges in value from 1 to 5, with greater values signifying better protections of freedoms. It is calculated as 6 minus the economic freedom index of the Heritage Foundation. I expect a positive relationship between economic freedom and equity announcement effect.

GDP growth is expected to associate with positive bank issued equity announcement effect. Because with higher GDP growth, banks might have more business opportunities and can sustain positions of abnormal profitability (Goddard et al, 2011). Beck et al (2006) also suggest that the growth rate of GDP is positively correlated with firm growth, indicating that

firms grow faster in an economy with greater growth opportunities. This may give the investor more incentive to invest because they may think that the purpose for bank issue equity is to raise money for some project with positive NPV.

5.4 Summary statistics

Table 6.1 shows the characteristics of regulatory restrictions across countries, where I observe a wide variation in all aspects of the regulation measures of Activity restriction, Initial capital stringency, Depositor protection, Prompt corrective action, and Total regulation.

Activity restriction varies from a low of around 0.13 in Germany and 0.14 in Thailand to a high of 0.75 in China. These results indicate that China forbids banks from most non-banking activities, such as securities, insurance, and real estate activities. Germany and Thailand, on the other hand, have relatively low restrictions for banks that want to participate in these markets. With the highest value of Initial capital stringency (1.00), U.K. banks can include other funds than cash, government securities and borrowed funds as regulatory capital. I find that, on average, developing countries have lower Depositor protection. The average value for Depositor protection of Brazil, Chile, China, India, are all zero, which indicate that these countries barely have explicit deposit insurance scheme for banks during the sample period. Low depositor protection is not only limited to developing countries: Greece, the U.K., and Austria also score low on depositor protection (all have scores below 0.01). Indonesia has the greatest supervision power with the highest prompt corrective action level (1.00), indicating the greatest power to force automatic enforcement actions when the level of bank solvency deterioration is reached. The Total regulation index varies from 0.02 (China) to 0.85 (U.S.) with an average value of 0.62.

Table 5.1 Summary statistics for regulation variables of equity issuers

Country	N	Activity restriction	Initial capital stringency	Depositor protection	Prompt corrective action	Total regulation
Australia	89	0.44	0.78	0.13	0.88	0.49
Austria	13	0.51	0.46	0.01	0.78	0.17
Brazil	11	0.70	0.64	0.00	0.86	0.22
Canada	19	0.52	0.82	0.53	0.47	0.78
Chile	11	0.51	0.33	0.30	0.95	0.28
China	19	0.75	0.00	0.00	0.83	0.02
France	13	0.38	0.67	0.46	0.51	0.67
Germany	46	0.13	0.57	0.49	0.56	0.70
Greece	43	0.46	0.88	0.00	0.64	0.48
Hong Kong	11	0.64	0.56	0.11	0.82	0.26
India	122	0.45	0.33	0.00	0.76	0.09
Indonesia	44	0.70	0.33	0.38	1.00	0.27
Israel	20	0.42	0.73	0.03	0.81	0.40
Italy	39	0.50	0.75	0.19	0.31	0.50
Japan	91	0.49	0.64	0.09	0.94	0.35
Malaysia	16	0.38	0.67	0.26	0.63	0.53
Portugal	17	0.37	0.69	0.03	0.76	0.38
Spain	20	0.46	0.45	0.30	0.58	0.39
Thailand	21	0.14	0.52	0.02	0.73	0.33
U.K.	15	0.39	1.00	0.01	0.35	0.58
USA	641	0.46	0.84	0.58	0.92	0.85
Total	1307	0.45	0.72	0.37	0.83	0.62

Notes: This table includes the countries that are included in this study. The Column N represents the number of SEOs by banks from this country in the sample period (January 2001 to December 2012). The remainder of the table reports the mean figures (in percentage form) of the regulation variables over the sample period for each country. A detailed description of the definitions of the variables is included in Appendix 1.

I also include bank-specific, market-specific, and country-specific variables in the analysis of SEOs announcement stock returns. Ln(Total Assets) is the natural logarithm of total assets, which measures the size of the bank. Previous studies (Kang and Stulz (1996), De Roon and Veld (1998), Abhyankar and Dunning (1999), and Lewis, Rogalski, and Seward (1999)) suggest that larger firms are likely to have a lower level of information asymmetry, and may be associated with more negative announcement effects. The Capital Level of the bank is measured as the Equity/total assets ratio. Firms with a lower capital level are considered riskier, facing higher expected costs of financial distress. Diversification is a control variable for the level of bank diversification and is measured as non-interest income divided by total revenue. In previous studies, bank diversification is to have a conflicting impact on bank risk-taking (Liu, Molyneux, and Wilson (2013), Stiroh, (2004), and Beck, Demirguc-Kunt, and Levine (2006)), which may have implications on bank's moral hazard and the SEO announcement effects.

Market run-up is the cumulated stock return over the window (-60, -2) relative to the announcement date. It measures the overall market and economic conditions, as well as the growth expectations, during the period leading up to the security offer (see, for example, Korajczyk and Levy (2003); Lowry (2003)). Choe, Masulis, and Nanda (1993) argue that the investor reactions are typically less negative following the increases in stock market prices because of the lower costs of external equity financing during market expansions. Therefore, investors react less negative in good economic conditions. Stock run-up is the cumulated stock return over the window (-60, -2) relative to the announcement date. Lucas and McDonald (1990) argue that, after a period of positive abnormal returns, overvalued firms have incentives to issue equity directly. Stock return volatility is the annualised stock return volatility measuring firm's riskiness calculated from daily returns over the day interval from -250 to -10 relative to the equity issue date. A number of previous studies assume that firms with a higher stock return volatility face higher costs of attracting new debt financing (see, for example, Lewis, Rogalski, and Seward (1999, 2003)).

Finally, I control for a group of country-specific variables, which are Inflation, KKZ-index (an index of institutional development), Economic Freedom, and GDP growth. The KKZ-index is from Kaufmann, Kraay, and Mastruzzi (2008). A higher value of the KKZ-index indicates a more advanced level of institutional development. Economic freedom is derived from the Heritage Foundation and is the average value for the period 2001-2012 of an index of economic freedom (freedom from government interference afforded to

businesses and individuals). It measures the extent of how much freedom individuals and firms can get from their governments to carry on with their business. I expect bank SEO announcement effect is associated with lower inflation, higher GDP growth, better institutional development, and more economic freedom.

Table 5.2 shows the summary statistics of the key variables of this study. The highest and the lowest 2% of each variable have been eliminated from the sample to mitigate the potential distortions that may be caused by the extreme outliers. The Total Assets of the banks in the sample range from $0.04 billion to $3,060 billion, with the average total assets being $197 billion. Capital Level is measured as Equity/Total Assets. The results for this variable show that banks on average hold 7.27 per cent equity to their total assets, which is below the requirement of capital regulation. This result is consistent with Berger and Bouwman (2011). The Diversification variables show that, on average, 32.16% of the total operating income of the banks in the sample is from non-interesting income, with the minimum and maximum being 6.93% and 71.85%, respectively. Bank SEOs announcements are on average preceded by a significant market run-up (4%) and individual stock run-ups (4.32%), indicating that banks tend to announce SEOs after a period of stock price appreciations. The KKZ-index ranges from -0.93 to 1.69 indicating a wide variation of institutional development across the sample countries. The Economic Freedom index also shows significant variations among sample countries from 5 to 90, with the mean value being 72.38.

Table 5.2 Summary statistics for CAR and variables

Variable	N	mean	t-statistics	stddev	median	min	max
Firm-specific variables							
Total assets	1307	197***	13.42	518	14	0.04	3060
Equity/total assets	1307	7.27***	82.84	3.22	6.88	1.53	16.38
Diversification	1307	32.16***	76.23	15.21	30.73	6.93	71.85
Market runup	1307	4.00***	18.17	8.3	5.44	-21.54	22.21
Stock runup	1307	4.32***	10.86	14.87	4.56	-33.28	42.81
Stock return volatility	1307	80.50***	46.3	63.84	47.6	9.79	174.77
Country-specific variables							
Inflation	183	2.61***	36.67	2.66	2.23	-6.01	18.15
KKZ index	183	0.96***	59.73	0.63	1.2	-0.93	1.69
Economic freedom	183	72.38***	273.16	9.87	78	51	90
GDP growth	183	2.19***	23.67	3.34	2.55	-7.1	14.2

Notes: This table provides the summary statistics for the control variables of the bank-specific and country-specific variables over the sample period of January 2001 to December 2012. The sample consists of 500 banks in 21 countries for a 4-period panel. The variables are defined as outlined in Appendix 1. Total assets are in billion U.S. dollars. N denotes the number of observations. *** represent significance at 1% significance level.

Table 5.3 provides the mean and median values of the cumulative abnormal stock returns (CARs) for the SEO announcements for the banks in the whole sample.

The CARs are measured using a market model with an estimation window of (-250, -10). The mean CAR for the 1,307 observations over event window (-1, 1) is -0.74%. The median CAR over the same event window is -0.45%. Both mean and median are significant at the 1%-significance level. As a robustness check, I also calculate CARs for slightly different event windows. As can be seen from Table 6.3 all these CARs have means and medians that are negative and that are significantly different from zero at the 1%-level.

Table 5.3 Cumulative abnormal return

Event window	N	Mean	Median
(-1,1)	1307	-0.74***	-0.45***
(-1,0)	1307	-0.67***	-0.32***
(-1,2)	1307	-1.02***	-0.71***
(-2,1)	1307	-0.96***	-0.52***
(0,1)	1307	-0.79***	-0.35***
(0,2)	1307	-0.55***	-0.54***

Notes: This table provides the mean and median values of the cumulative abnormal return (CAR) for different event windows over the sample period from January 2001 to December 2012. CARs are estimated using the standard market model procedure with time window (day -250, day -10) as the estimation window. Day 0 is the announcement date. N represents the number of observations. *** represents a 1% significance level using a two-tailed test.

5.5 Multivariate analysis

5.5.1 Regression analysis

The overall results presented in Table 5.4 imply a curvilinear, non-monotonic relation between these regulation measures and the CAR associated with bank SEOs (the regression model and the estimation of CAR are mentioned in chapter 3). The results show a positive and significant coefficient for Initial capital stringency, Depositor protection, Prompt corrective action, and Total Regulation, and a negative and significant coefficient for their quadratic terms, respectively. These results support the hypothesis that there is an inverted U-shaped relation between the stringency of bank regulation and bank SEO announcement effects. Under a mild bank regulation environment, the market perceives that more regulation helps to take less risk and to reduce the moral hazard of banks. Hence, the market reacts more positively to the bank SEO announcement compared to a less regulated market. However, if bank regulation becomes too stringent and increases beyond a certain level investors are likely to become concerned that the too stringent regulation reduces the franchise value of the banks and that this regulation will induce more risk-taking by the banks. Thus, the market may react more negatively to bank SEO announcement in more regulated markets.

I calculate the inflection point of the quadratic function and compare it with the distribution of the data. In column (4), the inflection point is 0.61. The CAR increases at first and reaches the maximum value as Initial capital stringency reaches 0.61, and then it declines continuously as Initial capital stringency continues to 1. The inflection point for Depositor protection, Prompt corrective action, and Total regulation are 0.32, 0.55, and 0.55, respectively.

The only regulation variable for which I don't find significant results is Activity Restriction. On one hand, Barth et al (2004) suggest that restricting bank activities is associated with an increase in the likelihood of suffering a major crisis because broad banking power allows the bank to diversify income sources and enhance stability. However, on the other hand, broad financial activities might intensify moral hazard problems and provide more opportunities for banks to increase risk taking (Boyd et al., 1998). Moreover, broad activities may lead to the formation of extremely large and complex entities that are

extraordinarily difficult to monitor and "too big to discipline" (Laeven and Levine, 2007). Thus banks with broader activities are more likely to experience a more negative announcement effect upon equity issuance since investors may perceive these banks to be too complex and opaque. Therefore, these investors may have less confidence in equity issuance by these banks. This finding of insignificant coefficients on Activity restriction may be the result of these two cancelling effects of bank diversification on bank performance. This result is also consistent with the insignificant results of Diversification as a control variable in the regression model.

The signs and significance levels of the control variables are to a large degree in line with my expectations. For example, bank size, measured as Ln(Total Assets), is an important determinant of the SEO announcement effect where large banks SEOs are more likely to be associated with higher CARs. This result is consistent with Abhyankar and Dunning (1999), who find that larger banks are more efficient and have less information asymmetry problems. I observe that Market run-up tends to be positively associated with the bank SEO announcement effect. This finding is consistent with Choe (1993) who find that investor reactions are less negative following increases in stock market prices. I also observe that the GDP growth is positively related to the bank SEO announcement effect. This result is expected, since, with higher GDP growth, banks might have more business opportunities and can sustain positions of abnormal profitability (Goddard et al, 2011).

Table 5.4 Bank regulation and bank SEO announcement effect

	(1)	(2)	(3)	(4)	(5)
	Activity restriction	Initial capital stringency	Depositor protection	Prompt corrective action	Total regulation
Bank Regulation	0.944	14.615***	3.362**	11.319***	5.374*
	(1.151)	(2.777)	(1.995)	(3.347)	(1.949)
Bank Regulation squared	-0.146	-11.891***	-5.312***	-10.369***	-4.855***
	(-0.696)	(-3.222)	(-3.101)	(-4.027)	(-2.613)
lnTA	0.208**	0.186**	0.190**	0.202**	0.203**
	(2.504)	(2.233)	(2.294)	(2.438)	(2.452)
Equity/total assets	0.024	0.022	0.022	0.022	0.021
	(0.599)	(0.540)	(0.537)	(0.549)	(0.511)
Diversification	-0.007	-0.003	-0.004	-0.005	-0.005
	(-0.478)	(-0.240)	(-0.312)	(-0.334)	(-0.361)
Market run-up	0.041*	0.043*	0.039*	0.037	0.037
	(1.739)	(1.828)	(1.653)	(1.584)	(1.591)
Stock run-up	-0.023	-0.026	-0.024	-0.026	-0.025
	(-1.406)	(-1.560)	(-1.465)	(-1.560)	(-1.546)
Stock return volatility	-0.005	-0.005	-0.005	-0.005	-0.005
	(-1.432)	(-1.443)	(-1.355)	(-1.376)	(-1.352)
Inflation	-0.100	-0.155	-0.205**	-0.157	-0.101
	(-0.979)	(-1.614)	(-2.054)	(-1.630)	(-1.039)
KKZ index	-2.550	-3.268	-1.900	-2.541	-2.975
	(-1.136)	(-1.420)	(-0.861)	(-1.141)	(-1.305)
Economic freedom	-0.007	-0.149	-0.090	-0.157	-0.172*
	(-0.070)	(-1.468)	(-0.931)	(-1.573)	(-1.688)
GDP growth	0.363***	0.288**	0.275**	0.296**	0.312***
	(3.102)	(2.487)	(2.367)	(2.567)	(2.732)
Constant	-0.829	9.283	4.559	11.974	12.526
	(-0.108)	(1.095)	(0.578)	(1.438)	(1.476)
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes	Yes
N	1307	1307	1307	1307	1307
adj. R-sq	0.036	0.043	0.045	0.044	0.044

This table presents the results of the regression analyses of stock price reactions around bank SEOs from 21 countries for the period from January 2001 to December 2012. The dependent variable is the Cumulative Abnormal Return (CAR) measured over the window (-1, 1) relative to the announcement date, calculated using standard event study methodology with the estimation period from -250 days to -10 days. t-statistics are computed as heteroskedasticity-robust standard errors clustered for banks and are presented in brackets. Detailed definitions of the variables can be found in Appendix 1. N denotes the number of observations. *, **, *** represent statistical significance at the 10%, 5%, and 1% significance level, respectively.

5.5.2 Endogeneity issues

In this section, I consider the endogeneity between bank regulation stringency and SEO announcement effects. The reverse causality may not be a serious concern in the regression analysis. However, simultaneity may exist, for example, the observed inverted U-shaped relation between the bank regulation measures and the SEO announcement effects may be driven by some unknown factors that have an impact on both bank regulation and bank SEO announcement effects. I take advantage of the different timing of the adoption of Basel II framework by different countries as a source of exogenous variation. The Basel II accord adopts a "three pillars" concept. The first pillar deals with maintenance of regulatory capital calculated for three major components of risk that a bank faces: credit, operational, and market risk. The second pillar is a supervisory review, giving regulators more tools to supervise banks from different aspects. The third pillar is developing a set of disclosure requirements that allow the market participants to gauge the capital adequacy of a bank. Bank regulation tends to be strengthened from different aspects after the adoption of Basel II and that varies across countries and over time. For example, Austria adopted Basel II in 2005, whereas China and Malaysia adopted it only in 2010. Consequently, I use the exogenous cross-country and cross-year variation in the timing of the Basel II adoption as the instrument to bank regulation stringency in order to assess the causal impact of bank regulation on SEO announcement effects.

Table 5.5 provides the results of a two-stage least squares model. In the first stage, I run an OLS model of the bank regulation measures on its known determinants. I use the Basel II dummy (one for the time after the country adopted Basel II and 0 otherwise) as the instrumental variable for the regulation measures. The predicted values of bank regulations from the first stage are then used as the key explanatory variables in the second stage. In the first step, I find that the coefficients of Basel II are significantly positive for Initial capital stringency, Prompt corrective action, Depositor protection, and Total Regulation. These results indicate that bank regulation became more stringent after the adoption of Basel II by the respective countries. However, I find a significantly negative coefficient for the Basel II dummy for the Activity restriction variable. This result implies that, after the adoption of Basel II, banks are permitted to conduct more non-bank activities to diversify their income stream.

In the second step analysis, I find that the coefficients on the linear terms of Initial capital stringency, Prompt corrective action, Depositor protection, and Total Regulation are positive. At the same time, the square terms of these bank regulation measures are significantly negative. These findings confirm the main findings that the relation between bank regulation and bank SEO announcement effect is an inverted-U shaped non-linear relation.

Table 5. 5 Bank regulation and bank SEO announcement effect, including treatment effects

	(1) 1st stage:Activity restriction	(2) 2nd stage: CAR	(3) 1st stage:Initial capital stringency	(4) 2nd stage: CAR	(5) 1st stage:Depositor protection	(6) 2nd stage: CAR	(7) 1st stage:Prompt corrective action	(8) 2nd stage: CAR	(9) 1st stage:Total regulation	(10) 2nd stage: CAR
Bank regulation		2.033		20.030***		2.743**		21.168*		5.206***
		(0.357)		(3.056)		(1.963)		(1.705)		(2.923)
Bank regulation squared		0.513		-14.713***		-4.551***		-15.127**		-4.649***
		(0.709)		(-3.611)		(-3.294)		(-2.179)		(-3.863)
Basel II	-0.078*		0.136***		0.360***		0.074***		0.356***	
	(-1.748)		(14.725)		(21.324)		(7.965)		(21.096)	
lnTA	-0.002	0.245***	-0.006***	0.222***	-0.009*	0.218***	-0.005***	0.215***	-0.011**	0.221***
	(-0.263)	(2.918)	(-3.242)	(2.812)	(-1.951)	(2.759)	(-2.691)	(2.731)	(-2.364)	(2.786)
Equity/total assets	0.005*	0.002	0.000	0.018	-0.001	0.016	-0.000	0.017	-0.001	0.015
	(1.785)	(0.040)	(0.555)	(0.413)	(-0.671)	(0.378)	(-0.285)	(0.400)	(-0.765)	(0.348)
Diversification	-0.003**	0.003	0.001**	-0.009	0.002**	-0.007	0.000	-0.008	0.002***	-0.008
	(-2.270)	(0.135)	(2.571)	(-0.645)	(2.576)	(-0.497)	(1.019)	(-0.599)	(3.099)	(-0.560)
Market run-up	0.004	0.009	0.002***	0.026	0.002**	0.027	0.001***	0.028	0.003***	0.027
	(1.458)	(0.366)	(4.561)	(1.182)	(2.021)	(1.271)	(2.589)	(1.239)	(2.817)	(1.248)
Stock run-up	0.001	-0.018	-0.001***	-0.019	-0.001***	-0.019	-0.000*	-0.018	-0.001***	-0.019
	(0.691)	(-1.121)	(-3.568)	(-1.229)	(-2.715)	(-1.202)	(-1.919)	(-1.132)	(-3.259)	(-1.223)
Stock return volatility	0.000	-0.005	-0.000*	-0.005	0.000	-0.004	-0.000	-0.005	-0.000	-0.004
	(0.596)	(-1.549)	(-1.820)	(-1.402)	(0.438)	(-1.334)	(-0.415)	(-1.392)	(-0.173)	(-1.338)
Inflation	0.012	-0.071	-0.034***	0.016	-0.063***	-0.106	-0.019***	-0.113	-0.069***	-0.044
	(0.673)	(-0.738)	(-8.250)	(0.137)	(-11.368)	(-1.070)	(-4.928)	(-0.984)	(-10.684)	(-0.423)
KKZ index	-1.259***	5.456	-0.207***	0.024	-0.427***	0.482	-0.161***	0.229	-0.343***	0.034
	(-5.258)	(1.040)	(-4.055)	(0.013)	(-4.326)	(0.275)	(-3.227)	(0.119)	(-3.534)	(0.020)
Economic freedom	0.029**	-0.107	-0.028***	-0.072	-0.057***	-0.009	-0.011***	-0.031	-0.063***	-0.033
	(2.348)	(-0.870)	(-9.748)	(-0.812)	(-9.620)	(-0.113)	(-3.854)	(-0.378)	(-10.578)	(-0.382)
GDP growth	-0.020***	0.304***	-0.010***	0.187**	-0.015***	0.242***	-0.002	0.226***	-0.015***	0.231***
	(-2.654)	(2.833)	(-5.329)	(2.365)	(-4.256)	(3.170)	(-1.289)	(2.975)	(-4.295)	(3.046)
Constant	1.646*	-11.180	3.568***	-6.075	5.633***	-5.147	2.121***	-9.526	6.349***	-3.948
	(1.758)	(-0.925)	(14.473)	(-0.605)	(11.623)	(-0.663)	(9.343)	(-0.801)	(13.080)	(-0.489)
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1296	1340	1296	1340	1296	1340	1296	1340	1296	1340
adj. R-sq	0.399	0.033	0.765	0.042	0.651	0.040	0.667	0.036	0.696	0.043

Notes: This table presents the results of regression analyses of stock price reactions on bank issued SEO announcements from 21 countries for the period from January 2001 to December 2012. The dependent variable is the Cumulative Abnormal Return (CAR) measured over the window (-1, 1) relative to the announcement date, calculated using the standard event study methodology with the estimation period from -250 days to -10 days. I use a two stage least squares model to address the endogeneity problem between the bank regulation and CARs. I use the exogenous cross-country, cross-year variation in the timing of the Basel II adoption as the instrument to bank regulation stringency to assess the causal impact of bank regulation on SEO announcement effects. I report both the first and second stage results. In the first stage regression, I regress bank regulation measures on all exogenous variables and the instrument variable Basel II dummy. In the second stage, I use the predicted value of bank regulation measures from the first stage as the independent variable. The dependent variable in the second stage is the CAR. Detailed definitions of variables can be found in Appendix 1. t-statistics are reported in parentheses. N denotes the number of observations. *, **, *** represent significance at the 10%, 5%, and 1% significance level, respectively.

5.6 Robustness test

In this section, I consider the impact of involuntary equity issuance on the relation between the bank SEO announcement effect and the stringency level of bank regulation. Because of bank capital regulation, particularly after the implementation of the Basel Accord, banks are sometimes forced to involuntarily issue stock in order to meet government capital requirements. Besanko and Kanatas (1996) argue that forcing undercapitalised banks to issue equity in order to meet the government requirements reduces the expected surplus available to bank "insider" shareholders, who therefore provide less effort to monitor loan repayments. Hence, the reduction in insider effort reduces the equity value of the bank. For the period 1975-1986, Keeley (1989) documents a more negative announcement effect for involuntary bank stock issues compared to voluntary issues. He proposes three explanations to this finding: the reduction of the value of the deposit insurance guarantee, the distortion of capital structure optimum, and the conveyance of unfavourable information about the firm.

However, Cornett and Tehranian (1994) argue that for Keeley's sample, the regulator has the discretion to force involuntary bank stock issuance. Therefore, such an issue may convey inside information about the issuing bank. Cornett and Tehanian (1994) instead classify equity issues by "undercapitalized" banks with total capital ratios below 7% as oluntary issues. They find that these involuntary stock issuances have significantly lower negative abnormal stock returns than voluntary stock issues. This finding confirms their hypothesis that the issuance of equity, required to maintain capital standards, does not convey any signal of future prospects of the firm. Meharn and Tehranian (1998) also find that commercial banks that voluntarily issue SEO exhibit a long-run decline in both operating performance and stock return performance following the issue. These firms also experience a systematic negative market reaction to quarterly earnings announcements following the issue. Cornett et al., (1998) find that banks voluntarily (but not involuntarily) issue common stock experience a significant drop in the matched adjusted operating performance, in benchmark firm's adjusted stock prices following the issue. They also find there is a negative market reaction to post-issue quarterly earnings announcements. These results confirm that banks with the discretion to issue equity do so when they are overvalued. Using an extended data from 1983 through 2005 that covers more recent bank regulation changes, particularly the Federal Deposit Insurance Corporation Improvement Act (FDICIA) in 1991, Krishnan et al., (2010) find that both undercapitalised and well-capitalised banks

have significantly negative mean abnormal returns around SEO announcements. This result indicates that investors do not perceive these two types of banks to be economically different. Therefore, theories and empirical evidence on the relation between involuntary equity issuance and bank SEO announcement effects are not conclusive.

Calem and Rob (1999) suggest that although banks take more risk-taking when capital levels are very low or very high (hence a U-shaped relation between bank capital and risk-taking), the incentives behind the risk-taking are different. Undercapitalized banks take more risks to exploit risk-shifting benefits of deposit insurance. Hence, they are a reflection of moral hazard problems. However, well-capitalised banks take more risks because they are far from insolvency. Gorton and Rosen (1996) also argue that well-capitalised banks take excessive risks because of factors exogenous to the portfolio decisions, such as managerial incompetence or a lack of lending opportunities. Therefore, the relation between bank regulation and bank SEO announcement effects may be different between under-(involuntary) and well-capitalised (voluntary) banks issuance.

I conduct two empirical tests to investigate this relationship. First, I classify bank voluntary and involuntary SEOs based on the capital requirements of their own countries. I define a dummy variable, Involuntary, that takes a value of one if the bank SEO is issued when either of the following ratios is less than the requirement of the government: bank's capital ratio, equity to assets ratio, tier 1 capital ratio, or total capital ratio (Bank's capital ratio is the percentage of a bank's capital to its risk-weighted assets. Equity to assets ratio is the ratio of bank capital and reserves to total assets. Tier 1 capital ratio is the ratio of bank's core equity capital to its total risk-weighted assets. The total capital ratio is tier 1 capital ratio and tier 2 capital ratio divided by risk-adjusted assets. All these data are from datastream.) Otherwise, the value of the dummy variable is zero. I include this dummy variable in the main regression to examine whether involuntary bank SEOs have higher or lower announcement effects than their voluntary counterparts. Second, I include interaction terms between the Involuntary dummy and both the linear and the quadratic terms of the Initial capital stringency variable. These are included in the main regression in order to examine whether the previously found inverted U-shaped relation between bank capital regulation and bank SEO announcement effects is different between voluntary and involuntary issues. I do not consider the other four regulation measures because voluntary/involuntary issuance is mainly related with bank capital regulation.

Table 5.6 shows the results of these robustness tests. In column (1) I find that the Involuntary dummy is significant and negative. This result is consistent with Keeley (1989) in the sense that the involuntary bank SEOs are associated with more negative announcement effects. In column (2) I find that for involuntary issuance, the coefficients for initial capital stringency and initial capital stringency squared are the opposite sign of those for voluntary issuance, and they are significant and at a similar level in magnitude. When I sum the coefficients of involuntary issuance and the interaction of involuntary issuance and Initial capital stringency, it is close to zero and is insignificantly different from zero. The same is also true if I sum the square term of involuntary issuance and its interaction term with initial capital stringency. These results indicate that bank capital regulation has no significant impact on involuntary bank SEO's announcement effects. These results are consistent with Cornett and Tehranian's (1994)'s finding that the issuance of equity required to maintain capital standards (involuntary issuance) does not convey any signal of future prospects of the firm.

Overall, the results in Table 5.6 suggest that involuntary bank SEOs may signal more negative information (reduction of the value of the deposit insurance guarantee or the distortion of capital structure optimum) than voluntary bank SEOs and hence leads to more negative SEO announcement effects. However, the stringency of the regulation on the source of funds that can be counted as regulatory capital does not have any further impact on the announcement effects of these involuntary issuances.

Table 5.6 Bank regulation and bank SEO announcement effect, including involuntary issuance

	(1)	(2)
	CAR	CAR
Initial capital stringency	13.771***	18.775***
	(2.583)	(3.059)
Initial capital stringency squared	-11.260***	-14.752***
	(-3.012)	(-3.583)
Involuntary * Initial capital stringency		-18.043**
		(-2.550)
Involuntary * Initial capital stringency squared		13.702**
		(2.423)
involuntary	-1.052*	4.023**
	(-1.700)	(2.003)
lnTA	0.185**	0.200**
	(2.247)	(2.407)
Equity/total assets	0.009	0.011
	(0.221)	(0.258)
Diversification	-0.005	-0.004
	(-0.331)	(-0.323)
Market run-up	-0.024	-0.025
	(-1.471)	(-1.503)
Stock run-up	0.043*	0.043*
	(1.809)	(1.824)
Stock return volatility	-0.158	-0.140
	(-1.643)	(-1.465)
Inflation	0.266**	0.282**
	(2.283)	(2.427)
KKZ index	-0.005	-0.005
	(-1.393)	(-1.405)
Economic freedom	-0.131	-0.171
	(-1.285)	(-1.619)
GDP growth	-3.426	-3.105
	(-1.486)	(-1.332)
Constant	8.639	9.095
	(1.016)	(1.047)
Time fixed effects	Yes	Yes
Country fixed effect	Yes	Yes
N	1307	1307
adj. R-sq	0.045	0.046

Notes: This table presents the results of regression analyses of stock price reactions on bank issued SEO announcements from 21 countries for the period from January 2001 to December 2012. The dependent variable is the Cumulative Abnormal Return (CAR) measured over the window (-1,1) relative to the announcement date, calculated using a standard event study methodology with the estimation period from -250 days to -10 days. I include the dummy variable Involuntary and the interaction term of Involuntary and Initial capital stringency. Detailed definitions of variables can be found in the Appendix 1. t-statistics are reported in parentheses. N denotes the number of observations. *, **, *** represent significance at the 10%, 5%, and 1% significance level, respectively.

I also consider the impact of the sample size of the U.S. issued SEOs. The relationship between the bank SEO announcement effect and the stringency level of bank regulation may be bias because of U.S. issuance. Therefore, I also conduct an empirical test without the U.S. sample to investigate this relationship as a robustness test. The results are very similar to the main results. There is a significantly positive coefficient of initial capital stringency and prompt corrective action, and a significantly negative coefficient of their quadratic terms, respectively. These results support the hypothesis that there is an inverted-U shaped relation between the stringency of bank regulation and bank SEO announcement effects. The market reacts more positively to the bank SEO announcement compared to a less regulated market, but may react more negatively to bank SEO announcement when the bank regulation becomes too stringent.

Table 5.7 Bank regulation and bank SEO announcement effects, sample without US

	(1)	(2)	(3)	(4)	(5)
	Activity restriction	Initial capital stringency	Prompt corrective action	Depositor protection	Total regulation
Bank regulation	0.241	11.386**	15.006***	-1.661	-5.755
	(0.278)	(2.011)	(3.252)	(-0.556)	(-1.255)
Bank regulation squared	-0.121	-8.538**	-12.974***	2.251	3.123
	(-0.536)	(-2.085)	(-3.632)	(0.574)	(1.182)
lnTA	0.283**	0.263**	0.272**	0.284**	0.277**
	(2.300)	(2.105)	(2.200)	(2.335)	(2.229)
Equity/total assets	0.028	0.019	0.029	0.024	0.028
	(0.507)	(0.342)	(0.531)	(0.438)	(0.522)
Diversification	0.015	0.018	0.015	0.016	0.018
	(0.921)	(1.034)	(0.902)	(0.960)	(1.039)
Market run-up	0.005	0.007	0.006	0.005	0.006
	(0.214)	(0.302)	(0.258)	(0.206)	(0.260)
Stock run-up	-0.023	-0.024	-0.021	-0.023	-0.024*
	(-1.573)	(-1.611)	(-1.454)	(-1.546)	(-1.651)
Stock volatility	-0.021	-0.026*	-0.020	-0.023	-0.024*
	(-1.547)	(-1.845)	(-1.448)	(-1.585)	(-1.760)
Inflation	-0.106	-0.122	-0.197**	-0.103	-0.145
	(-1.063)	(-1.284)	(-1.979)	(-0.968)	(-1.504)
KKZ index	-4.646	-5.502*	-3.985	-4.979*	-4.483
	(-1.624)	(-1.885)	(-1.405)	(-1.749)	(-1.582)
Economic freedom	0.072	0.061	0.140	0.080	0.038
	(0.660)	(0.545)	(1.275)	(0.690)	(0.325)
GDP growth	0.282**	0.293**	0.233*	0.292**	0.267**
	(2.385)	(2.440)	(1.920)	(2.452)	(2.254)
constant	-4.397	-4.798	-12.405	-4.488	0.549
	(-0.515)	(-0.540)	(-1.441)	(-0.504)	(0.054)
Time fixed effect	Yes	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes	Yes
N	641	641	641	641	641
adj. R-sq	0.095	0.098	0.116	0.094	0.096

Note: This table presents the results of regression analyses of stock price reactions around bank SEOs using the sample without the U.S. data. The dependent variable is the cumulative abnormal stock return (CAR) measured over the window (-1, 1) relative to the announcement date, calculated using standard event study methodology with the estimation period from -250 days to -10 days. T-statistics are computed by the heteroskedasticity-robust standard errors clustered for banks and are presented in brackets. Detailed definitions of variables can be found in Appendix I. N denotes the number of observations. *, **, *** represent statistical significance at the 10%, 5% and 1% significance level, respectively.

I also consider the impact of the 2007-09 GFC. The relationship between the bank SEO announcement effect and the stringency level of bank regulation may be bias because of this GFC. Therefore, I conduct another empirical test and control for the crisis. I add a dummy variable ‘yearcrisis’ which equals to 1 if the SEOs issued during the year 2007 to the year 2009, otherwise equals to 0. The results stay the same as the main results, which are consistent with the hypothesis that there is an inverted-U shaped relation between the stringency of bank regulation and bank SEO announcement effects.

Table 5.8 Bank regulation and bank SEO announcement effects, controlling the GFC

	(1)	(2)	(3)	(4)	(5)
	Activity restriction	Initial capital stringency	Prompt corrective action	Depositor protection	Total regulation
Bank regulation	1.229	15.260***	11.331***	4.188***	5.615**
	(1.598)	(3.036)	(3.439)	(2.619)	(2.268)
Bank regulation squared	-0.239	-12.653***	-10.950***	-5.780***	-3.266***
	(-1.203)	(-3.570)	(-4.334)	(-3.296)	(-2.779)
lnTA	0.223***	0.218***	0.209***	0.240***	0.237***
	(2.775)	(2.741)	(2.627)	(2.986)	(2.939)
Equity/total	0.022	0.023	0.021	0.024	0.022
	(0.531)	(0.565)	(0.523)	(0.587)	(0.528)
Diversification	-0.009	-0.006	-0.006	-0.010	-0.009
	(-0.647)	(-0.451)	(-0.435)	(-0.744)	(-0.682)
Market run-up	-0.019	-0.023	-0.022	-0.022	-0.020
	(-1.156)	(-1.420)	(-1.359)	(-1.376)	(-1.263)
Stock run-up	0.021	0.029	0.024	0.023	0.024
	(0.972)	(1.325)	(1.103)	(1.061)	(1.059)
Stock volatility	-0.005	-0.005	-0.005	-0.005	-0.004
	(-1.399)	(-1.386)	(-1.354)	(-1.373)	(-1.287)
Inflation	0.031	-0.137	-0.147	-0.184*	-0.125
	(0.323)	(-1.457)	(-1.564)	(-1.821)	(-1.264)
KKZ index	1.962	-1.787	0.158	-0.838	-0.978
	(1.160)	(-1.026)	(0.096)	(-0.487)	(-0.562)
Economic freedom	-0.025	-0.129	-0.073	-0.051	-0.044
	(-0.291)	(-1.518)	(-0.876)	(-0.623)	(-0.538)
GDP growth	0.217***	0.143*	0.211***	0.192**	0.183**
	(2.704)	(1.847)	(2.742)	(2.512)	(2.369)
constant	0.061	-0.087	0.267	0.078	-0.037
	(0.151)	(-0.221)	(0.675)	(0.199)	(-0.096)
Time fixed effect	-7.793	4.815	-0.418	0.638	-1.916
Country fixed effect	(-1.076)	(0.653)	(-0.059)	(0.093)	(-0.269)
N	1307	1307	1307	1307	1307
adj. R-sq	0.029	0.042	0.044	0.038	0.037

Note: This table presents the results of regression analyses of stock price reactions around bank SEOs after controlling the global financial crisis. The dependent variable is the cumulative abnormal stock return (CAR) measured over the window (-1, 1) relative to the announcement date, calculated using standard event study methodology with the estimation period from -250 days to -10 days. T-statistics are computed by the heteroskedasticity-robust standard errors clustered for banks and are presented in brackets. Detailed definitions of variables can be found in Appendix I. N denotes the number of observations. *, **, *** represent statistical significance at the 10%, 5% and 1% significance level, respectively.

5.7 Conclusion

The recent global financial crisis has spurred renewed interest in assessing the appropriate regulatory reforms. But how does the level of the stringency of bank regulation may impact on the announcement effect upon equity issuance announcement is still a question. In this regard, and building upon a recent worldwide survey, I examine the effects on bank regulation and the announcement effect upon equity issuance announcement.

Based on the empirical analysis, I find that bank regulation has a significant nonlinear relation with the bank issued SEO announcement effects. More specifically, I find an inverted U-shaped relation with the security issuance announcement effect. This effect increases as the level of bank regulation increases, and then decreases as the level of bank regulation continues to increase. Regarding bank regulation, I find in particular that higher initial capital stringency, prompt corrective action, depositor protection, and total regulation exert a positive impact on the SEO announcement effect at first, but turn to be negative when these regulations rise too high. The results imply that the bank regulation can pay a double-sided role in affecting the stock price reaction to SEO announcements. There are potential tradeoffs between the wealth effect of bank issued SEO announcements and bank regulations.

I use the different timing of the adoption of Basel II framework by different countries as a source of exogenous variation to address the endogeneity concern in the regressions. The main findings hold. I further find that involuntary bank SEOs are associated with more negative SEO announcement effects than their voluntary counterparts, and the stringency of the regulation on the source of funds that can be counted as regulatory capital do not have any further impact on the announcement effects of these involuntary issuances.

Chapter 6 Conclusions

6.1 Chapter introduction

This chapter summarises and concludes this thesis. The chapter begins by presenting an overview and summary of this research project in section 6.2, which includes research objective, hypotheses, and findings. This is followed in section 6.3 by a discussion of the

contributions of the study. The research limitations are highlighted in section 6.4. Finally, section 6.5 concludes the chapter.

6.2 Overview of the thesis

This thesis carries out an extensive analysis of security announcement effect of commercial banks. I focus on the differences in the stock market reactions of convertible bonds and SEOs offerings between banks and non-bank firms, and how the stringency levels of bank regulation have an impact on the stock price reaction of bank issued equity. Chapter 3 and chapter 4 focus on the U.S. data, and the third one undertakes a cross-sectional country analysis.

The overarching research question for the first research objective is: is there any difference between the stock market reactions of convertible bond offerings between banks and non-banks? To address this question, two sets of literature were reviewed: first, the literature which directly investigates the theories on why firms issue convertible bond; second, the literature on convertible bond announcement effect. The hypothesis is formulated with test the abnormal return associated with the announcement of bank issued convertible bond comparing with that of non-bank issued convertible. I collect convertible bond issuance data between January 1982 and December 2011 and compare the share price reaction of convertible bond issuance for U.S. banks into counterpart U.S. non-bank firms. The dataset consists of 2,076 convertible issues out of which 88 are by banks and the remaining 1988 by non-banks. The abnormal return is measured by using the Ordinary Least Squares (OLS) regression, and I calculate the cumulative abnormal return (CAR) by using market model within an event study approach. The empirical findings show that banks issued convertible bond experience overall 2.889% significantly stronger returns than that of non-bank institutions. Bank regulation changes increased bank capital requirement and encouraged voluntary disclosure, and thus reduced the level of information asymmetry between managers and investors, leading to more favourable stock abnormal return upon convertible bond offerings for banks than non-banks. These results hold after adjusting for a number of firm-, issue-, and market-specific characteristics.

In this study, I also find that arbitrageurs' activity of buying convertible bonds and short selling equities induce significant downward pressure on stock price, however, this

effect cannot explain the full difference in CARs between banks and non-banks. Further research may be extended to conduct a cross-country study to examine the impact of different levels of bank regulation on the announcement of security issuance.

The second research question formulated to address the second research objective is: was: is there any difference between the stock market reactions of SEOs between banks and non-banks? Two set of literature is relied on to provide a context for this research objective. First, the literature on the SEO announcement effect is reviewed. The second literature reviews the evidence with regards to bank security announcement effect**.** This literature has mostly focused on the examination of bank issued SEO announcement effect. The hypothesis is centred on the differences between the announcement effect associated with bank and non-bank issued SEOs. To empirically examine the research question, I examine 375 SEO announcements of U.S. banks and compare their announcement returns in relation to those of counterpart non-banks from 1982 to 2012.

Empirical results of this study are consistent with the results of chapter 3, which bank issued securities experience higher announcement effect than non-bank. I find that the cumulative difference on abnormal return associated with equity offerings for banks is 0.61 percent higher than the counterpart non-bank firms. These results are also consistent with the hypothesis that bank regulation reveals positive information about banks. First bank monitoring regulations limit the behaviour of banks at the time of the SEO; second, there is an incentive for banks to avoid excessive risk-taking due to the existence of capital regulation; and third, the market perceives that banks may benefit from the government's implicit too-big-to-fail (TBTF) policy. Therefore, the market is less likely to assume that bank SEOs signal information that the bank is overvalued compared to their non-bank counterparts.

Chapter 5 addresses the third research question how the bank regulation affects bank issued SEO announcement effect. This chapter examines the relation between bank regulation and the market reaction of associated with bank issued equity announcement. Based on the analysis, I find that bank regulation has a significant nonlinear relation with the bank issued SEO announcement effects. More specifically, I find an inverted U-shaped relation with the security issuance announcement effect. This effect increases as the level of bank regulation increases, and then decreases as the level of bank regulation continues to increase. Regarding bank regulation, I find in particular that higher initial capital stringency,

prompt corrective action, depositor protection, and total regulation exert a positive impact on the SEO announcement effect at first, but turn to be negative when these regulations rise too high. These results imply that the bank regulation can pay a double-sided role in affecting the stock price reaction to SEO announcements. There are potential tradeoffs between the wealth effect of bank issued SEO announcements and bank regulations.

I also use the different timing of the adoption of Basel II framework by different countries as a source of exogenous variation to address the endogeneity concern in the regressions, and the main findings hold. I further find that involuntary bank SEOs are associated with more negative SEO announcement effects than their voluntary counterparts, and the stringency of the regulation on the source of funds that can be counted as regulatory capital do not have any further impact on the announcement effects of these involuntary issuances.

6.3 Contributions

The findings in this study provide evidence that the bank issued convertible bonds and SEOs are associated with higher announcement effects than non-bank firms issued. Dutordoir et al. (2014, p.12) suggest that it would be interesting to examine whether the financial firms' choice for convertible securities is merely driven by regulatory concerns since these financial firms are often excluded from convertible bond research samples, as is common in corporate finance research. To my best knowledge, Janjigian (1987) and De Jong et al. (2012) are the only other two studies that report the share price reactions on convertible bond offerings in firms within alternative industries, including banks. However, neither study focuses on commercial banks nor do they provide any explanation of the difference between banks and non-banks. This study intends to fill this gap and contribute to the literature by exploring whether the share price reaction to convertible bond offerings made by U.S. commercial banks is significantly different from that of non-bank firms.

This study also contributes to the debate on bank regulation regarding whether carefully designed regulation/supervision/monitoring boosts investor confidence and significantly reduces firm equity issuing costs in terms of announcement effects. These results confirm the fact discussed in Slovin et al. (1991) that banks are frequent equity issuers, and one of the reasons for this frequency may be the lower issuing costs. These results are also

consistent with the previous literature, which documents significantly higher announcement effects of SEOs by another highly regulated utility industry (Smith, 1986).

This study contributes to the literature by extending Polonchek et al. (1989), who find that the mean abnormal returns of bank SEO announcements are higher than those of non-bank counterparts. The limitations of Polonchek et al. (1989), however, are that it covers the period (1975-1984) before the adoption of Basel I in 1988 and the Federal Deposit Insurance Corporation Improvement Act (FDICIA) in 1991. These important regulation changes should have a significant effect on the stock market behaviour of bank SEOs. The 2007-09 financial crisis may also change the investors' perception of firm/bank SEO announcement. Their relatively small sample also suggests that their findings are not conclusive. For example, there are merely 41 equity event announcements in Polonchek et al. (1989), and the researchers themselves admit that "the sample sizes involved in this study are necessarily small" (p.449). Another recent study on U.K. rights issues between 1988 and 1998 by Iqbal (2008) finds less negative stock market reactions in the rights offerings by financial firms compared with industrial firms. However, both studies' findings are based solely on the comparison of the mean values of the cumulated abnormal return (CAR) over the SEO announcement window and ignore the differences in other characteristics between banks and non-banks. These characteristics are important in determining the differences in CARs between banks and non-banks if any. For example, banks that issue SEOs are generally larger than non-banks, and the different stock market reactions to the announcement of SEOs may simply be caused by the differences in size between banks and non-banks.

This study also complements to the strand of literature that studies the determinants of the announcement effects of bank SEOs. For example, Wansley and Dhillon (1989) find negative announcement effects from the issuance of common stock, the magnitude of which is similar to that found in the previous literature for utilities and smaller than that of industrial firms. Keeley (1989) documents a more negative announcement effect for involuntary bank stock issues than voluntary ones during the period 1975-1986, whereas Cornett and Tehranian (1994), on the contrary, find that involuntary equity issuance does not convey any signal of the firm's future prospects. Krishnan et al. (2010) find that both undercapitalised and well-capitalised banks have a significantly negative mean abnormal return around SEO announcements, indicating that investors do not perceive these two types of banks as economically different.

Finally, the findings suggest that there is an inverted U-shaped non-linear relationship between the stringency of bank regulation and bank issued SEO announcement effect. In this study, I consider the impact of the extent of the stringency of bank regulation on SEO announcement effect and focus only on banking industry across the world. To my best knowledge, this study is the first empirical analysis of the relationship between bank regulation and the announcement effect associated with bank issued equity.

This study also has timely implications to the current debate over bank regulation. It examines the stock market's reactions to bank SEO announcement across countries with different bank regulation environments and shows that the relation between bank regulation and the SEO announcement effect is more complex than previous literature would suggest. Though the work does not examine the total benefits and costs of bank regulation to the real economy, the results do indicate that over-regulation is harmful to bank's equity issuing cost in terms of SEO announcement effects. Given that reducing firm's financial constraints is important for the whole economy, countries with highly stringent regulation should rethink and redesign their regulatory systems.

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Appendix 1: Variables definition

Variable name	Classification	Description
CAR	Firm-specific	The cumulative abnormal return over the three-day event window (-1,1) from one day before to one day after the SEO announcement date
Bank	Firm-specific	1 for commercial banks, 0 otherwise
Bid-ask-spread	Firm-specific	The average daily bid-ask spread, scaled by the stock price, over the 250 trading days prior to the announcement date
Capital expenditure	Firm-specific	Dummy variable equals to 1 if the issuer uses the proceeds of convertible bond for capital expenditure, and 0 otherwise.
Diversification	Firm-specific	The ratio of non-interest income over total operating income
Equity/total assets	Firm-specific	Total equity divided by total assets. It is the sum of common equity, preferred stock, minority interest, long-term debt, non-equity reserves and deferred tax liability in untaxed reserves. For insurance companies, policyholders' equity is also included
lnTA	Firm-specific	Natural logarithm of total assets denominated in US dollar
Involuntary	Firm-specific	Dummy variable equals to 1 if the bank SEO issued when either one of the bank's capital ratio, equity to assets ratio, tier 1 capital ratio or total capital ratio is less than the government's requirement, and 0 otherwise.
Share turnover	Firm-specific	Trading volume divided by the number of shares outstanding
Stock return volatility	Firm-specific	Annualized stock return volatility, calculated from daily returns over the window (-250, -10) relative to the convertible bond announcement date
Stock run-up	Firm-specific	Stock return over the window (-60, -2) relative to the announcement date
Arbitrage risk	Issue-specific	The residual variance, expressed as a squared percentage of the market model OLS regression residual estimated over the 250 trading days before the announcement date
Cbarbitrage	Issue-specific	I scale the change in monthly short interest by the number of shares outstanding measured on trading day -20 relative to the announcement date, then regress this ratio on potential determinates of convertible arbitrageur's interest in that particular convertible bond offering. The predicted value of this regression for each convertible bond issue is arbitrage demand.
Conversion Premium	Issue-specific	Conversion premium of the convertible, expressed as a percentage. It is calculated by dividing the conversion price by the stock price measured on trading day -5, and subtracting one from this ratio.

Firm commitment	Issue-specific	Dummy variable equals to 1 for equity issued as a firm commitment (the entire issue is sold directly to the underwriter), and 0 otherwise (eg. best efforts).
Inverse elasticity	Issue-specific	The natural log transformation of the absolute value of the daily raw return divided by the daily turnover, averaged over 250 trading days before the announcement date
Maturity	Issue-specific	Convertible bond maturity measured as the issue date
Market-to-book ratio	Issue-specific	Market value divided by the book value of common equity
Porceeds/total assets	Issue-specific	Relative size of the convertible bond/equity offerings, calculated as the offering proceeds divided by total assets
Rule 144A	Issue-specific	1 for offerings made under SEO Rule 144A, and 0 otherwise
Secondary	Issue-specific	1 for shares being sold by existing shareholders, 0 otherwise
Rule 415 shelf	Issue-specific	1 if equity offering was shelf registered, 0 otherwise
Market volatility	Market-specific	Annualized market return volatility, calculated from daily returns on the S&P 500 index over the window (-240, -40) relative to the security announcement date
Market run-up	Market-specific	Return on S&P 500 index over the window (-60, -2) relative to the announcement date
Economic freedom	Country-specific	An index based on trade freedom, business freedom, investment freedom, and property rights (ranging from 1 to 5). Calculated as 6 minus the economic freedom index of the Heritage Foundation.
GDP growth	Country-specific	The exports, government spending, retail expenditures, and inventory levels.
Inflation	Country-specific	The ratio of nominal GDP to the real GDP
KKZ	Country-specific	An indicator of the quality of institutional development in the country. Calculated as the average of six indicators: voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption. Greater values signify better institutional environment.
Year crisis		1 for equity issued during year 2007 to year 2009, 0 otherwise

Appendix 2 Measure for arbitrage-related short selling

Although I do not have direct data on convertible bond arbitrage activity in individual issues, I am able to identify firms and dates on which I know that initial arbitrage positions are taken: convertible bond issuance dates. Following by Duca et al., (2012), I construct a measure for the amount of arbitrage-related short selling associated with each convertible bond offering, to test the arbitrage explanation for differences in convertible bond announcement returns of bank and non-bank industry respectively. Firstly, I download monthly short interest data from the Datastream database during the sample period January 1982 to December 2011. To match short interest data to convertible bond issues, I apply the algorithm used by Bechmann (2004) and Choi et al. (2009). If a bond is issued before the cutoff trade date of a given month (three trading days prior to the 15th of each month), I match the issue date with the short interest data filed for that month. Otherwise, I match the issue date with the short interest data for the following month. I scale the change in monthly short interest (ΔSI) by the number of shares outstanding (SO) measured on trading day -20 relative to the announcement date. Using ΔSI as a proxy for arbitrage activity has several advantages over using hedge fund databases to estimate convertible bond arbitrage activity. First, this provides a measure of positions taken by arbitrageurs in individual securities. Fund flows data in hedge fund databases are self-reported and therefore provide an incomplete measure of convertible bond arbitrage activity. The databases only partially represent the hedge fund universe, with many large funds choosing not to participate. Second, there can be style misclassification and funds reporting multiple strategies to hedge fund databases. Third, even if I measured the assets of the funds perfectly, the positions would still be unobservable due to the use of leverage.

As argued by Choi et al. (2009), part of the observed increase in short interest around convertible bond offerings may be attributable to the short-selling actions of fundamental traders. Secondly, I isolate the portion of the ΔSI/SO measure that can effectively be attributed to short selling by convertible arbitrageurs by regressing ΔSI/SO on potential determinants of convertible arbitrageurs' interest in that particular convertible offering. I take the predicted value of this regression for each convertible bond issue as a measure for the change in short interest caused by arbitrage-related short selling for that convertible bond.

I expect convertible arbitrageurs to be more interested in issuers with more liquid shares (since high liquidity makes it easier for them to obtain their hedging positions), with no dividend pay-outs (since dividends represent a cash outflow for short sellers, and with more volatile stock returns (since volatility positively affects the option value of the convertible, thus allowing a higher potential profit). I therefore consider the Amihud (2002) measure for illiquidity, a dummy variable equal to one for convertible bond issuers that paid out a dividend in the previous fiscal year, the percentage of institutional ownership (obtained from Thomson Reuters), and the issuer's stock return volatility as potential issuer-specific determinants of the arbitrage demand for convertible bond offerings.

Moreover, I expect arbitrageurs' interest in a convertible bond issue to be affected by the characteristics of the offering itself. I predict a larger increase in arbitrage-related short interest around offerings for which arbitrageurs need to short-sell a larger number of shares to hedge their positions. I therefore include the ratio of DeltaNeutral to shares outstanding (SO), with DeltaNeutral representing the expected number of shares shorted by arbitrageurs following a delta-neutral hedging strategy. The typical convertible bond arbitrage strategy employs delta-neutral hedging, and consists of two parts. The arbitrageur initially buys the convertible bond and sells short the underlying equity at the current delta. Next, if the price of the stock increases, the arbitrageur adds to the short position because the delta has increase. Similarly, when the stock price declines, the arbitrageur buys stock due to the decrease in delta. Although deltaneutral hedging represents the "bread-and-butter" strategy of convertible arbitrageurs (Calamos, 2003), arbitrage funds may also follow directional hedging strategies in which they short sell slightly more or less than what would be required under a deltaneutral hedge (Calamos, 2003; Fabozzi et al., 2009). Consistent with Fabozzi et al. 2009), I define GammaBear (GammaBull) as the number of shares expected to be shorted under a bearish (bullish) gamma hedging strategy in which arbitrageurs short well delta plus (minus) 0.09 at issuance. The bearish gamma hedge yields a small profit when stock prices decrease, and the bullish gamma hedge yields a small profit when stock prices increase. I also expect arbitrageurs' interest to be positively influenced by the convertible debt gamma. Gamma captures the sensitivity of the convertible's delta with respect to changes in the underlying stock price. A convertible with a high gamma offers dynamic hedging opportunities more frequently, thus allowing the possibility of higher returns (Calamos, 2003). Finally, I expect arbitrageurs to be more interested in zero-coupon convertibles. The reason is that paying no coupons makes it easier to separate the option

component of the convertible from its fixed-income component, which is a technique often applied by convertible arbitrage hedge funds.

Calculation of DeltaNeutral, GammaBear, and GammaBull

DeltaNeutral represents the number of shares expected to be shorted by arbitrageurs, under the assumption that arbitrageurs follow a delta-neutral hedging strategy. In line with De Jong et al. (2011), I calculate this variable as follows:

$$DeltaNeutral = \frac{number\ of\ convertibles\ issued\ \times face\ value \times delta}{conversion\ price}$$

(6)

I calculate the number of convertibles issued by dividing the offering proceeds by the face value of the convertible (both obtained from SDC). Delta represents the sensitivity of the convertible bond value to its underlying common stock value. In line with Burlacu (2000), Dutordoir and Van de Gucht (2007), and Loncarski et al. (2009), I calculate delta as follows:

$$Delta = e^{-\delta T} N \left\{ \frac{\ln\left(\frac{S}{X}\right) + \left(r - \delta + \frac{\sigma^2}{2}\right) T}{\sigma\sqrt{T}} \right\}$$

(7)

With δ the continuously-compounded dividend yield (obtained from DataStream database), N(.) the cumulative probability under a standard normal distribution, S the stock price on trading day -5 relative to the announcement data (obtained from DataStream database), X the conversion price (obtained from SDC), r the yield on a 10-year US Treasury Bond

measured on the issue date (obtained from Datastream), σ the stock return Volatility and T the convertible bond Maturity (both measured as outlined in Appendix 1, table 1). [15]

Arbitrageurs may also exploit the convertible's gamma to obtain incremental profits. Gamma measures the sensitivity of the convertible's delta to underlying stock price movements. In line with Fabozzi et al. (2009), I calculate gamma as:

$$Gamma = e^{-\delta T} N'(d_1) = e^{-\delta T} \frac{\varphi\left\{\frac{\ln\left(\frac{S}{X}\right) + \left(r - \delta + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}\right\}}{S\sigma\sqrt{T}}$$

(8)

With φ the probability distribution function of the standard normal distribution, and all other parameters defined as in the context of Eq. (2). Consistent with Fabozzi et al. (2009), I consider a bearish gamma strategy in which arbitrageurs buy the convertible and short-sell delta plus 0.09, and a bullish gamma strategy in which they buy convertible and short-sell delta minus 0.09. I calculated GammaBear and GammaBull values using Eq. (1), but replacing delta with delta plus 0.09 and delta minus 0.09, respectively.

[15] As argued in Zabolotnyuk et al. (2010), a potential disadvantage of delta is that it does not capture convertibility and callability characteristics. As such, delta provides as incomplete measure for the equity component size of convertibles. However the purpose of the delta measure included in the DeltaNeutral variable is to replicate the inputs that are actually used by arbitrageurs in their hedging strategy. Calamos (2003) argues that arbitrageurs base their hedging on a delta measure analogous to the one defined in Eq. (7), so I conclude that it is appropriate to use this measure as an input in DeltaNeutral.

Appendix 3 Correlation matrix

Correlation matrix for chapter 3

	CAR	lnTA	Proceeds/Total Assets	Equity/Total Assets	Maturity	Stock Run-up	Market Run-up	Stock Return Volatility	Market Volatility	Opacity	Rule144A	CBarbitrage
CAR	1											
lnTA	-0.0881*	1										
Proceeds/Total Assets	-0.0116	-0.5188*	1									
Equity/Total Assets	-0.0681*	-0.1140*	0.2125*	1								
Maturity	0.0747*	0.0204	-0.1088*	-0.0512*	1							
Stock Run-up	-0.0824*	-0.1910*	0.1057*	-0.0231	-0.0703*	1						
Market Run-up	-0.000	0.0421	0.0046	-0.0044	-0.0991*	0.2446*	1					
Stock Volatility	-0.0332	-0.3989*	0.0799*	-0.1044*	-0.0329	0.5469*	-0.0142	1				
Market Volatility	-0.0729*	0.0899*	-0.1118*	-0.0845*	-0.013	0.2011*	0.0962*	0.4424*	1			
Opacity	-0.0540*	0.5554*	-0.4415*	-0.0543*	0.029	-0.1237*	0.0381	-0.2271*	0.0413	1		
Rule144A	-0.1623*	0.2741*	0.0969*	0.1670*	-0.1212*	0.0323	-0.0092	-0.1373*	0.0161	0.1371*	1	
CBarbitrage	-0.0649	0.2205*	-0.0309	0.0657	0.0161	-0.4140*	-0.0071	-0.7346*	-0.3043*	0.1026*	0.1471*	1

Notes: This table reports the correlation matrix for the variables used in the empirical analysis. Detailed definitions of variables can be found in Appendix 1 The *represent 5% significance level.

Correlation matrix for chapter 4

	CAR	Secondary	Rule415 shelf	Share turnover	lnTA	Proceeds ratio	Equity/Total assets	Stock run-up	Stock return volatility	Market volatility	Market run-up	Year crisis	Firm commitment	Capital expenditure	Inverse elasticity	Arbitrage risk	Bid-ask-spread
CAR	1																
Secondary	0.0830*	1															
Rule415 shelf	0.0684*	0.5522*	1														
Share turnover	-0.0118	-0.2334*	-0.3000*	1													
lnTA	0.0649*	-0.1021*	-0.1368*	0.0681*	1												
Proceeds/total assets	-0.0775*	-0.0677*	0.0186	0.0926*	-0.5879*	1											
Equity/Total assets	-0.0417*	-0.0032	-0.0134	0.0863*	-0.5013*	0.3203*	1										
Stock run-up	-0.1051*	-0.1145*	-0.1106*	0.1483*	-0.0571*	0.1792*	0.1327*	1									
Stock volatility	-0.0916*	0.0369*	0.1986*	0.0272	-0.3731*	0.2980*	0.1662*	0.2514*	1								
Market volatility	-0.0420*	-0.0225	0.1220*	0.0117	0.1716*	-0.0928*	-0.1251*	0.1549*	0.4625*	1							
Market run-up	0.0155	-0.1464*	-0.1829*	0.1024*	0.0118	0.0352*	0.0184	0.3613*	0.0274	0.0961*	1						
Year crisis	-0.0471*	-0.0802*	0.1085*	0.0158	0.1153*	-0.0440*	-0.0908*	0.0559*	0.2486*	0.4592*	0.0416*	1					
Firm commitment	-0.0472*	-0.4526*	-0.7633*	0.2919*	0.0156	0.0463*	0.0703*	0.0908*	-0.1623*	-0.1458*	0.1739*	-0.1067*	1				
Capital expenditure	-0.0674*	-0.3770*	-0.0886*	0.0545*	0.0302*	0.1000*	0.0227	0.0913*	0.0900*	0.1539*	0.0505*	0.1908*	0.0647*	1			
Inverse elasticity	-0.0547*	0.0881*	0.1921*	-0.1565*	-0.4445*	0.2205*	0.0714*	-0.0248	0.2842*	-0.0046	-0.0291*	0.0556*	-0.1285*	0.0448*	1		
Arbitrage risk	-0.0972*	0.0564*	0.1762*	0.0404*	-0.5421*	0.3836*	0.2548*	0.2433*	0.9089*	0.2846*	-0.0229	0.1577*	-0.1213*	0.0549*	0.3577*	1	
Bid-ask-spread	-0.0376*	0.0181	0.0789*	-0.0580*	-0.3415*	0.1441*	0.0392*	-0.0339*	0.1857*	-0.0246	-0.0288	0.0121	-0.0331*	-0.0139	0.6676*	0.2437*	1

Notes: This table reports the correlation matrix for the variables used in the empirical analysis. Detailed definitions of variables can be found in Appendix 1. * represents the significance at 5% significance level

Correlation matrix for chapter 5

	CAR	Activity restriction	Initial capital stringency	Prompt corrective action	Depositor protection	Total regulation	Total assets	Equity/total assets	Diversification	Market runup	Stock runup	Stock return volatility	Involuntary	Inflation	KKZ	Economic freedom	GDP growth
CAR	1																
Activity restriction	0.01	1															
Initial capital stringency	-0.13*	-0.04	1														
Prompt corrective action	-0.08*	0.17*	0.30*	1													
Depositor protection	-0.12*	-0.04	0.65*	0.41*	1												
Total regulation	-0.14*	-0.16*	0.84*	0.38*	0.95*	1											
Total assets	0.08*	-0.20*	0.04	-0.22*	-0.00	0.04	1										
Equity/total assets	0.02	0.14*	0.06*	0.16*	0.10*	0.08*	-0.18*	1									
Diversification	0.02	-0.19*	-0.10*	-0.33*	-0.12*	-0.10*	0.37*	-0.17*	1								
Market runup	0.02	0.05	0.03	0.11*	0.06*	0.05	0.01	0.03	0.02	1							
Stock runup	-0.03	0.02	-0.07*	0.04	-0.02	-0.05	-0.07*	0.12*	0.02	0.52*	1						
Stock return volatility	-0.07*	0.07*	0.37*	0.34*	0.42*	0.43*	-0.10*	0.20*	-0.23*	0.12*	0.02	1					
Involuntary	-0.07*	-0.16*	-0.01	-0.20*	-0.09*	-0.05	0.32*	-0.36*	0.15*	-0.03	-0.02	-0.19*	1				
Inflation	0.11*	0.18*	-0.53*	-0.10*	-0.32*	-0.45*	-0.11*	0.09*	-0.00	-0.04	0.03	-0.19*	-0.21*	1			
KKZ index	-0.10*	-0.16*	0.54*	0.11*	0.27*	0.41*	0.16*	-0.00	-0.02	-0.06*	-0.07*	0.27*	0.10*	-0.60*	1		
Economic freedom	-0.09*	-0.03	0.58*	0.31*	0.40*	0.50*	0.05	0.12*	-0.19*	-0.04	-0.07*	0.46*	-0.10*	-0.50*	0.87*	1	
GDP growth	0.16*	-0.04	-0.57*	-0.07*	-0.40*	-0.49*	-0.11*	-0.01	-0.02	0.03	0.07*	-0.34*	-0.08*	0.51*	-0.52*	-0.54*	1

This table reports the correlation matrix for the variables used in the empirical analysis. Detailed definitions of variables can be found in Appendix 1. The *represent 5% significance level.